The Effects of Precision Teaching and a Token Economy on Handwriting Skills: A Case Study

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The purpose of this case report was to determine the effectiveness of a token economy program with a second grade student who was exhibiting skill deficits in the area of cursive writing. The participant was enrolled in the second grade and was a focus of concern for the classroom teacher. The major dependent measure was correct rate in handwriting. The effects of an individualized token program were evaluated in an ABAB experimental design. For scoring, each written letter was awarded with one point (token) for appropriate legibility, ending, size, and slant. This yielded a total score of four points for each letter. During the token reinforcement phases of the study, these points were then converted to tokens and used to purchase back-up reinforcers such as candy, pencils, cream soda, lunch out, milkshakes, a movie, and a shopping trip to a local sporting goods or toy store. Overall outcomes indicate an increase in appropriate cursive letter ending, legibility, size, and slant when the token economy was in effect. There was a decline in rate, but not in celeration for the second baseline condition. Suggestions for use of token programs to assist children with their handwriting were made.

Precision Teaching has a strong data base which has been effective in improving the academic skills of children and youth and in assisting teachers making instructional decisions based on rates of child progress (Lindsley, 1991; Lovitt, 1989; White & Haring, 1980). Precision Teaching methodology has merit for use in today's schools.

Developing basic skills in the early elementary grades is very common and necessary for a successful educational career; however, many times, for a variety of reasons, these skills are not learned appropriately and correctly. Therefore, it is essential to remedy the situation and provide adequate resources for students to obtain the required skills.

Handwriting is viewed as an important communication skill (Hansen, 1978, Sweeney, Salva, Cooper, & Talbert-Johnson, 1992, 1993, McLaughlin, 1981). It can be difficult for a person reading a message to comprehend it if the writer has written the message in an illegible manner.

One of the major goals in handwriting research concerns legibility (e.g. Brunner, McLaughlin, & Sweeney, 1993; Hansen, 1978, Talbert-Johnson, Salva, Sweeney, & Cooper, 1991).

Intervention strategies to assist and improve legibility have ranged from error drill (Brunner et al. 1987), academic positive practice (McLaughlin, Mabee, Byram, & Reiter, 1987), to self-management strategies (Sweeney et al. 1993).

Handwriting, in particular, is very important to master at a young age (Peck, Askov, & Fairchild, 1980). If difficulties arise, many problems will occur when trying to communicate through writing (Hansen, 1978). Individuals may become frustrated if nobody can understand their writing (McLaughlin et at., 1987). Writing is also been suggested as important for proficient reading (Smith, 1976). The more students write and read, the more accurate their reading becomes (Smith, 1976). It is obvious that reading, writing and handwriting skills are essential for a successful educational career (Bushell, 1978; Slavin, Madden, Dolan, Wasik, Ross, & Smith, 1994).

One of the most effective and data-based ways to improve classroom behaviors has been to implement a classroom token economy. Token systems have been effective across various grade levels, school populations, and academic and social behaviors (e.g. Kazdin, 1977, 1982b; McLaughlin & R. L. Williams, 1988; O'Leary & Drabman, S. G. O'Leary & K. D. O'Leary,

1977; B. F. Williams, R. L. Williams, & McLaughlin, 1988).

The purpose of this case study was to increase a second-grade male student's cursive handwriting abilities through Precision Teaching and a token economy. Hopefully, this program would enable the student to communicate clearly and efficiently on paper because of increases in legibility and speed.

Method

Participant and Setting
The participant of this study was a male elementary student enrolled in an urban public school of 672 students in the Pacific Northwest. The student was chosen because he exhibited severe difficulty in the area of handwriting. His teacher and school administrator suggested that he receive tutoring because they felt that the pupil was at-risk for school failure. The child was assigned to a regular second grade classroom and received two 30-minute sessions of handwriting assistance in the hall outside of his assigned classroom each week. This tutoring was provided by an undergraduate special education major completing a course in Precision Teaching at a local university.

Dependent Variables and Measurement Procedures
The dependent variable was the frequency of movements per minute for legibility, size, slant and endings of cursive letters during a 30 minute tutoring session. The student practiced a new letter through air writing, tracing and independent practice. After the timing, the letters were given points legibility, size, slant, and ending. The letter was legible if the tutor could recognize which letter the student's sample represented. For size to be scored, the letter had to contain the correct height and not be above or below the line on the paper; for slant to be scored, the letter had to contain the appropriate slant. For an ending point to be given, the letter had to contain the correct ending (e.g. curl, upward movement, etc.). Frequency of these correct movements in handwriting was determined by dividing the number of correct letter points by the total number of minutes in the tutoring session.

