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Journal of Precision Teaching and Celeration

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ERRATUM

50 Erratum
At the time of this Journal’s printing, a climate exists in education where researched-based practices receive attention. For instance, recent legislation such as the No Child Left Behind Act of 2001 has mandated evidence-based criteria serve as a standard for judging whether programs will receive Federal education funding. Additionally, the National Research council has published a book entitled Scientific Research in Education (2002) describing scientific research in education. Evidenced-based, or researched-based, practices have become exceedingly important as the stakes of educational outcomes shift. Now more than ever before has the job market changed with an increasing emphasis placed on higher degrees of literacy, numeracy and “critical thinking” skills. A technically driven society requires educational practices to change. The Journal of Precision Teaching and Celeration has met the call of providing evidenced-based practices from its inception in 1980. The tradition continues.

In this issue three applied studies show how Precision Teachers conduct research and further help explicate specific evidenced-based practices. Seevers, Malanga and Cooper provide Standard Celeration Charted data showing a self managed learning strategy for proofreading by seven students with specific learning disabilities. Malanga used a repeated readings procedure with an error correction package to increase reading fluency in three elementary students at-risk for academic failure. The last application article, by Commons, offers insight into the publication history of the author using Standard Celeration Charting.

Another feature and longstanding tradition for sharing promising practices, replications, and other research and potential researched-based practices comes in the form of chart shares. Bank, Le and Fabrizio share data showing how Precision Teaching helped a child with cerebral palsy accept food. Another chart share by Neely explains how application, adduction, and generalization all become evident in a reading chart for a 6-year-old girl. Cauley, Brian, and Snider add to the growing evidence that Precision Teaching can help students with autism. The chart share describes a method for accelerating play-related talk for two children with autism.

REFERENCES

The use of self-managed proofreading for detecting and correcting mechanical errors by students
with a learning disability

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John O. Cooper
The Ohio State University

The purpose of this study was to explore the use of a learning strategy involving self managed proofreading by seven students with specific learning disabilities on their detection and correction of capitalization errors, punctuation errors, and spelling errors. Specifically, this study investigated whether using self managed proofreading involving a visual prompt and written cues increased the number of errors detected and the number of errors corrected on experimenter prepared writing samples during a one minute counting period. During a no-practice sheet condition, students were asked to circle all the errors they could find. During a practice sheet condition, the experimenter modeled how to proofread for mechanical errors on experimenter prepared practice sheets and provided students the opportunity to complete the practice sheet. The self managed proofreading condition followed the same sequence described above with self managed proofreading instruction added. An examination of the no practice sheet and practice sheet data for the students indicated that providing students practice sheets did not make a difference for six of the seven students in the number of mechanical errors they were able to detect. However, the results suggest a functional relationship between self managed proofreading and improvement in the count of errors students detect. That is, marked improvements in the median count of errors detected by students with learning disabilities and improvements in celeration were shown for each of the seven students in the study.

DESCRIPTORS: Frequency, Self-Managed, Proofreading, Error Detection

Over the last decade (1993-2003), the educational system in the United States has taken its share of criticism. Indeed, the American public has expressed concern in recent years that public education has lost touch with the priorities of the public and should focus on academic learning (that is, student achievement in basic skills) as a major goal (Committee for Economic Development, 1995). Reading and writing, two major components of literacy, are regarded as essential and basic skills that all children need to function in today's society. To a large degree, children's success in school depends on what many associate with literacy (Howell, Fox, & Morehead, 1993).

Gee (1990) maintains that in today's society, reflective of a highly technological culture, people engage less in face to face interactions; they rely more and more on written types of communication. Consequently, being able to read and write cannot be underestimated as an integral part of socializing and life-long learning in general. Indeed, higher level of literacy will be expected and demanded as changing economic conditions further decrease the number of jobs for workers with low level literacy skills, while jobs will increase for better educated workers (Davidson & Koppenhaver, 1993).

Literacy in schools has been viewed in a variety of ways (Beach, 1995). Among them is the view that literacy involves acquiring a repertoire or set of skills through explicit and systematic instruction. Automaticity of reading and writing words underlines this approach to literacy. Adams (1990) reports an increasing data base that supports such an instructional approach to literacy, particularly for students who experience difficulty.

Brown and Campione (1990) suggest that many students with learning disabilities do not acquire strategies to improve effectively their writing skills unless detailed and explicit instruction is provided. Furthermore, self management strategies have been advocated as an approach to promote the acquisition of academic skills for individuals with disabilities (Glomb & West, 1990). Martin and Manno (1995) acknowledged the effectiveness of a self-management procedure used to improve adolescent students' story compositions. Self-management procedures have also accounted for improved writing skills for students with learning and behavior problems in terms of
completeness, accuracy, and neatness of creative writing homework assignments (Glomb & West, 1990). An error monitoring strategy known as COPS, developed in the learning disability institute at the University of Kansas (Schumaker, Deshler, Alley, & Warner, 1983), proved beneficial to students with learning disabilities in the detection and correction of mechanical errors. Other writing research that indicated self management an effective tool in helping students improve their writing skills include Shannon and Polloway's study (1993) in the COPS error monitoring strategy, which proved beneficial to sixth grade students participating in the study by helping them focus on the mechanics of writing. Thus, using an error monitoring strategy, such as COPS, to help students with learning disabilities become successful and acquire the necessary skills to become competent writers is of great interest.

The advancement of monitoring teacher effectiveness has been enhanced by Precision Teaching. Precision Teaching is a precise and systematic method of evaluating the effects of instruction. One of the basic elements of precision teaching is the use of number of responses per unit of time to monitor the development of fluency (that is, speed plus accuracy and quality) of a learner's work to a performance standard (for example, 20 to 25 words per minute for free writing) (Binder, 1990). Frequency (number of errors/unit of time and number of corrects/unit of time) indicates how well a student can do a task. In addition, fluency facilitates generalization and maintenance of skills, and often has functional implications as well (for example, reading a map).

Precision Teaching uses frequent assessments of learner performances and displays those assessment data on Standard Celeration Charts (Pennypacker, Koenig, & Lindsley, 1972) to allow teachers to evaluate the effectiveness of instruction (Binder, 1990). Many precision teachers and their students use one-minute counting periods when counting and charting performance (Binder, Haughton, & Van Eyk, 1990).

Although gains have been made in the effectiveness of instructional methods for other writing aspects (for example, composing, style) for students with a learning disability, there is limited knowledge of the strategies needed to assist students to improve their proofreading skills. Self management combined with specific precision teaching qualities (that is, one-minute assessments, Standard Celeration Chart) should offer great potential for helping students with a learning disability acquire proofreading skills.

The purpose of this study was to determine the effects of self managed proofreading on the detection of capitalization errors, punctuation errors, and spelling errors. Specifically, this study investigated whether using self managed proofreading involving a visual prompt and written cues affected the number of mechanical errors detected and the number of errors corrected by students with a learning disability.

The following questions were the focus of this study: (a) What effect will practice sheets have on students' detecting mechanical errors on experimenter-prepared writing samples? (b) What effect will practice sheets have on students' error correction on experimenter-prepared writing samples? (c) What effect will self managed proofreading have on students' detecting mechanical errors on experimenter prepared writing samples? (d) What effect will self managed proofreading have on students' error correction on experimenter-prepared writing samples? (e) What effect will self managed proofreading have on students' maintaining proofreading skills on experimenter-prepared writing samples after instruction has been terminated? (f) What effect will the use of experimenter-prepared writing samples have on the type of mechanical errors detected by students with learning disabilities over the course of the study?

**METHOD**

**Participants**  
The experimenter selected seven students with specific learning disabilities. The specific learning disabilities were documented by school records (such as grades, performance in class) and diagnostic testing in accordance with state guidelines for student eligibility for special education services. Criteria for participant selection included: (a) teacher identification of students who had experienced difficulty in the mechanics of writing, (b) teacher recommendation that these students would benefit from error monitoring instruction and self managed proofreading, and (c) students' willingness and parental permission to participate in the study. All students participating in the study were eleven-year old males. Two students were in fourth grade and five students were in the fifth grade. Two students were African-American and five students were Caucasian.

**Setting and Materials**  
The study was conducted in an urban elementary school with an approximate enrollment of 400 students in grades K-5 located in the midwest. The individualized assessment and instructional sessions were held in either of two separate, quiet, well lit rooms equipped with a table and three chairs. The rooms were large enough to...
comfortably accommodate the student, the experimenter, and one observer. All sessions were conducted during the regular school day in one of the two rooms, depending upon room availability.

The writing samples used in the study consisted of 200 to 220 words and contained ten experimenter-selected capitalization errors, ten experimenter-selected punctuation errors, and ten experimenter-selected spelling errors. Practice sheets consisted of 90 to 100 words and contained five experimenter-selected capitalization errors, five experimenter-selected punctuation errors, and five experimenter-selected spelling errors. In both the writing samples and practice sheets, the number of errors per sentence ranged from a high of two errors to a low of zero errors. Specific errors were randomly inserted in the materials. Table 1 provides a summary of specific errors targeted in the writing samples. Each writing sample and practice sheet was adapted from a set of reading materials at a third grade reading level. Each text was typewritten and double spaced on 8.5" x 11" paper using 12 point New York font.

Dependent Variables

The primary dependent variables were the count of capitalization, punctuation, and spelling errors correctly and incorrectly detected and corrected per minute by each student on experimenter prepared materials.

Detected mechanical errors (capitalization, punctuation and spelling). Detected mechanical errors were defined as the frequency of capitalization, punctuation, and spelling errors identified correctly by the student. An answer key was used to determine the frequency of mechanical errors detected correctly by the students. To be considered correct, student marks for a given error matched exactly with the experimenter’s answer key.

Types of capitalization errors students were able to detect include: (a) capital letters not used in the first letter of a sentence (b) capital letter not used for the pronoun "I", (c) capital letters not used for names of people, (d) capital letters not used for titles of people, (e) capital letters not used for the days of the week (f) capital letters not used for holidays, (g) capital letters not used for months of the years (h) capital letters not used for the names of streets, (i) capital letters not used for the names of cities, and (j) capital letters not used for the names of states. All other types of capitalization errors (that is, names of countries, oceans, rivers, mountains, landmarks, titles of books) were excluded from this study.

