

# The Effect of Increasing the Rate of Clerical Skill Performance on Challenging Behavior

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In the field of Applied Behavior Analysis, much focus is placed on the intense training needs of young children with autism. Many educators believe that adolescents and adults with autism are less likely to make significant strides than their younger counterparts. The present research looks at fluency-based instruction as an instructional strategy that is time efficient and has the potential to significantly improve the quality of life for older learners with autism by establishing competent performance that will prepare them for future job placements. The study examined the impact of fluency-based instruction on the rate of skill acquisition and the rate of challenging behavior of an adolescent with autism learning vocational skills. Results showed that increases in rate of performance of trifolding (folding paper into thirds) corresponded with decreases in rates of aggression and self-injury during performance of the task. Results were replicated with the introduction of fluency-based instruction for envelope stuffing and mail sorting. These findings yielded support for the effectiveness of fluency training in addressing challenging behavior and increasing competence in vocational skills. This has implications for increasing the potential employability of adults with autism.

DESCRIPTORS: Precision Teaching, frequency-building, Autism, challenging behavior

Precision Teaching emerged out of the early work of Lindsley (1971). It focuses on the methodology of operant conditioning. Recent interest in Precision Teaching with rate building procedures has led to its increased implementation in the field of Applied Behavior Analysis for learners with autism (Fabrizio & Moors 2003, Fabrizio & Schrimmer 2002, Fabrizio, Schrimmer, Vu, Diakite & Yao, 2003, Kerr, Campbell & McGroory 2002, King, Moors & Fabrizio 2003, Moors & Fabrizio 2002, Zambolin, Fabrizio & Isley 2004).

One of the most widely cited applications of Precision Teaching was a study implemented in Great Falls, Montana in the early 1970's (in Binder 1996).. Over the course of four years the Sacajawea Elementary School students " . . . advanced 19-40 percentile points higher on the Iowa Test of Basic Skills than students elsewhere in the district" (Beck, cited in Binder & Watkins, 1990). The success of this type of intervention has been documented in other areas as well. Binder and Bloom (1989) used fluency-based instruction to train new sales representatives, who later demonstrated a stronger knowledge base than more experienced sales representatives who did not receive such training. Johnson and Layng (1992) reported the success of this methodology for working adults learning to read. They found that the results of fluency-based instruction were superior to any other

program funded by The Job Training Partnership Act. Clearly, the implementation of fluency-based instruction has widespread implications across a variety of applications.

Behavioral fluency is that combination of accuracy plus speed of responding that enables individuals to function efficiently and effectively in their natural environment" (Binder 1996 p. 164). Initial stages of implementation of fluency-based instruction at Adult and Transitional Services of the Douglass Developmental Disabilities Center demonstrated that this technology could have a significant impact on the efficiency of vocational skills training leading to increased potential for employment as well as decreases in escape driven disruptive behavior. More recent results have indicated that Precision Teaching with frequency-building procedures has increased independence in activities of daily living in a 30-year-old man with autism who was demonstrating unilateral motor neglect following a stroke. The staff of Adult and Transitional Services have determined that the majority of adolescents and adults with autism in our program are not fluent in simple motor movements (e.g., reach, point, touch, grasp, place, release). This has led to the realization that the lack of progress students and adults with autism experience in daily living and other skills may be a direct result of dysfluent performance

of component skills (smaller skills that comprise more complex behaviors). Binder (1996) notes that "Use of fluency-based instructional methods has led to unprecedented gains in educational cost effectiveness, and has the potential for significantly improving education and training in general" (p.163). There is a tremendous need for research that demonstrates effective methods of instruction for adolescents and adults who have an urgent need to demonstrate competency in employable skills in order to live productive and fulfilling lives.

Recent interest in Precision Teaching with frequency building procedures has led to its increased implementation in the field of applied behavior analysis for learners with autism and other developmental disabilities (Binder, 2003; Fabrizio & Schrimmer, 2002; Fabrizio, Schrimmer, & Vu, 2003; Zambolin, Fabrizio & Isely, 2004). Specific research has found that Precision Teaching with frequency-building procedures with this population of children has achieved powerful results in many curricular areas, including: language (preposition use), social skills (joint attention), pre-academics (picture matching and pattern imitation), and academics (sight words) (Fabrizio & Schrimmer, 2002; Fabrizio, Schrimmer, Vu, Diakite & Yao; 2003, Kerr, Campbell & McGrory, 2002; and King, Moors & Fabrizio, 2003). These findings have supported the need for teaching and measurement methods that ensure "true skill mastery" or "fluent performance," (measured as performance frequencies or frequency ranges with "mastery" defined by the fluency outcomes indicated by RESA/SEAR and other acronyms) in contrast to more traditional teaching methods for this population which traditionally have focused solely on accuracy and percent correct as measurement and mastery criteria (Fabrizio & Moors, 2003).