In addition, data were also calculated as percent correct. Accuracy data were gathered despite its problems with ceiling effects, providing a distorted picture of acquisition, fluency, and mastery (White & Haring, 1980). This was done to provide the student, parent, and teacher a more familiar form of data to evaluate student progress. Percent correct was calculated by dividing the number of correct components per letter by the number of letters completed and multiplying by 100.

Experimental Designs and Conditions
An ABAB single case design (Kazdin, 1982a) was employed to evaluate and establish a functional relationship as to the effects of a token economy and Precision Teaching on handwriting skills.

Baseline 1. The initial baseline was established during four sessions over a two week period. During Baseline 1, the following routine was followed. The subject was shown a new letter, through verbal prompts, he was then asked to air write it, trace it, and then write it independently. The tutor then scored each letter for accuracy according to the four parts (legibility, size, slant, and ending).

Token economy 1. During this phase, a token economy program was implemented. During the program, the tutor and subject met six times. The student was introduced to two new cursive letters per session. The subject was expected to follow the same routine that was completed in Baseline 1, which was air writing, tracing and independent practice. Air writing is where the student writes the letter in the air for the tutor. After each page was completed, the tutor scored each individual letter or word for a total of four points per letter. Letters were scored on the basis of legibility, slant, size and ending. The student earned a token for each point earned. With his tokens, the student was able to purchase a variety of back-up reinforcers. These back-up reinforcers and their respective prices are shown in Figure 1.

Baseline 2. To test the effects of the token program, a return to baseline was carried out. During Baseline 2, new letters were still introduced to the student, but he was told he would not be receiving tokens for the points he made from

Back Up Item	Cost in Points (Tokens)
Candy	20
Pencils	30
Milkshake	50
Lunch Out with Tutor	80
Nintendo Game	90
Movie	100
White Elephant Toy Store Trip	140
Toy's "R" Us Trip	180
Star Wars Movie Video	200

Figure 1. Back-up reinforcer items and their respective costs.

hishandwriting. This condition was in effect for two sessions.

Token economy 2. A second token economy was implemented. The same type of routine was followed which included air writing, tracing and independent drill and practice. The subject again earned points that were exchangeable for tokens for his accuracy in writing cursive letters. The participant was able to choose back-up rewards from the same menu that was used during the first token economy intervention.