Types of punctuation errors students were able to detect include: period not used after (a) a statement, (b) an initial, (c) an abbreviation, (d) question mark not used after a question, (e) exclamation point not used after an exclamation or a command that exclaims, (f) comma not used to separate names of cities and states, and (g) comma not used to separate day numbers and years. All other types of punctuation errors (that is, commas in a series, commas to set off words in dialogue, apostrophes in all forms) were excluded from this study.

Types of spelling errors students were able to detect include (a) omission of letters (for example, "mes age" for "message"), (b) reversal of letters (for example, "recieve" for "receive"), and (c) insertion of letters (for example, "tommorrow"

| Table 1 | Specific Errors Targeted |
|-----------------|-----------------|-----------------|
| Capitalization  | Punctuation      | Spelling        |
| Beginning of sentence | Period at end of sentence | Omission of letter(s) |
| Names of people  | Period after abbreviation | Reversal of letter(s) |
| Pronoun "I"      | Period after an initial | Insertion of letter(s) |
| Days of week     | Question mark after question |                     |
| Months of year   | Comma between date and year |                     |
| Special days     | Comma between city and state |                     |
| Names of streets | Exclamation point after command |                     |
| Names of cities  |                               |                     |
| Names of states  |                               |                     |
| Titles of people |                               |                     |

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Measurement of the Dependent Variables

Misidentified mechanical errors (capitalization, punctuation, and spelling). Misidentified mechanical errors were defined as the frequency of capitalization, punctuation, and spelling errors misidentified by the student. A misidentified error was considered as such when the student identified an error when in fact there was not one. The same answer key used to determine detected mechanical errors was used to determine the frequency of errors misidentified by the students.

Errors corrected and not corrected. Student error corrections were defined as the total count of mechanical errors per minute the student accurately corrected after proofreading for capitalization, punctuation, and spelling errors. An answer key was used to determine the accuracy of corrected mechanical errors by the students. To be considered correct, student corrections for a given error matched exactly the experimenter’s answer key.

Student errors not corrected were defined as the count of mechanical errors per minute the student failed to correct accurately after proofreading for capitalization, punctuation, and spelling errors. If the student correction for a given error did not match exactly with the experimenter’s answer key, the student’s response was considered as a failure to correct a detected error.

Measurement of the Dependent Variables

Experimenter prepared writing samples. A new experimenter prepared writing sample for students to proofread for capitalization, punctuation, and spelling errors was distributed to students for each day of the study. The same new passage was used by all the students in attendance for any given day. Each writing sample was developed from stories below or equal to the student’s current reading level. The readability level was controlled to uphold findings that students’ proofreading performances may be a function of exposure to self-managed proofreading instruction, rather than limited reading skills. Each writing sample consisted of 200 to 220 words and contained 10 experimenter selected capitalization errors, 10 experimenter selected punctuation errors, and 10 experimenter selected spelling errors. Each passage contained more errors than the student could possibly detect in a one minute timing period as determined by adult proofreaders. The adult proofreaders used in this study (two graduate students) detected a count of 19 and 21 errors per minute.

Students were given a new writing sample each day to proofread for each type of mechanical error. In a one minute timing, the students were required to proofread for errors in the writing sample and indicate (by circling) all the errors detected. After the one-minute timing, the students then had the opportunity to correct the errors detected.

Inter-observer Agreement and Accuracy of Measurement

Before the start of the study, the experimenter trained an independent observer to obtain interobserver agreement. The training sessions consisted of the experimenter describing the purpose of the study, explaining and giving examples of the definition for detected and misidentified mechanical errors and detected errors corrected and not corrected, practicing with the independent observer the marking and scoring procedures, and conducting several pilot sessions using samples from two students not participating in the study. The experimenter and observer independently checked each student’s permanent product on the dependent variables. The trained observer independently scored and recorded the dependent variables a minimum of 20% of all sessions. Student products were randomly selected by the trained observer for scoring and recording. The experimenter was not informed of which days the trained observer selected for interobserver agreement. Percentage of agreement for each dependent variable measurement ranged from 97-100% for all students. An answer by answer comparison of the scored products with discrepancies by the experimenter and observer to the true value answer keys was conducted for the assessment of accuracy measurement of the dependent variables (Johnston & Pennypacker, 1993). All inaccurate measurements were corrected and the correct counts reported in the results.

Procedural Integrity

To assess the consistent application of the procedures for each phase of the study, procedural checklists containing the scope and sequence of the experimental design were developed and used to verify the implementation of the procedures. An observer completed the checklist for 20% of all sessions. If discrepancies arose between the checklist and the observed procedures, the observer discussed the discrepancies with the experimenter. Before beginning the study, the experimenter conducted two pilot sessions so the observer would have an opportunity to practice using the form. Procedural integrity was reported as the percentage of adherence to each of the procedural checklists. During the no practice sheet condition, the experimenter adhered to the procedural checklist for all students 100% of the time. During the prac-
tice sheet condition, the experimenter adhered to the procedural checklist 97-100%. During the self managed proofreading condition, the experimenter followed established procedures 100% of the time for all students.

Experimental Design and Procedures

A multiple baseline design across students (Cooper, Heron & Heward, 1987) was employed to analyze the effects of self managed proofreading on the frequency of mechanical errors detected and misidentified by the student, and the frequency of errors corrected and not corrected by the student. Implementation of each experimental change was based upon charted data and its relation to an established decision rule. A visual analysis of the data charted on the Standard Celeration Chart (Pennypacker, Koenig, & Lindsley, 1972) was used to determine when a phase change would be made. In this study, the criterion used was four consecutive days of data where the minimum celeration line multiplied by less than x1.25.

Pre-Baseline Instruction. During the pre baseline instruction phase, the experimenter provided individual instruction in the mechanics of writing (that is, capitalization, punctuation, and spelling) for each student participating in the study. The objectives of the instruction were for each student to orally recall ten rules for using capital letters, to orally recall seven rules for correct punctuation (including when to use a period, a question mark, an exclamation point, and commas), and to orally recall three types of common spelling errors. Each instructional session was conducted within a 15 minute period, and began with a two to three 3 minute warm up /rapport building discussion.

No Practice Sheets. Sitting next to the student at the table, the experimenter prepared the student for a one minute counting period. The experimenter prepared in advance the day’s writing sample. During the one minute counting period, the student proofread the experimenter prepared writing sample for mechanical errors. At the beginning of each one minute counting period, the experimenter set the timer and gave scripted directions to the student. At the end of the counting period, the experimenter asked the student to mark the place in the passage where he stopped proofreading and the experimenter then terminated the proofreading session by providing the appropriate cue. The student was then permitted to detect and correct new errors after the assessment was completed, although these data were not reported. When the student finished, the experimenter provided the student nonspecific praise as well as commented on the number of correct errors detected and the number of errors corrected accurately. The experimenter ended the session for the day by thanking the student and returning him to class.

Practice Sheets. Sitting next to the student at the table, the experimenter instructed the student in exactly the same way as described in the no practice sheet condition, except that specific practice sheet instruction was added. During instruction, the experimenter followed a script. Once the student signaled that he had completed the practice sheet, the experimenter instructed the student to correct all the errors detected in the practice sheet. The experimenter then provided nonspecific feedback to the student upon completion (for example, good job, well done, thanks). In addition to nonspecific feedback, the experimenter commented on the number of correct errors the student detected and the number of errors corrected accurately. Next, the experimenter prepared the student for a one minute counting period as outlined in the no practice sheet condition.

Self Managed Proofreading. After four consecutive days of data where the minimum celeration line multiplied by less than x1.25, a self management strategy was introduced. The experimenter instructed the student in exactly the same manner and sequence as described in the practice sheet condition with the self management strategy added. The experimenter reminded the student to use the self management strategy each time he was asked to proofread the experimenter prepared practice sheets and the experimenter prepared writing samples.

The self management strategy included two steps. First, the student was instructed to write the letters CPS (for capitalization, punctuation, spelling) at the top of each practice sheet/writing sample once the practice sheet/writing sample had been distributed. The student was then told that each letter was to help remind him of the types of errors to look for when proofreading each sentence.

Second, the experimenter instructed the student to write at the end of each sentence the corresponding letters for the types of errors (C for capitalization, P for punctuation, and S for spelling) he was proofreading. The experimenter provided corrective feedback to the student on his use of the self management strategy only if he failed to implement the self management strategy correctly.

Generality Probe. In order to assess the affect of the intervention procedure to students’ own writing assignments, the classroom teacher collected writing samples from each student two
times a week. As part of their seatwork, students had as much time as they wanted in class to proofread their own completed stories for mechanical errors.

Maintenance. Following intervention, maintenance measurements were collected on the count of mechanical errors detected, the count of misidentified mechanical errors, the count of mechanical errors corrected accurately, and the count of failures to correct detected mechanical errors by asking students to proofread experimenter prepared writing samples. Definitions and procedures for the maintenance probes were identical to those used during the no practice sheet condition.

RESULTS

Assessment of Errors Detected

Charts one through seven depict the error detection data for each student in the study. During the no practice sheet and practice sheet conditions, the individual median scores for the number of errors detected in the one-minute counting period by a student ranged from zero errors to three errors. For six of the seven students, the practice sheet made little difference in the number of errors the students detected. For Tray, the practice sheet did appear to have some effect. His median score for the number of errors detected increased from zero mechanical errors detected in a one-minute counting period to three detected in the practice sheet condition. The individual median scores during the no practice sheet condition to the practice sheet condition. A no turn celeration pattern developed for Tray's count of errors detected. The remaining five students produced a no jump and no celeration pattern in the count of errors detected as compared in the no practice sheet condition to the practice sheet condition.

All students jumped up in counts of errors detected when experimental conditions changed from practice sheet to self-managed proofreading. Six of the seven students' celeration courses turned up. Tray's celeration course produced a no turn celeration.