The purpose of the present study was to determine effective and highly efficient instructional strategies that have a significant impact on the lives of the older learners with autism. This result would make a meaningful contribution in the Precision Teaching arena.

## METHOD

### *Participant*

The intervention was implemented with a

16-year-old student with autism. The subject had a history of aggression and self-injury associated with vocational training sessions. Aggression includes grabbing, pinching, scratching, digging fingernails into another's skin, head butting, striking with a fist, and/or kicking. Self injury includes striking self with open hand or fist and pinching self with enough force to temporarily discolor skin.

The student is able to perform basic functional academic skills such as reading (at a Kindergarten to First grade level as tested by the Woodcock-Johnson III Tests of Achievement), phonics, number concepts to 100, and telling time with a digital clock. He uses an augmentative communication system, which contains various category levels appropriate for use in a number of environments (school, community, recreation, etc.).

### *Setting*

The student receives educational services from the Transitional Services component of Adult and Transitional Services, a division of the Douglass Developmental Disabilities Center. The Center is a university based day school/adult program at Rutgers University serving adolescents and adults with autism, ages 14 to 30 years. Adult and Transitional Services employs the techniques of applied behavior analysis in the education and treatment of individuals with autism. The Transitional Services unit was designed specifically to meet the unique needs of adolescents with autism and a long-standing history of challenging behavior. The goals of the unit include determining the function of challenging behavior, teaching the student skills that enable them to manage their own behavior, and transitioning the students into a variety of community environments for the purpose of daily living, recreation, and potential employment.

### *Design*

A single case study was implemented and replicated across three instructional conditions using a multiple probe design. A multiple-probe design is a variant of the multiple baseline design (Baer, Wolf & Risley, 1968), in which the independent variable is applied sequentially to each of three behaviors for the same participant. Baseline measurement of each participant's frequency

of performance of the target motor behavior was obtained. Baseline measurement of the frequency of each clerical skill was obtained. Precision teaching with frequency building procedures was implemented for the first skill (trifolding). Once the criterion has been met for trifolding, an additional probe of the performance of the second skill (envelope stuffing) was completed before initiating timed practice with this skill, and so on with the third skill (mail sorting). The multiple-probe design was selected to eliminate the need for continuous baseline measurement for the two participants remaining in the baseline phase in order to avoid unnecessary exposure to measurement in the absence of reinforcement and instruction to improve the target behavior. The multiple baseline/multiple probe designs demonstrate a functional relationship between the independent variable and the dependent measure when the participants' response frequencies demonstrate the most improvement only when the intervention is applied (Baer, Wolf & Risley, 1968). Frequency-building sessions were implemented five school days per week

### *Materials*

The instructional conditions selected for the intervention were as follows: Trifolding - trifold machine, paper, finished bin, Envelope stuffing - envelopes, trifolded paper, finished bin, Mail sorting - 24 slot mail-sorting bin, labeled envelopes (first and last name of staff members). Trifolding consisted of grasping a single paper from a stack of paper, placing the paper evenly into the top of the trifold machine, releasing the paper as it feeds into the machine, and placing the folded paper into a bin. Envelope stuffing consisted of grasping a single trifolded paper, grasping an envelope with the other hand, placing the paper into the envelope, and releasing the stuffed envelope. Mail sorting consisted of grasping an addressed stuffed envelope, placing it into the corresponding mail slot, and releasing the envelope. Frequency aims were determined utilizing a performance standard established by sampling the performance of three competent neurotypical performers. Progress was graphed on standard celeration charts.