Results and Discussion

Frequency and Celerations
The subject's handwriting showed improvement over the course of eight weeks. During baseline, the student had an average legibility rating in handwriting of 35.25 points. His celeration for Baseline 1 was x1.01. During the first token program, the student's performance increased (X = 56.83 points; Celeration = x1.5). A return to Baseline resulted in a decrease in the counts per minute (X = 45.0 points). However, there was not a corresponding decline in celeration (x2.0). With the introduction of the token sys-tem (Token 2) increases in the frequency of correct aspects of handwriting accuracy were noted (X = 56.5). However, no such change in celeration was found (x1.01).
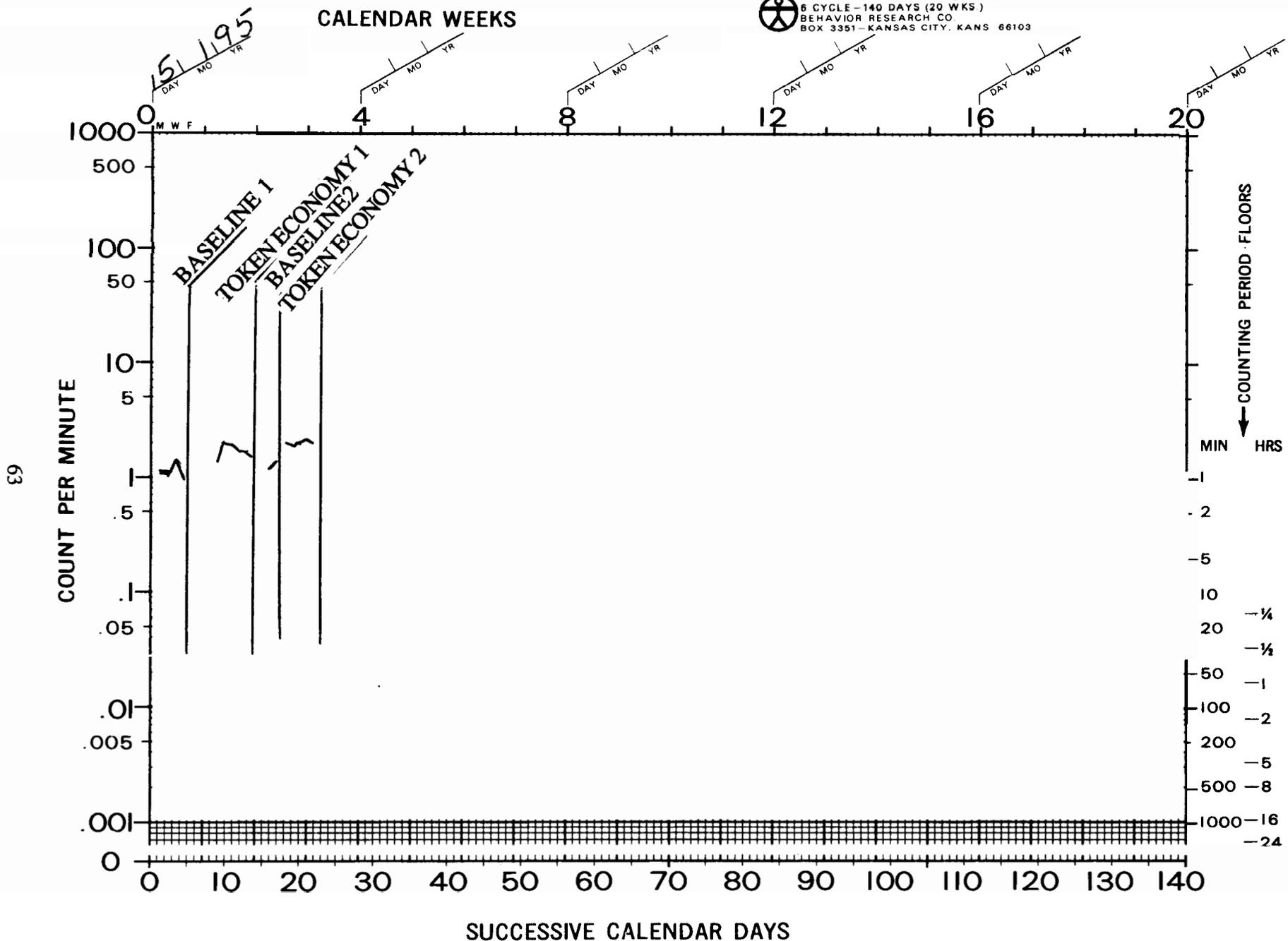
Percent Correct
The percent correct for these same data can be seen in Figure 2. As these data show, percent correct can provide a very different picture for these outcomes. The subject's handwriting showed improvement over the course of sessions. During baseline, the participant had an average of 54% for accurate ending, legibility, size and slant of cursive letters. During the first token economy, the subject generated an average of 76% for slant, size, legibility, and ending of cursive letters. For the second baseline, the average percent correct fell to 68%. However, this was still higher than that found in Baseline 1. During the second token economy, the student increased his accuracy to an average of 76%.

The token economy increased accuracy of cursive letters a total of 12 percentage points. The ending percentage of 76% is not as high as desired, but the teacher and school administration were happy with these outcomes. At this writing, the token economy was continued, along with verbal prompting to increase accuracy Chart 1 concerning legibility, size, slant and endings of cursive letters.

The results of this study indicated that a token economy program, verbal prompting, and Precision Teaching procedures were effective strategies in improving the handwriting skills of the subject. However, the results were not totally satisfactory. It would be ideal if the subject could have achieved a writing accuracy percentage of at least 90%. In addition, increases in celeration during the token program phases would have been desireable. Through practice and time, the subject will be able to improve his cursive writing to an acceptable degree of accuracy. Token economy and verbal prompting encouraged the subject to stay on task, as well as keep him motivated. The student's handwriting decelerated during the first token program. The pupil simply slowed down when he worked on his practice sheets trying to be more accurate, since accuracy led to points exchangeable for various activities and items. He could obtain four points per letter, rather than just two or three, if he