In terms of the count of misidentified errors, five of the seven students produced no jump and no turn patterns across all changes in experimental conditions. Two of the students, however, had changes in performance and learning in the count of misidentified errors. Winston produced a jump down and Kent produced a jump up pattern when experimental conditions changed from the no practice sheet condition to practice sheet condition. During the change from practice sheet to self-managed proofreading, Winston's count of misidentified errors remained constant during the other conditions. Winston's misidentified errors ranged from zero to three. For Kent, the median score for the number of misidentified errors increased from two during the no practice sheet condition to the median score count of three in the practice sheet condition. The median count of misidentified errors decreased to zero as a result of introducing self-managed proofreading.

Celerations of the Errors Detected

Celeration courses are indicated on the students' charts to describe how rapidly students improved (that is, the amount of learning) in the numbers of errors detected in each condition. During the no practice sheet condition, the celeration multiplied by 1.0 for all students. During the practice sheet condition, the celeration multiplied by 1.0 for all students except Tray. The celeration for Tray multiplied by 2.3. During the self-managed proofreading condition, the celeration multiplied by 1.2 for Mark, 1.9 for Jesse, 2.3 for James, Tray, and Winston, 2.6 for Ali, and 15.0 for Kent. During maintenance, the celeration multiplied by 1.0 for all students.

Jumps and Turns with Errors detected and Misidentified Errors

Charts one through seven show two students jumped up in count of errors detected when experimental conditions changed from no practice sheet to practice sheet. A no turn celeration pattern emerged for Winston's count of errors detected. A turn up celeration pattern developed for Tray's count of errors detected. The remaining five students produced a no jump and no celeration pattern in the count of errors detected as compared in the no practice sheet condition to the practice sheet condition.

All students jumped up in counts of errors detected when experimental conditions changed from practice sheet to self-managed proofreading. Six of the seven students' celeration courses turned up. Tray's celeration course produced a no turn celeration.
Chart 2

Cooper Seevers
Reagan Elementary School
Seevers
Seevers
Seevers
Cooper Seevers
Reagan Elementary School Seevers Seevers Seevers

Winston 11 SLD Errors Detected
showing a no jump pattern) while Kent's count of misidentified errors produced a jump down pattern.

**DISCUSSION**

An examination of the no practice sheet and practice sheet data for the students indicates that providing students practice sheets did not appear to make a difference for six of the seven students in the number of mechanical errors they were able to detect in a minute. For these six students, the median count of errors detected showed little variability as compared between the two experimental conditions. Further evidence that the introduction of practice sheets did not improve students' performances was indicated by the celeration lines for each of these six students. A x1.0 celeration was reported for each of these six students, indicating no changes in learning. Although there was a slight jump up for Mark and Winston in the number of errors detected between the two conditions, it was not seen as an important difference and there was no turn up in celeration. For Tray, however, there was a change in learning as a function of introducing practice sheets. Tray exceeded his median score of the number of errors detected in one minute by 3. Further, a x2.3 celeration was produced, indicating Tray did indeed more than double his learning, before reaching a plateau. It is not clear, however, what produced this change since there was no opportunity for verification (that is, practice sheets were introduced to all students except Ali at the same time, thus the practice sheet condition served as a baseline condition).

In general, the number of errors students corrected during the practice sheet condition did not vary from the no practice sheet condition. In addition, the performance of six of the seven students showed celerations of x1.0 for both conditions of the study, indicating no improvement. For Mark and Winston, the median count of errors corrected did jump up slightly between the two conditions, but it was not an important difference and there was no turn up in celeration.

The results from the present study also document a low frequency of incorrect responses (that is, opportunities for students to misidentify an error) for the majority of students. Indeed, the frequency of misidentified errors rarely exceeded 1 or 2 per minute for all students except Winston and Kent across all conditions. For Winston, the frequency of misidentified errors exceeded three during the no practice sheet condition but decreased in subsequent conditions. For Kent, however, the frequency of misidentified errors was an influential variable during the no practice sheet and practice sheet conditions of the study, and the number of misidentified errors significantly decreased with the introduction of self managed proofreading.

The collection of data on student performances suggests a functional relationship between self managed proofreading and the count of error corrections. Marked improvements in the median count of errors detected by students with learning disabilities and improvements in celeration were shown for each of the seven students in the study. Such findings are consistent with earlier studies (Reynolds, Hill, Swassing, & Ward, 1988; Shannon & Polloway, 1993) that describe some monitoring procedures as effective strategies to revise and correct writing mistakes.

The data from this study are inconclusive regarding the effect of self-managed proofreading and students maintaining proofreading skills. There was not sufficient time in the study to collect more than three days of data during the maintenance condition, thus there were not enough data to make a projection on the effects of self-managed proofreading and students maintaining proofreading skills. All participants, however, continued to use self managed proofreading to detect learning disability. The overall effectiveness of self managed proofreading lends support to research suggesting that verbally-mediated strategies employing a self management component (Danoff, Harris, & Graham, 1993; MacArthur, Schwartz, & Graham, 1991) are effective in improving the academic behaviors of students with learning disabilities. The results support other studies that demonstrated that self instruction and providing extra prompts may help students with learning disabilities focus attention on what has to be accomplished (Graham, Harris & Reid, 1992; Schunk, 1985). That is, writing CPS at the top of the paper and after each sentence serves as a reminder of what the student is to do. Furthermore, self managed proofreading provides students guided practice and requires that students apply known rules, perhaps explaining in part the overall effectiveness of the instruction.
and correct mechanical errors in the experimenter prepared writing samples after all intervention procedures had been terminated.

Actual changes in the type of errors detected over the course of the study were assessed by analyzing the percentage of each error type detected in each condition. The types of error with the highest percentage of detection for each condition were then compared to one another. Results reveal there were changes across conditions for four of the seven students in the type of errors detected; that is, no patterns emerged. Two students consistently detected a higher than or equal to percentage of punctuation errors across all three conditions, while one student detected a higher percentage of capitalization errors across all three conditions.

Several limitations of this study need to be addressed. First, the participants in this study were seven male students with specific learning disabilities. Two of the students were African American and the other five were Caucasian; two of the students were fourth graders and the other five were fifth graders. All of the students received part of their instruction in a resource room designed to meet their individual needs in a large urban elementary school. It is not known to what extent the generality of effects of the error detection and error correction results would be across students of different ages and skill level, of different gender, of different races, and of different socioeconomic levels.

Second, students were taken out of their resource or regular classes to work individually with the experimenter in a separate area of the school in one of two rooms. To what extent the academic environment and the occasional special events (e.g., field trip, school assembly, classroom party) influenced the outcomes is unknown.

Third, the study was conducted over a course of 9 weeks (40 sessions). Consequently, there was not enough time available to collect extended maintenance data. Further, a more stringent evaluation of self managed proofreading may be strengthened by implementing the study at the beginning or middle of a school year, rather than toward the end of one.

Fourth, the writing samples used were selected from supplemental materials and may have some grade level variability. It cannot be assumed that similar results would result if the students used different materials. Since error detection and error correction only required the students to identify three kinds of errors, what students were reacting to is not exactly certain. Moreover, all the writing samples were neatly typed. Further research is needed to determine whether the outcomes of this experiment have generality with other instructional materials and with student generated passages.

Fifth, during the course of the study, the classroom teacher made every attempt to collect writing samples from each student two times a week. However, other classroom demands, special events, and time constraints did not always permit the teacher to follow through on collecting the weekly writing samples for each student. In addition, the teacher did not follow a standard procedure when instructing students to proofread their papers. Sometimes students were given the assignment as part of their seatwork, other times it was done one on one with the teacher. For the most part, students were given as much time as they wanted in class to proofread their own completed stories for mechanical errors, therefore no record of frequency counts were obtainable.

Finally, only two days of maintenance data for Ali and Kent and three days of maintenance data for each of the other students were collected in the study. The limited number of days with maintenance data made it difficult to draw any meaningful conclusions in regards to maintenance of skills over any extended period of time.

Movement toward integrating students with special problems into regular education classrooms has created a major trend toward classroom based intervention (Gerber, 1993). The effects of self managed proofreading on error detection and error correction were evaluated in a setting that was not like the environment in which the students received their primary instruction. Particularly useful would be effective strategies that could generalize to other settings, thus, the need for this study to be replicated in other environments is warranted. The question of whether self managed proofreading is indeed effective in general education or resource environments is an intriguing one and continued examination of how self managed proofreading can be applied to varied settings will be needed. In addition, all the students in this study received individually administered instructions. Investigations of group administered instructions, typical of general education classrooms, may provide additional insight on the effectiveness of self managed proofreading.

Furthermore, attention should be given to the question of whether self managed proofreading is effective on student generated assignments. Of considerable interest would be the effect of self managed proofreading and the transfer to other types of writing assignments (e.g., journals, science logs, personal correspondence).

In addition, it is not known from this study what performance frequencies could be achieved
if students were to set aims. Further investigations need to explore appropriate aims on detecting and correcting errors and extend the relationship of these performance rates to eventual generalization and subsequent skill development.

Finally, other areas of research that warrant further exploration because of the potential impact for improving error detection and error correction of students with specific learning disabilities include public posting of daily performance scores, self-charting, and various error correction procedures.

**CONCLUSION**

The results of the study indicate that these seven students with specific learning disabilities were able to increase the count of errors detected and the count of errors corrected on experimenter-prepared writing samples through self-managed proofreading. The medians, celerations, and performance changes suggest that a functional relationship among the count of errors detected and the count of errors corrected and self-managed proofreading instruction occurred for all students.

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Using Repeated Readings and Error Correction to Build Reading Fluency with At Risk Elementary Students*

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A repeated readings procedure was used simultaneously with an error correction package that included modeling, prompting, and chaining procedures to increase reading fluency in three elementary students at risk for academic failure. An analysis of celerations and learning pictures common to Precision Teaching programs was used to evaluate the change of correctly and incorrectly read words across one-minute timing periods. The design was an A-B experimental design. The dependent variables included the frequency, celeration and bounce within and across conditions (i.e., passages) for both correct and incorrect performances. During baseline, students read between 55-69 correct words per minute. All participant's experienced substantial improvements in reading fluency with the introduction of the repeated readings and error correction package. Improvements sustained even when substantial breaks in instruction occurred, thereby demonstrating the robust nature of repeated readings at maintaining reading fluency. Upon introduction of the repeated readings and error correction procedure, jump-ups occurred in correctly read words per minute ranging from 9 and 25 words. Terminal performance within and across conditions varied and is discussed.

DESCRIPTORS: At-risk, Fluency, Reading Instruction, Repeated Readings, and Precision Teaching

Reading and comprehending what is read is crucial to success in school. In fact, becoming a successful reader is key to success with life. As early as fourth grade the demands of reading increase dramatically. The reason is two-fold. First, learning begins to rely more on textbooks that are expository in nature. Second, the context becomes less familiar and more specialized (Allington, 2002). Failure to remediate reading difficulties can have a substantial effect on a student's ability to learn new, more complex, information. For example, Juel (1988) found that students classified as poor readers in grade 1, without intensive remediation, are likely to remain so classified in grade 4. The Carnegie Corporation exemplifies the need for early identification and remediation in a recent report. The report surveyed students entering high school in the 35 largest cities in the U.S. Half of the students surveyed were found to read at or below the sixth grade level (Vacca, 2002).

Historically, a 95-97 percent accuracy level was viewed as sufficient for comprehension. However, with this level of accuracy, students reading a book at their "instructional reading level" may skip five words of every 100 read (Allington, 2002). Accuracy, while a necessary condition for comprehension, is not a sufficient condition. For instance, a student may read 50 words with no errors but take 5 minutes to do so. While the reader accurately read each word, such a sufficient amount of his attention was consumed with decoding tasks, that little meaning would likely be gleaned from the passage (Hempenstall, 1999). The reader may be accurate, but not fluent. Fluency then, is another critical aspect in comprehending text.

The term "mastery" is closely related to the term "fluency". Mastery is commonly used to refer to the achievement of a certain level of performance normally expected from the best learners (Dick & Carey, 1996). While mastery implies a certain level of performance accuracy, it does not include a rate or speed dimension. When a standard temporal dimension is allotted for each performance (e.g., 1-minute) and empirically validated performance aims are used to define mastery, fluent performance is the result. A fluent skill is one that occurs automatically, without hesitation, and with a high degree of accuracy. Formally defined, fluency is the fluid combination of accuracy plus speed (Binder, 1996). Fluent reading then, is reading that occurs quickly and without hesitation with few errors (Teigen, Malanga, & Sweeney, 2001).

The ability to decode words and read fluently are prerequisite to understanding the information in a text (McCormick, 1995). Without fluent reading skills, the acquisition of a general knowledge base, such as civics, history, and science, is likely to be hindered (Teigen, Malanga, & Sweeney, 2001). A well informed citizenry requires the accumulation of "intellectual capital", or, a com-

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knowledge is intellectual capital and, without fluent reading, the acquisition of background knowledge is severely hindered. Simply stated, students with fluent reading skills can recall what they read, which is the main point of reading (McCormick, 1995). Repeated readings is one procedure that has been shown to be effective at developing fluent reading (Samuels, 2002).

Repeated readings is a procedure that requires readers to read and reread a passage multiple times to develop fluent reading performance (Samuels, 2002). A number of studies have validated the efficacy of the repeated readings procedure on the acquisition of fluent reading performance (Bolich & Sweeney, 1996; Brosovich-McGurr, 1991; Carroll, McCormick, & Cooper, 1991; Herman, 1985; O'Shea, Sindelar, & O'Shea, 1985; Polk & Miller, 1994; Teigen, et al., 2001). Repeated readings, combined with Precision Teaching daily charting of performance, has been shown to be an effective means of establishing fluent reading within a relatively short period of time. Precision teaching is a process of direct observational measurement that combines daily assessment probes and charting to monitor student performance.

Precision Teaching is guided by two primary assumptions: a) for students to remember, transfer, and generalize a skill across settings, they must be fluent, and b) need for a standardized system of monitoring, displaying, and making decisions about student performance (Witt & Beck, 1999). Charting data on a standard chart is an easy and convenient way to formatively assess student progress and provides an accurate method of comparing within and across student performances.

Teigen, et al., (2001) assessed the effect of repeated readings, an error correction package and daily charting on the acquisition of fluent reading performance with a fourth grade special needs student. At the beginning of each reading episode, the passage to be read was previewed and difficult words reviewed prior to the initial one-minute timing. Subsequent to the initial timing, additional instruction was provided for difficult portions of the text via modeling, prompting, and chaining, and the neurological impress method. Three additional timings were conducted with the best performance charted. Results showed immediate and substantial improvement in reading fluency. The number of correctly read words improved by 140 words per minute with only 36 minutes of instruction. While the instructional package provided a convincing demonstration of the effectiveness of repeated readings, limitations exist.

One of the limitations of the Teigen, et al., study was the sheer number of corrective procedures included in the error correction package (5). It is unknown whether all components or only some components are necessary to produce the substantive gains demonstrated by Teigen, et al. Could fewer components produce just as effective results? The current study was designed to answer this question. The study examined the effects of repeated readings on the acquisition of fluent oral reading performance with three at risk elementary students. The study systematically replicated the Teigen, et al., study using only three components of their error correction package: modeling, prompting, and chaining.

**METHOD**

After initially previewing the passage with the instructor to correct any initial reading problems, the participants were told that it was time for their repeated readings. To complete the repeated readings procedure, the instructor told the students to read as much of the passage as possible in a minute. The students were told to skip words they could not pronounce. The text chosen was determined to be challenging based on each student's baseline performance.

The repeated readings procedure involved five steps: a) previewing the text for difficult words and reviewing those words prior to the reading episode, b) directing the learner to read as much as they can in 1-minute, c) subsequent to the timing, providing remediation as necessary in the form of modeling, prompting, and chaining, and d) conducting two follow-up 1-minute assessments.

After previewing the passage, the experimenter stated, "Read as much of the passage as you can in a minute. Ready, begin." A timer on a Casio wrist watch (Model W-71) was used for all timings. At the conclusion of each 1-minute timing, the number of correct and incorrectly read words was counted. The procedure was repeated twice and the best performance was charted.

**Subjects**

Three second grade students identified as at risk for failure were referred by their teachers for additional reading instruction. In one students case, placing him at risk for formal referral to special education. Substantial reading and comprehension deficits of grade level texts were identified as the primary factor impeding their development through the scope and sequence of the curriculum.
Setting
All instructional sessions took place in a room reserved for IEP and other formal meetings. The room contained a circular table and three chairs. A full room divider separated the instructional setting from the other half of the room, which was occasionally used concurrently for instruction with other students.

Independent and Dependent Variables
The independent variable was the repeated readings and error correction package. The dependent variable was oral reading, specifically, the number of correctly and incorrectly read words per minute. An incorrect is defined as an omission, substitution, mispronunciation, or self-correction. A correct is defined as one-to-one correspondence between the word read and the printed word.

Materials
The passages were selected from future stories from the grade level anthologies. Since the class had not yet read the passages, these were selected to enhance the likelihood of generalization and success in the classroom. The scope and sequence of the curriculum dictated the sequence in which the stories were introduced. The specific stories used were Emma's Dragon Hunt (O'Connor & Hamanaka, 1990), Molly the Brave (Rylant & Gammell, 1993), and The Relatives Came (Stock, 1987).

Design
The experimental design used was an analysis of celerations and learning pictures common to Precision Teaching programs. The primary dependent variable dimensions analyzed were frequency level and celeration changes within and across condition (i.e., passages) for both correct and incorrect performances. This design incorporates a trend analysis model which is designed to identify repeated patterns of behavior (e.g., acquisition rates, level changes, bounce) under given circumstances.

Conditions
Baseline: During baseline, the storyline of the passages was discussed, the passage was previewed, and a 1-minute timing was conducted. While only one datum constitutes the baseline, any additional timings would have constituted a form of practice and would have been considered an instance of repeated reading. The student's initial performance is the truest measure of baseline for this type of procedure.
Repeated Readings: The repeated readings procedure was implemented using the procedure outlined above with modeling and chaining as error strategies used as necessary. Modeling consisted of the experimenter reading the word correctly and requiring the learner to re-read the word properly. Chaining consisted of the experimenter modeling the difficult passage once while the learner followed along then requiring the learner to re-read the passage until it could be read at least once without hesitation.

15'' Sprint: Due to the maintaining trend in Merrit's performance when reading Emma's Dragon Hunt (Stock, 1987) a 15'' sprint condition was instituted. A section of the passage was functioning as a fluency blocker in that Merrit was experiencing difficulty decoding some of the words. Modeling and one 15'' sprint was used to mitigate the difficulty Merrit was experiencing with this section of the passage. The repeated reading procedure immediately followed the 15'' sprint.

Untimed Reading: For one student, Cory, an untimed reading condition was incorporated as a result of consecutive days of flat performance. During untimed readings, Cory read the passage once with prompting and error correction strategies being used as necessary. Subsequent to the untimed reading, the repeated reading procedure was used and the best performance was charted.

RESULTS
All students improved their reading performance when repeated readings was instituted. In Merrit's case, he literally improved his performance with each minute of practice.

Merrit
During baseline, Merrit correctly read 59 wpm with six errors. Overall, while reading Emma's Dragon Hunt (Stock, 1987) Merrit's performance shows an accelerating trend for correctly read words and a maintaining trend for incorrectly read words. Specifically, Merritt's overall celeration of the number of correctly read words was X1.25. Merrit's frequency of correctly read words improved from 59/6 to 179/0 across 12 sessions, representing a frequency jump of X3.

For the passage Molly the Brave (O'Connor, et al., 1990), across 12 minutes of instruction and practice the number of correctly read words accelerated by X1.8 while Merrit's learning opportunities remained stable at X1. Merrit's performance improved with each minute he practiced.

The introduction of The Relatives Came (Rylant, et al., 1993) produced a jump-down-turn-up in the number of correctly read words with a
no-jump-no-turn in learning opportunities. Merrit's correctly read word performance accelerated by X3.25 while Merrit's learning opportunities remained stable at X1.