CALENDAR WEEKS

DAILY BEHAVIOR CHART (DCM-9EN)
6 CYCLE – 140 DAYS (20 WKS.)
BEHAVIOR RESEARCH CO.
BOX 3351 – KANSAS CITY, KANS 66103

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COUNT PER MINUTE

BASELINE 1
TOKEN ECONOMY 1
BASELINE 2
TOKEN ECONOMY 2

COUNTING PERIOD · FLOORS

MIN   HRS

SUCCESSIVE CALENDAR DAYS

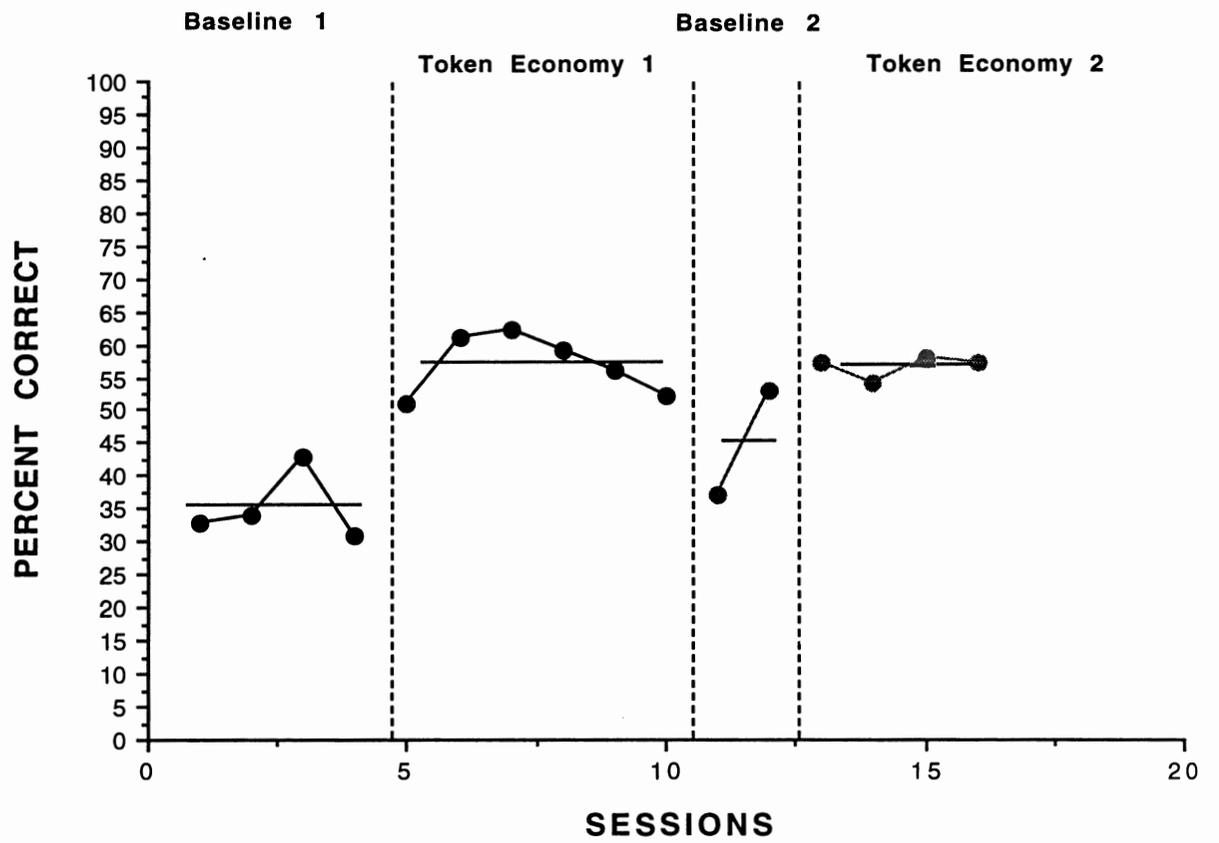| SUPERVISOR	ADVISER	MANAGER		BEHAVER	AGE	LABEL	COUNTED
DEPOSITOR	AGENCY		TIMER	COUNTER	CHARTER		

Figure 2

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wrote more letters faster which were illegible, containing the wrong slant, etc.

The token program continues to be implemented for this student. The classroom teacher felt it important to reward improvements in handwriting by reminding him that he would still receive back-up reinforcers for good handwriting. At times, young children may fail to remember that they are receiving back-up reinforcers for previous work. Overall, this study implied that a token economy accompanied with verbal prompting and tutoring can be helpful when improving the handwriting of second grade students.

The separate contributions of the Precision Teaching procedures and the token economy cannot be singled out. Additional research where both procedures could be evaluated in either a multi-element or a counterbalanced multiple baseline design (Kazdin, 1982) could be performed. The present design, ABAB, did not allow such a comparison to be made. After treatment is withdrawn in this design, then the behavior under investigation should revert to baseline levels. Teachers and others working in school settings dislike the difficulty of reverting to a baseline condition and prefer the use of designs that do not require return to baseline. (McLaughlin, 1983).

It is important to note that percentage measures did not accurately portray this student's progress. When one views these data from celeration changes, a very different picture of outcomes emerges. Though accuracy did decline, celerations did not. Therefore, using precision measurement can change one's views as to the outcomes of learning.

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