Chris

During baseline, Chris correctly read 69 wpm with four errors. Overall, while reading Emma's Dragon Hunt (Stock, 1987) Chris's performance shows an accelerating trend for correctly read words and a slight decreasing trend for incorrectly read words. Specifically, Chris's overall celeration of correctly read words was X1.4 celeration. Maintenance is clearly evident in the number of correctly read words. Chris correctly read 22 more words after a twelve day break. Furthermore, during the final seven days of repeated readings, Chris evidenced a Jaws learning picture with corrects accelerating by X 1.5 while his learning opportunities divided by approximately +2.25. Overall, for the passage Emma's Dragon Hunt, Chris's frequency of correctly read words improved from 69/4 to 184/0 across 9 sessions. That represents approximately a tripling (X2.7) of correct performance.

For the passage Molly the Brave (O'Connor, et al., 1990), across 9 minutes of instruction and practice the number of correctly read words accelerated by X1.5 while Chris's learning opportunities remained stable. The passage change produced a jump-down-turn-up in Chris's corrects and a no-jump-no-turn in errors. Chris's learning opportunities decelerated by /1.8. The number of correctly read words per minute improved from 75/1 to 135/2, representing a X1.8 improvement in correctly read words. Chris's performance improved substantially across long periods of time without formal repeated reading practice. For instance, a week passed between each repeated reading session, yet the number of correctly read words improved by 28 and 32 words, respectively.

With the introduction of The Relatives Came (Rylant, et al., 1993) Chris's performance evidenced a bottoms-up-steeper-slope with a celeration in correctly read words of X3.0. Chris's learning opportunities decelerated by /6. In nine minutes of instruction and practice, the frequency of correctly read words improved from 97/2 to 128/0, representing slightly better than a X1.3 frequency change.

Cory

During baseline, Cory correctly read 55 wpm with one error. Overall, while reading Emma's Dragon Hunt (Stock, 1987) Cory's performance shows an accelerating trend for correctly read words and a slight decreasing trend for incorrectly read words. Specifically, Cory's overall celeration of correctly read words was X1.25 while learning opportunities maintained at approximately X1. Maintenance is clearly evident in the number of correctly read words. Cory correctly read 6 more words after a twelve day break. However, since Cory's correct performance was flat for three consecutive practice sessions, an untimed reading procedure was used in an attempt to improve Cory's performance. This program change resulted in a jump-up-no-turn in Cory's correct performance. A frequency jump in correctly read words occurred with the introduction of the untimed reading procedure. Cory's correct performance improved from 108/1 to 134/3. Overall, for the passage Emma's Dragon Hunt, Cory's frequency of correctly read words improved from 55/1 to a high of 154/0, a frequency change of X2.8.

With the introduction of The Relatives Came (Rylant, et al., 1993) Cory's performance evidenced a jump-down-turn up in celeration. Cory's celeration of correctly read words was X6.0 while his learning opportunities decelerated by /5.5. In twelve minutes of instruction and practice, the frequency of Cory's correctly read words improved from 53/4 to 107/2. This represents a X2.0 frequency change.

DISCUSSION

The current study's data are consistent with the existing repeated reading database (O'Shea, et al., 1985; Polk, et al., 1994; Samuel, 2002; Teigen, et al., 2001). All participant's improved their oral reading performance to varying degrees. The standard acceptable oral reading fluency criterion within the Precision Teaching literature is 180-200 correctly read words per minute. The combination of the passage selection criterion and naturally occurring scheduling changes common to a public school setting precluded reaching this level of fluency for all participants on a consistent basis. Passages were selected deliberately to include yet-to-be-read passages in the classroom as defined by the curriculum scope and sequence. This imposed temporal limitations for ongoing instruction for each passage. Furthermore, participant absences and professional exigencies precluded more consistent data collection. This said, when an extended duration of time passed between repeated reading sessions, all participant's either maintained or improved their reading performance. The only exception being the final repeated reading session for Cory during the untimed reading condition. While inconsistency in instruction may have mitigated the magnitude
Figure 3: Cory's Correct and Incorrect Oral Reading Performance

SUCCESSIVE CALENDAR DAYS

COUNT PER MINUTE

Dr. M. Sioux Falls Public

DEPOSITOR   AGENCY   TIMER   COUNTER   CHARITER   COUNTED

Carolyn x Dr. M. x 2nd Grade
of effects of the repeated reading procedure, it also provided maintenance probes within a naturally occurring context. Limitations, however, need to be addressed.

Procedural modifications needed to be made for Cory and Merrit. For each, relatively flat data paths dictated the need for an instructional change to improve their performance. For Merrit, the 15" sprint was used to mitigate the effect of a difficult portion of the passage while for Cory, the untimed reading procedure was used to improve overall performance. Both instructional modifications achieved their intended objective.

Due to temporal constraints imposed by the scope and sequence of instruction, standard fluency ranges for oral reading (180-200 wpm) could not be established consistently for each passage. It is very likely that had reading performance been achieved within this fluency range, improved acquisition and generalization of reading performance would have been realized for all learners. This may have been a particularly crucial variable for Cory. Cory attained performance levels noticeably lower compared with Merrit and Chris. For instance, Cory's highest performance for Emma's Dragon Hunt was 154/0 while Merrit and Chris achieved high performances of 179/0 and 184/0 respectively. Further, due to scheduling conflicts, Cory did not experience the repeated readings procedure for "Molly the Brave". This precludes a direct comparison with Chris and Merrit's performance on this passage. However, a celeration analysis reveals some interesting comparisons across participants.

Celeration values for "Emma's Dragon Hunt" were relatively comparable across students. Merrit and Cory's baseline performance were comparable, 59/6 and 55/1 respectively. Both made comparable progress with celerations of X1.25. Comparatively, Chris's baseline performance was 69/4 and evidenced steeper slopes, X1.5, compared to Merrit and Cory. An interesting distinction arose with the introduction of "The Relatives Came". While Merrit and Chris evidenced higher overall performance levels, Cory's celeration of correctly read words was virtually twice that of Merrit's and Chris's. With the elimination of temporal constraints, it is possible that Cory's performance could have reached that comparable to Chris's and Merrit's. Comparing total instruction time within each passage provides an additional dimension of analysis of performances.

For "Emma's Dragon", Cory and Merrit's performances were comparable after ten sessions or 30 minutes of repeated reading instruction, 154/0 and 155/0 respectively. Chris received 9 sessions or 27 minutes of instruction and practice but achieved overall higher performance rates. Comparatively, for "The Relatives Came" passage, Merrit's oral reading rate after 9 minutes of instruction and practice was 124/0 while Chris's was 128/0. Cory's performance, after 3 additional minutes of repeated reading instruction and practice was 107/2. While analyzing individual performances is a static rather than dynamic analysis, it may be useful to correlate, within the overall context of frequency, celeration, and bounce change analyses, performance levels with actual practice time. When compared with other students at the same age and grade level, this may provide a useful curriculum-based normative assessment of student performances and may provide a more direct measure of identifying students who are potentially at risk for reading failure.

One of the goals of the current study, and the basis for passage selection, was to increase the likelihood of transfer from the repeated readings sessions to the regular education classroom. From a social validity perspective, both Merrit's and Cory and Chris's teacher reported improved reading performance during language arts instruction. Both teachers reported more fluid levels of reading indicated by less hesitations and fewer errors. Merrit's teacher reported improved fluency and an increased frequency of volunteering to read in class, something he was previously unwilling to do.

Future repeated readings research might focus on investigating the relationship between amount of practice time and performance levels achieved when compared with peers. For instance, what is the performance difference among students already receiving Title 1 services (i.e., already identified as at risk for a reading disability) with students not receiving such services and identified as average readers? To what extent do comparable performances across passages differ among students in different educational demographics such as Title 1, Mild Mental Retardation, Learning Disabilities and regular education? Could curriculum-based comparisons such as those displayed on the Standard Celeration Chart provide predictive utility for student's who may be at risk for future failure and provide a reliable indicator for early intervention? Answers to these questions may provide educators with a quick, reliable assessment tool by which to make accurate educational decisions for early intervention that may obviate the need for special education services.

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This study examines the publication history of the author using celeration charting. Some possible naturalistic contingencies were suggested that may account for the changes in the overall rate of publication and the specific increase in publishing in journals. These were moving to a research university, the use of computers, and collaborating with and getting help from seasoned researchers. Explicit academic promotion contingencies explain switch to publishing more in journals.

DESCRIPTORS: Celeration, Charting, Contingencies, Publication, Frequency, Rate, Journals, Advancement, Academia

Because of tenure issues, there always seems to be interest in the publication rates of faculty at institutions of higher education. In psychology, much of the research on this topic is devoted to the identification of individuals and institutions that have the highest publication rates in major journals (Cox & Catt, 1977; Howard et al., 1987; Jones et al., 1982; Smith et al., 1998; Smith et al., 2003; Webster et al., 1993). In addition, several studies have attempted to determine the factors that may affect a researcher's productivity (Bernardin, 1996; Kiewra & Creswell, 2000; Allison & Long 1990). Yet, with the exception of B. F. Skinner's cumulative record of his publication history, no studies were found that systematically charted and examined the publication history of an individual researcher. This type of study could be important because it may elucidate determinants of publication rate that are yet to be explored.

In this paper, the author will examine his own publication record through the use of an Count per Year Standard Celeration Chart. Standard Celeration Charts have been widely used by teachers to improve a student's performance. In this charting technique, counts of desired behavior performed in a set time frame are charted on a logarithmic linear scale, thus helping one visualize the acceleration or deceleration rate of an individual's performance. Standard Celeration Charts may be useful for professionals by helping them visualize their publication rates and by helping them examine the extent to which specific factors may increase their rates. As of now, Celeration Charts have not yet been used for these purposes.

The first objective of this paper is to demonstrate and explore the insights that may be gained by analyzing an individual's (the author's) publication history. The paper's second objective is to demonstrate the usefulness of the Standard Celeration Charts for professionals interested in increasing their publication rates.

METHOD

Participant. The participant is Michael L. Commons, a 63 year old male. His publications are divided into journal and non-journal publications. The number of publications in each category, as well as total publications, are counted for every year from 1971 to 2002. Journal, non-journal, and total publication counts are plotted separately on three Standard Celeration Charts using an Microsoft Excel template (from Scott Born). The year floor is set to 1 because counts are taken annually.

RESULTS

The celerations in the author's journal, non-journal, and total publications from 1971 to 2002 are described in this paper. These celerations are plotted on three charts. Note that it usually takes about one to two years for manuscripts to be published after they are submitted, thus there is an expected lag between changes in the author's career that may affect his publication rate and changes which actually occurred in his publication rate.

Most studies of publication productivity only consider journal publications. However, non-journal publications are important as well. One psychology researcher comments that books and other forms of publications should not be excluded from studies of productivity because journal publication rates only reflect a part of a professional's work (Nederhof, 1989). Although on average, journal articles have larger impact (as measured by the number of times a paper is cited by other

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researchers), books and chapters often can have greater impact than journal articles. Thus in this paper, both journal and non-journal publications are considered.

It has been shown that changes in a researchers’ work conditions influence their publication rate (Allison & Long, 1990). According to changes in his work conditions, the author’s publishing career during the span of 31 years can be divided into three periods. As shown in figures 1, 2 and 3, during the first period (1971-1977), the author experienced little incentive to publish. Tenure did not depend on publication rate. In 1971, he was 31 years old, and was a full time graduate student. In 1972 he became a lecturer at University of Manitoba. From 1973 to 1977 he worked as a lecturer and later as an Assistant Professor at Northern Michigan University. From 1971 to 1981, the publication rate was very low; all publications were non-journal publications.

In 1977, the author started working at Harvard University as a post-doctoral fellow. He completed two such fellowships and then became a Research Associate in Psychology. During his experience at Harvard, the author experienced a stronger incentive to publish. Thus 1977-1987 marked the second period in his career.

Two years into his work at Harvard, his rate of his total publications began to accelerate. After 1981 and throughout the next 21 years, this rate remained about the same with some ups and downs. For example, in 1985, there was not a single publication, but in the prior year (1984) there were 8. In the second period there seems be an initial acceleration in total publications, with a peak in 1973 mainly due to the book Beyond Formal Operations in which the author wrote four chapters. Two journal articles in 1982 were helped by having Deanna Kuhn, my post doctoral advisor as a co-author.

The third period to be discussed is from 1987 to the present. In 1987, the author became a Research Associate in the Department of Psychiatry at Harvard Medical School. At the Medical School, there was a stronger emphasis on journal publications than on other forms of publication. During this period, there was a second maximum peak of 10 publications in 1991 due to a third Adult Development book. When the author learned that only journal publications counted for professional advancement in 1995, there was a subsequent deceleration of non-journal publications at a rate of one or two non-journal publications per year. Journal publications from 1993 to the present seem to have increased in a nonuniform manner, peaking in 2001 with 5 journal articles. As a result of the increase in journal publication rate (especially in psychiatric journals), the author became an Assistant Clinical Professor in 2002.

DISCUSSION

Rejection in 1964 from the Journal of Applied Behavior Analysis was discouraging for this new author. But later on, several factors appear to increase the overall publication rate. The use of computers starting from 1981 facilitated the writing process. Computers allowed the author to cut and paste text with ease, featured word wrap, had spell check programs, and helped the author visualize his writing immediately on the screen. Computers also facilitated communication with colleagues via emails, floppy disks, internet, and with group works software allowed collaborating researchers to edit papers simultaneously. Therefore, use of computers may have been an important factor in the rise of the author’s publications during the 1980's.

Another factor that may have contributed to the rise is the work atmosphere at Harvard University. A study of the productivity of scientists prior to and after a job change found that the scientists who moved to less prestigious institutions generally increased their publication rate, while the scientists who moved to more prestigious institutions generally decreased their publication rate. Harvard has been ranked among the top institutions in terms of productivity and prestige in the field of psychology (Cox & Catt, 1977; Howard et al., 1987, Jones et al., 1982). In their paper, Allison & Long suggest that scientists are more productive at prestigious institutions because prestigious institutions are likely to have better facilities, intellectual stimulation from other outstanding scientists, and more rigorous publication requirements and "informal esteem among colleagues," although other factors are possible.

Upon coming to Harvard, it quickly became clear to the author that having very good ideas and presenting ideas and studies at national meetings were not the only important things in his career at the postdoctoral level. Publication and collaboration with other scientists was very important as well. During his work at Harvard, not only did the author feel there was an emphasis placed on publishing, he also received much help and guidance. Deanna Kuhn helped him publish two articles in Child Development and Journal of Applied Development. John Anthony Nevin and Richard J. Herrnstein assisted him in several publi-

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1 This was especially the case for someone who was dyslexic and found that writing on a typewriter was extremely laborious due to the difficulty in correcting spelling and reorganizing the writing.
Name of Behavior: Michael Commons

Movement Cycle: 10
cations as well. The people he worked with made substantive contributions. In a case analysis of three prominent educational psychologists, all three psychologists attributed a part of their success to good advisors at institutions with strong programs in psychology and to collaboration with other researchers (Kiewra & Creswell, 2000).

To help increase the number of publications, the author adopted several "self-commitment" procedures, undertakings whereby he was obligated to publish a certain amount of work in a certain amount of time. The author also organized yearly symposia where he was committed to collecting material from colleagues and editing these into books. Submission and acceptance of abstracts to the meetings that led to the books also promoted production of material that could be published. By writing book proposals and taking book contracts, he was motivated and obligated to finish the books by set deadlines. Usually it took three years for the book to be published after the symposia.

The publication rates of different types of publication seem to correspond to different contingencies. For example, after learning that only journal articles counted for promotion at the medical school, there was a deceleration of non-journal publications and an acceleration of journal publications. In the period of 1990-1991, the author's books began to become special issues of journals, which raised the journal publication rate. In a study, already published articles were re-submitted to the same journals, the rejection rate of these articles were equal to overall rejection rate of newly submitted articles, as if these articles had never been published. This led the author to consider the rejections in a less personal way. It became much easier to resubmit papers responding to all suggestions made by reviewers. This lowered the rejection rate from journals but did not eliminate it.

Throughout the period at Harvard, the author felt that everyone was publishing at a high rate, and there was a great deal of incentive to get ideas out and accepted. To see whether one's ideas are getting accepted, maybe it would be useful to chart citations and number of students who then go on to train other students. But even that does not really plot whether or not one's ideas are key in shaping a field. One of the major problems in charting influence is to know what counts and then to chart it and later figure out what controls the success.

In conclusion, Standard Celeration Charts can be used to chart a researcher's publication rates. The contingencies in the author's career described in this paper seem to influence his publication rate, although several contingencies occurred around the same time. It is my hope that other researchers will adopt the Standard Celeration Charts for similar use and will find them useful for tracking their publication histories.

REFERENCES


The Precision Teaching of Food Acceptance to a Child with Cerebral Palsy

Nicole Bank  
*University of North Texas*

Duy Le  
*Child Study Center*

Michael Fabrizio  
*Fabrizio/Moors Consulting*

In the summer of 2003, the first author began her internship at the Child Study Center of Ft. Worth under the supervision of Duy Le. She chose the Child Study Center for the chance to develop skills in treating children with food selectivity. Her first client was Al, a talkative 6-year-old with a diet of French fries and chicken nuggets. Al's only diagnosis was cerebral palsy, which did not interfere with his eating; otherwise, he was a very bright and verbose little boy. It seemed Al's food selectivity was reinforced primarily by escaping unwanted foods and secondarily by the attention he garnered while he sat at the table talking instead of eating (he absolutely loved to talk).

The first and second authors utilized a combination of escape extinction and positive reinforcement for acceptance of new foods in an attempt to increase the rate at which Al accepted new foods. Although this intervention increased Al's acceptance of new foods while refusals and other inappropriate behaviors (such as vomiting, gagging) decreased to zero, Al's rate of eating was still lower rate of food acceptance meant that mealtime was taking too long for the behavior change to likely maintain in Al's home, within his family's normal daily routine. During this same summer, the first author enrolled in a graduate course on the behavior analytic treatment of autism at the University of North Texas. One of the final projects for the summer course was to conduct and present a clinical intervention project charting a learner's performance data on the Standard Celeration Chart. This chart share is the culmination of that final project.

During Al's first session at the Center, he ate the four available non-preferred foods at a rate of 0.7 bites per minute. The first ten minutes of Al's second session at the Center, the same four foods were available as well as potato chips (a highly preferred food). Al was free to eat whatever he chose, and he chose to eat potato chips at a rate of 2.0 bites per minute, and this rate became the frequency aim used for eating non-preferred foods later in treatment. Three sessions followed in which the first author provided Al with social praise when he accepted non-preferred foods. Acceptance of non-preferred foods increased slightly until Al began refusing bites and food refusal was followed by escape from the target food. Immediately, food refusal increased and his overall eating rate dropped to 1.2 bites per minute of only preferred foods. It became apparent that praise alone was an insufficient treatment option.

On the sixth day of treatment, the first and second authors added an escape-extinction procedure to Al's intervention. This procedure included reinforcement for acceptance as well as a re-presentation of bites that Al refused to eat or that he vomited after accepting. If Al refused verbally ("I don't want it"), the same bite was presented and was not removed until he accepted the bite. If he vomited, a new bite of the same food was presented again and was not removed until he accepted and swallowed it without vomiting. The escape-extinction procedure increased Al's acceptance of non-preferred foods to 98-100% of bites presented although his rate of acceptance decreased to 0.8 bites per minute. On the ninth day of treatment, a visual feedback system was used to show Al when food was accepted within 15 seconds of an instruction to do so in an effort to decrease the latency of Al's acceptance of non-preferred foods. Acceptance of non-preferred bites stayed at a high percentage while the rate only increased to 1.4 bites per minute.

The next five sessions were spent training Al's mother to implement the escape-extinction procedure and the visual feedback system. During these training sessions, rates increased slightly and then slowly began to decrease. After Al's three-and-a-half-week vacation, his rate of accepting non-preferred foods dropped to 0.9 and then 0.7 bites per minute, although the percentage of bites that he accepted remained high. On the 16th day of treatment, the authors began a rate-based intervention they called the "beat the clock game" with Al. Seven bites of food were available (four bites from non-preferred foods and three bites from preferred foods) and Al was told to eat as fast as he could in six minutes. What was left of the six minutes was what Al could spend as "talk time." The last four sessions of "beat the clock" showed rates of eating at between 2.0 and 2.75 bites per minute. Percent acceptance remained above 94%. Three new foods were introduced within the last five sessions of "beat the clock" with no decrease in rate of acceptance. The authors ensured that Al's mother was comfortable introducing new foods and implementing the escape extinction procedure before terminating treatment for Al at the Center.
All visual feedback added to escape extinction

Parent trained to implement procedures

Free operant baseline with preferred food

Social praise for accepting non-preferred foods

Escape extinction starts

Parent feedback added to escape extinction

"Beat the clock" game starts

Bites of non-preferred foods.
Climbing Bottoms Show AAG

Malcom Neely

Lindsley (2001) posted on SCLISTSERV some comments regarding application, adduction, and generalization (AAG), and agility while interacting with curricula. During the May, 2003 ABA Chart Share, I showed a summation of Ogden's message:

\[
\begin{align*}
A &= \text{application} \\
A &= \text{adduction} \\
G &= \text{generalization} \\
(A=A=G) &= \text{AAG}
\end{align*}
\]

Climbing bottoms show AAG
Steeper slopes show Agility

I then displayed my granddaughter Ciara Neely's Daily per minute Standard Celeration Chart. Looking at Ciara's chart at the lower right-hand corner, you can notice that she was six years and two months on 19 JAN 03, the chart lock-in date. She and her Papa, Ciara's name for me, were co-timers and co-charters while Papa was counter and manager (teacher). Papa darkened and smoothed the marks for better display, though darkening and smoothing shades the look of authenticity, a bit.

Ciara and Papa learn in Papa's basement Chart Room where Learning Courses receives its pupils.

Ciara's reading chart shows her reading aloud performances and her improvements during eight lessons (51-58) that make up "The Magic Pouch" story in SRA's Reading Mastery 11, Book 1. The charted reading aloud performances show the first trial data of each day.

AAG

The larger dots and X's show the first practice of the first day of each lesson. The larger dots show that as Ciara advances in her lessons (Lindsley's moves up the curriculum), the first readings increase in frequency from 45 correct words per minute to 120 correct words per minute. Lindsley refers to the acceleration of correct words for such sequential cold readings as climbing bottoms. A best-fit-line through the eight lesson bottoms shows a X1.2 per week climbing bottoms acceleration. Conversely, the larger X's show first reading errors decreasing from six error words per minute to one. The beginning error best-fit-line shows a /1.7 per week deceleration (descending tops ?). The climbing bottoms and the descending tops best-fit-lines might appear as a jaws learning picture, but they differ. Climbing bottoms and descending tops refers to the celerations of first-time performances of several consecutive events when they are at their worst. Jaws refers to average performance celerations through a single event.

The horizontal tic marks above the last session days attest to Ciara's hitting her 150 correct words per minute aim during that day's session timings.

Agility

Ciara spent two to four rated days on each lesson resulting in steep mini-celerations or quick step-ups to aim.

The frequencies at the bottom of the chart show Ciara practiced one to ten times each reading day with a median average of five times. The tic marks on the last day of each book-lesson show Ciara's total lesson practices. She practiced each book-lesson from sixteen to nine times with an average of 12. The best-fit-line through the book-lesson totals shows a slight, /1.1, decrease from the beginning of "The Magic Pouch" curriculum to its eighth lesson.

Ciara's steep mini-slopes (celerations) or quick step-ups to aim, and fewer practices before reaching aim speak to Ciara's developing agility.

Summary

Ciara's chart shows her "cold" readings getting faster, thus climbing bottoms. Climbing bottoms indicate Ciara's applying (application, AAG) her established skills to similar, but newly arranged tasks at ever increasing speeds. Ciara's chart also shows very steep learning and slightly decreasing practices, both suggesting a developing agility (learning becoming faster learning).

REFERENCE

Lindsley, O. R. Re: chart share comments agility. SCLISTSERV@LISTS.PSU.EDU (http://lists.psu.edu/archives/sclistserv.html), Sat, 10 Nov 2001 13:57:24 EST.
Teaching children with autism to engage in play-related talk

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*Step By Step Learning Group Inc*

Jessica A. Brian
*The Hospital for Sick Children*

Jennifer Snider
*Step By Step Learning Group Inc*

The core features of the autism spectrum disorders include deficits in communication, socialization, and restricted interests including deficits in imaginative play. Specific deficits in play-related behavior include repetitive and stereotypic, non-functional, manipulation of play materials (for example, repeatedly spinning the wheel of a toy car), reduced flexibility in choice of activities, and limited generative and imaginative play. Perhaps related to deficits in communication, some children with autism also initiate play on a limited basis and infrequently talk about their play (for example, giving narrative descriptions of actions). When viewed as a compound skill, typical play consists of many component behaviors including manipulating play materials and toys appropriately, remaining on-task during play, and using play related talk.

For the current project, a fluency-based procedure that would lead to children using play-related talk during actual play with toys was designed to build fluent component play skills for two children with autism. The goal was to produce skill stability, which authors have defined as performance under highly distracting conditions (Johnson & Layng, 1992; Fabrizio & Moors 2002; Fabrizio & Schirmer, 2002; Fabrizio & Moors, in press). The procedure for both children involved developing play-related statements relevant to a theme-based toy such as a Fisher Price™ Car Wash by building the use of those statements through the Hear /Say learning channel in one-to-one sessions. Number of words repeated by the learner per minute was counted and charted. Checks for stability (Free /Say) were conducted approximately twice per week using the targeted theme-based toy. During stability checks, the number of context relevant words spoken per minute was counted and charted. Stability checks entailed leading the learner to the theme-based toy and instructing him to play with it. No other prompts were given during these checks.

The learner in Figure 1, Thomas, was a 3-year-old boy with autism. He was verbal, with some spontaneous phrase speech, and had acquired some brief, appropriate toy manipulation in the absence of context-relevant talk. As depicted in Figure 1, Thomas’ performance during the Hear/Say practice sessions accelerated by X1.3. During the initial 2-minute stability checks (Free /Do Say), 0 play related statements were emitted per minute. However, subsequent stability checks revealed a X2.6 acceleration in the spontaneous use of context relevant play statements. Although not depicted in the figure, anecdotal observations included increased durations of on-task play behavior, increased use of play related talk with novel theme-based toys, stability, and adduction demonstrated with play materials in a novel community setting, and the elimination of stereotypic behavior with the targeted theme-based toy.

The learner in Figure 2, Peter, was a 5-year old boy with autism. He was verbal with spontaneous phrase speech, and demonstrated limited appropriate manipulation of toys accompanied by some non-contextual talk such as unintelligible vocalizations. Peter also repetitively manipulated theme-based toys. For example, he often repeatedly rolled a train back and forth on a track over and over again. As shown in Figure 2, Peter’s performance during the Hear/Say practice sessions accelerated by X1.2. Unfortunately, the stability checks only yielded a acceleration of X1.0, which caused us to modify the existing learning channel that we used during Peter’s practice sessions. The modified practice sessions consisted of a HearoSee/DooSay (Hear and See then Do and Say) learning channel in which Peter not only had to repeat play statements, but also had to concurrently imitate play actions with items pulled from the theme-based toy. During these practice sessions, both the number of words spoken and actions imitated per minute were counted and charted. Performance during the HearoSee/ DooSay practice sessions accelerated by X1.5. Peter’s spontaneous use of context-relevant talk during the stability checks with the reassembled toy accelerated at X3. According to anecdotal report, Peter also began using novel and varied play-related statements during the 5-minute stability checks. The repetitive use of the targeted play materials and non-contextual vocalizations were eliminated.

This project supports Carl Binder’s (1996) argument that the accumulation of dysfluent skills may well be the greatest contributor to student failure. These data demonstrate the effect of dysfluent play skills on the ability to apply a component skill to a compound skill in situations in which the behavior should naturally occur. These data also demonstrate the efficacy of using yoked learning chan-
nels for some students as a powerful teaching intervention. This reminded us to heed Elizabeth Haughton's (2003) admonishment to be creative and flexible in our selection and use of learning channels.

REFERENCES


Haughton, E. (2003). Workshop presented at Morningside Academy, Summer Institute, Seattle, WA.


*Authors' note: We are grateful to Michael Fabrizio for his generous technical support and for helping us reconceptualize our understanding of stability and application.
Journal Description

The Standard Celeration Society publishes the *Journal of Precision Teaching and Celeration* (JPTC) two times a year. JPTC provides a forum for research, practical applications and discussions of Precision Teaching and Celeration technology. JPTC has dedicated itself to the promotion and diffusion of Precision Teaching and Standard Celeration technologies.

Journal Sections:

Authors may submit their original contributions to one of five sections of JPTC:

I. **Application Articles**: “Application articles” require:
   (1) Use of Standard Celeration Charts;
   (2) Use of basic charting conventions;
   (3) Description of variables or procedures supporting the interpretation of the data.

   “Application articles” usually represent data from applied settings such as schools, clinics, human service agencies.

II. **Research Articles**: “Research articles” require:
   (1) The use of Standard Celeration Charts;
   (2) Descriptions of the collection and analysis of data;
   (3) Use of basic and advanced charting conventions and analysis;
   (4) Description of variables or procedures supporting the interpretation of the data;
   (5) Control for extraneous variables or report of their influence.

III. **Discussion Articles**: “Discussion articles” offer explanations, reviews, and extensions of Precision Teaching and Standard Celeration concepts.

IV. **Chart Shares**: “Chart shares” contain data displayed on Standard Celeration Charts along with brief descriptions of the performer, what occurred, and other relevant observations. [Note: We encourage performers (e.g. students, clients, patients) to submit their own charts to the chart share section.]

V. **Technical Notes**: Brief technical descriptions clarifying, elaborating, or reporting upon Precision Teaching and Standard Celeration concepts.

Submission Guidelines:

To submit a manuscript authors must conform to the following guidelines:
(1) Submit three (3) typewritten, doubled spaced copies of the manuscript without author’s names or affiliations;
(2) Follow the format outlined in the Publication Manual of the American Psychological Association (5th edition, 2001);
(3) Do not exceed 20 words in the article title;
(4) Include an abstract and do not exceed 250 words in the abstract (Technical Notes do not require an abstract);
(5) Select 3 to 5 key words that describe the manuscript;
(6) Secure permission for use of copyrighted materials;
(7) Send submissions to: Dr. Richard M. Kubina Jr., The Pennsylvania State University, Department of Educational and School Psychology and Special Education, 209 CEDAR Building, University Park, PA 16802-3109.

The Editors reserve the right to edit all material accepted for publication.
### BASIC CHARTING CONVENTIONS for the DAILY STANDARD CELEBRATION CHART

<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
<th>CONVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CHARTED DAY</td>
<td>A day on which the behavior is recorded and charted.</td>
<td>1. Chart the behavior frequency on the chart on the appropriate day line.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Connect charted days except across phase change lines, no chance days and ignored days.</td>
</tr>
<tr>
<td>a) ACCELERATION TARGET FREQUENCY</td>
<td>Responses of the performer intended to accelerate.</td>
<td>Chart a dot (●) on the appropriate day line.</td>
</tr>
<tr>
<td>b) DECELERATION TARGET FREQUENCY</td>
<td>Responses of the performer intended to decelerate.</td>
<td>Chart an (x) on the appropriate day line.</td>
</tr>
<tr>
<td>2. NO CHANCE DAY</td>
<td>A day on which the behavior had no chance to occur.</td>
<td>Skip day on daily chart.</td>
</tr>
<tr>
<td>3. IGNORED DAY</td>
<td>A day on which the behavior could have occurred but no one recorded it.</td>
<td>Skip day on daily chart.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Connect data across ignored days.)</td>
</tr>
<tr>
<td>4. COUNTING-TIME BAR (aka Record Floor)</td>
<td>Designates on the chart the performer's lowest possible performance (other than zero) in a counting time. Always designated as &quot;once per counting time.&quot;</td>
<td>Draw solid horizontal line from the Tuesday to Thursday day lines on the chart at the &quot;counting-time bar.&quot;</td>
</tr>
<tr>
<td>5. ZERO PERFORMANCE</td>
<td>No performance recorded during the recording period.</td>
<td>Chart on the line directly below the &quot;counting-time bar.&quot;</td>
</tr>
<tr>
<td>6. PHASE CHANGE LINE</td>
<td>A line drawn in the space between the last charted day of one intervention phase and the first charted day of a new intervention phase.</td>
<td>Draw a vertical line between the intervention phases. Draw the line from the top of the data to the &quot;counting-time bar.&quot;</td>
</tr>
<tr>
<td>7. <strong>CHANGE INDICATOR</strong></td>
<td>Words, symbols or phrases written on the chart in the appropriate phase to indicate changes during that phase.</td>
<td>Write word, symbol and/or phrase. An arrow (✔) may be used to indicate the continuance of a change into a new phase.</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 8. **AIM STAR**        | A symbol used to represent: (a) the desired frequency, and (b) the desired date to achieve the frequency. | Place the point of the caret...^ for acceleration data  
...for deceleration data  
...on the desired aim date. Place the horizontal bar - on the desired frequency. The caret and horizontal line will create a "star." |
| 9. **CALENDAR SYNCHRONIZE** | A standard time for starting all charts. | It requires three charts to cover a full year. The Sunday before Labor Day begins the first week of the first chart. The twenty-first week after labor day begins the second chart. The forty-first week after Labor day begins the third chart. |
| 10. **CELERATION LINE** | A straight line drawn through 7-9 or more charted days. This line indicates the amount of improvement that has taken place in a given period of time. A new line is drawn for each phase for both acceleration and deceleration targets. (Note: For non-research projects it is acceptable to draw free-hand celeration lines.) | ![Diagram of Acceleration Target and Deceleration Target] |
2 Sep 01 30 Sep 01 28 Oct 01 25 Nov 01 23 Dec 01 20 Jan 02

@phase
change line
---)

@frequency

25 Nov 01
/
Slice back to 50 basic
addition problems

23 Dec 01

OPTIONAL: The age of the performer when the chart begins. If not filled in, draw a line through the space.

A clear description of the performer's counted behavior. Use a learning channel and active verbs/noun (e.g., see/say reading books).

OPTIONAL: Any additional information relevant to the performer or chart. If not filled in, draw a line through the space.

The name of the person who charts the performer's counted behavior.

The name of the person whose performance appears on the chart.

The name of the person who counts the performer's behavior.

The name of the person who advises the manager or performer on a daily basis.

The name of the person who works with the performer on a weekly basis.

The name of the person who advises the manager or performer on a monthly basis. The person may give advice to the Adviser or Manager.

The name of the organization where the counted behavior takes place.

The name of the division of the organization.

The room where the counting occurs.

The name of the person who times the performer.

Labelled Blanks (Adapted from Pennypacker, Gutierrez, & Lindsley, 2003)
<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
<th>CONVENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1. FREQUENCY CHANGE (FC)  
(aka frequency jump up or jump down) | The multiply "x" or divide "+" value that compares the final frequency of one phase to the beginning frequency in the next phase. Compute this by comparing: (1) the frequency where the celeration line crosses the last day of one phase -to- (2) the frequency where the celeration line crosses the first day of the next phase. (e.g. a frequency jump from 6/minute to 18/minute. FC = x 3.0) | Place an "FC =" in the upper left cell of the analysis matrix. Indicate the value with an "x" or "+" sign (e.g. FC = x 3.0) |
| **Celeration:** | | |
| 2. CELERATION CALCULATION  
(Quarter-Intersect Method) | The process for *graphically* determining a celeration line (aka "the line of best fit.")  
(1) Divide the frequencies for each phase into four equal quarters (include ignored and no chance days),  
(2) Locate the median frequency for each half,  
(3) draw a celeration line connecting the quarter intersect points. | See advanced charting conventions sample chart. |
| 3. CELERATION FINDER | A piece of mylar with standard celeration lines which can be used to compute celeration line values. | Buy commercially or copy and cut out part of the vertical axis on the Standard Celeration Chart. |
| 4. PROJECTION LINE | A dashed line extending to the future from the celeration line. The projection offers a forecast that enables the calculation of the celeration change value. | See advanced charting conventions sample chart. |
| 5. CELERATION CHANGE (CC)  
(aka celeration turn up or turn down) | The multiply "x" or divide "+" value that compares the celeration of one phase to the celeration in the next phase (e.g. a celeration turn down from x1.3 to ÷ 1.3. CC= ÷ 1.7) | Place an "CC =" in the upper middle cell of the analysis matrix with the value indicated with a x or ÷ sign. (e.g., CC = ÷1.7). |
| **6. CELERATION COLLECTION** | A group of three or more celerations for different performers relating to the same behavior over approximately the same time period. | Numerically identify the high, middle and low celeration in the celeration collection and indicate the total number of celerations in the collection. |
| **7. BOUNCE CHANGE (BC)** | The multiply "x" or divide "÷" value that compares the bounce of one phase to the bounce in the next phase. Computed by comparing: (1) the total bounce of one phase -to- (2) the total bounce of the next phase. (e.g., a bounce change from x 5.0 to x 1.4, BC = ÷ 3.6) | Place a "BC=" in the upper right cell of the analysis matrix with the value indicated with a multiply "x" or divide "÷" symbol (e.g., BC = ÷ 3.6) |
| **8. ANALYSIS MATRIX** | The analysis matrix provides the numeric change information regarding the effects of the independent variable(s) on frequency, celeration and bounce between two phases. | Place the analysis matrix between the two phases being compared. For acceleration targets place the matrix above the data. For deceleration targets place the matrix below the data. |
| **Optional:** |  |  |
| **9. FREQUENCY CHANGE P-VALUE (FCP)** | The frequency change p-value is the probability that the noted change in frequency would have occurred by chance. (Use the Fisher exact probability formula to compute the p-value.) | Use "FCP =" and indicate the p value in the lower left cell on the analysis matrix (e.g., FCP = .0001). |
| **10. CELERATION CHANGE P-VALUE (CCP)** | The celeration change p-value is the probability that the change noted in celeration would have occurred by chance. (Use the Fisher exact probability formula to compute the p-value.) | Use "CCP =" and indicate the p value in the lower middle cell of the matrix (e.g., CCP = .0001). |
| **11. BOUNCE CHANGE P-VALUE (BCP)** | The bounce change p-value is the probability that the change noted in bounce would have occurred by chance. (Use the Fisher exact probability formula to compute the p-value.) | Use "BCP =" and indicate the p value in the lower right cell of the analysis matrix (e.g., BCP = .0001). |
Frequency Change (FC)

1. Frequency change = x 3.0

Celeration Change (CC)

2. Celeration calculation (Quarter-intersect method)

Quarters: 1st 2nd 3rd 4th

5. Celeration change calculation

6. Celeration Collection

- High
- Medium
- Low

7. Celerations

Bounce Change (BC)

Acceleration Target

<table>
<thead>
<tr>
<th></th>
<th>FC</th>
<th>CC</th>
<th>BC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x 2.8</td>
<td>x 2.3</td>
<td>x 1.8</td>
</tr>
<tr>
<td>FCP</td>
<td>.001</td>
<td>.003</td>
<td>.005</td>
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</table>

Analysis Matrix

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<thead>
<tr>
<th></th>
<th>FC</th>
<th>CC</th>
<th>BC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outlier</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>x 1.96</td>
<td>x 3.6</td>
<td></td>
</tr>
<tr>
<td>Bounce</td>
<td>= x 2.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Deceleration Target

<table>
<thead>
<tr>
<th></th>
<th>FC</th>
<th>CC</th>
<th>BC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x 2.8</td>
<td>x 1.6</td>
<td>x 1.1</td>
</tr>
<tr>
<td>FCP</td>
<td>.005</td>
<td>.001</td>
<td>.01</td>
</tr>
</tbody>
</table>
ERRATUM

At the 16th annual International Precision Teaching Conference Ogden Lindsley pointed out that under the convention guidelines in the journal the "ignored day" description needed to be changed. In the past issues the convention description stated: “Skip day on daily chart,” and “Do not connect data across ignored days.” As Ogden Lindsley correctly pointed out the proper convention should read “Connect data across ignored days.” The “Basic charting conventions for the Daily Standard celeration chart” and the Standard Celeration Chart showing the conventions have changed to reflect the correct usage of the ignored day.