### *Procedure*

Rate of performance was determined

during a five-minute timing for trifolding and one minute timing for envelope stuffing and mailsorting. Rate per minute was calculated. Rate of aggression and self-injury (total combined behaviors) was collected during the baseline session. The baseline rates for the clerical skills and aggression and self-injury were plotted on the standard celeration chart. A line of celeration of 1.25 was plotted in order to determine daily goal rates. The decision to utilize a minimum celeration line at all was made on the basis that previous research that demonstrated that the use of minimum celeration lines increased the likelihood of more timely decisions and higher learner progress than when minimum celeration lines were not utilized (Bohannon, 1975 & Mirkin, 1978; as cited in White, 2000). Further, previous clinical experience in the current setting suggested that use of the minimum celeration line was critical in helping to establish consistency in intervention across participant and staff. The aim (competent rate of performance) for trifolding and envelope stuffing was 13 per minute and for mail sorting was 11 per minute.

### *Precision Teaching with Frequency Building*

Intervention began by exposing the learner to daily timed practice sessions, consisting of 1 to 10 timings at the specified interval (as determined by achieving the minimum celeration goal). The learner performed the skill with verbal encouragement from the instructor for the length of the timing, and the frequency of response will be charted. Daily goals for timed practice were determined by the intersection of the minimum celeration line and the frequency value on the y-axis of the Standard Celeration Chart. Timed practices (or sprints) were repeated until the daily goal is reached or until a maximum of 10 sprints have been completed. If the learner did not meet his daily goal for 3 days, individual modifications were made as suggested in White (2000). Modifications included more frequent practice, change in materials or specific response requirements, more opportunities for modeling and feedback, shorter timing duration, change in reinforcement, or other individualized strategies. As soon as the learner's frequency met or exceeded the overall primary frequency aim for at least 2 days in one of the initial timings, the timing length increased to the next increment (e.g. from 10 seconds to 15

seconds). The learner then performed daily timed practice at the new timing length until he met or exceeded the frequency aim, at which time the timing length will be increased again. Timing lengths increased according to this strategy until a timing length of 30 seconds was reached. Once the learner achieved the frequency aim at a 30 second timing, fluency outcomes were evaluated (stability, endurance and retention).

The intervention was initiated for the first clerical skill, trifold. Daily criterion-based instruction (instruction focused on accuracy, but without relation to rate of performance) continued for the other two skills. Once a frequency aim was reached at a one-minute timing and the stability check was met (performance at the fluent rate in the face of distraction), the intervention began for the second clerical skill, envelope stuffing with a baseline session of a one-minute timing. The same criteria were used to begin the intervention with the third skill, mail sorting. The intervention was initiated at a one-minute timing for trifold; however due to lack of progress (failure to meet the daily goal for two to three consecutive timings), the timing length was reduced to 30 seconds, then to 20 seconds, then to 10 seconds. Intervention was initiated at a 10 second timing length for envelope stuffing, with increases made according to our research design. This included starting with short timings until the learner is performing at competent rates and increasing incrementally until the individual is able to perform at competent rates for one minute, demonstrating endurance (competent performance over a sufficient period of time). Current research indicates that competent performance for one-minute timings is sufficient in achieving competent performance. Baseline followed by the intervention was implemented at a ten second timing length for envelope stuffing, once fluent rates were achieved for envelope stuffing, baseline followed by intervention was implemented for mail sorting.

#### *Inter-observer Agreement and Treatment Integrity*

Inter-observer agreement was conducted on 20% of the scheduled sessions. Exact agreement for each completed behavior was implemented by an independent observer. In addition, treatment integrity data was collected by the independent

observer for 20% of the sessions utilizing a 14-step checklist of the behaviors included in our frequency-based procedure. Reliability ratings ranging from 70-100% (94% average) and treatment integrity was 100% all sessions.

## RESULTS

The rate per minute for trifold and the rate per minute aggression and self-injury (total rate combined) shows the trifold rate increasing from 8.4 per minute to an average of 13 per minute and the rate of aggression and self-injury decreasing from 8 per minute to an average of .2 per minute over the course of 20 weeks (See Chart 1). In Chart 2, the trend of aggression and self-injury during routine retention checks is illustrated, showing the rate of trifold remaining at 13 per minute and rate of aggression and self-injury decreasing to zero over the course of 9 weeks.

In Chart 3, the rate of envelope stuffing and decreasing trend for self-injury and aggression (total behaviors combined) is illustrated. The chart depicts the rate of envelope stuffing increasing from 4 per minute to an average of 13 per minute and rate of aggression and self-injury decreasing from 5 per minute to 0 per minute over the course of 11 weeks. This replicates the results achieved for trifold.

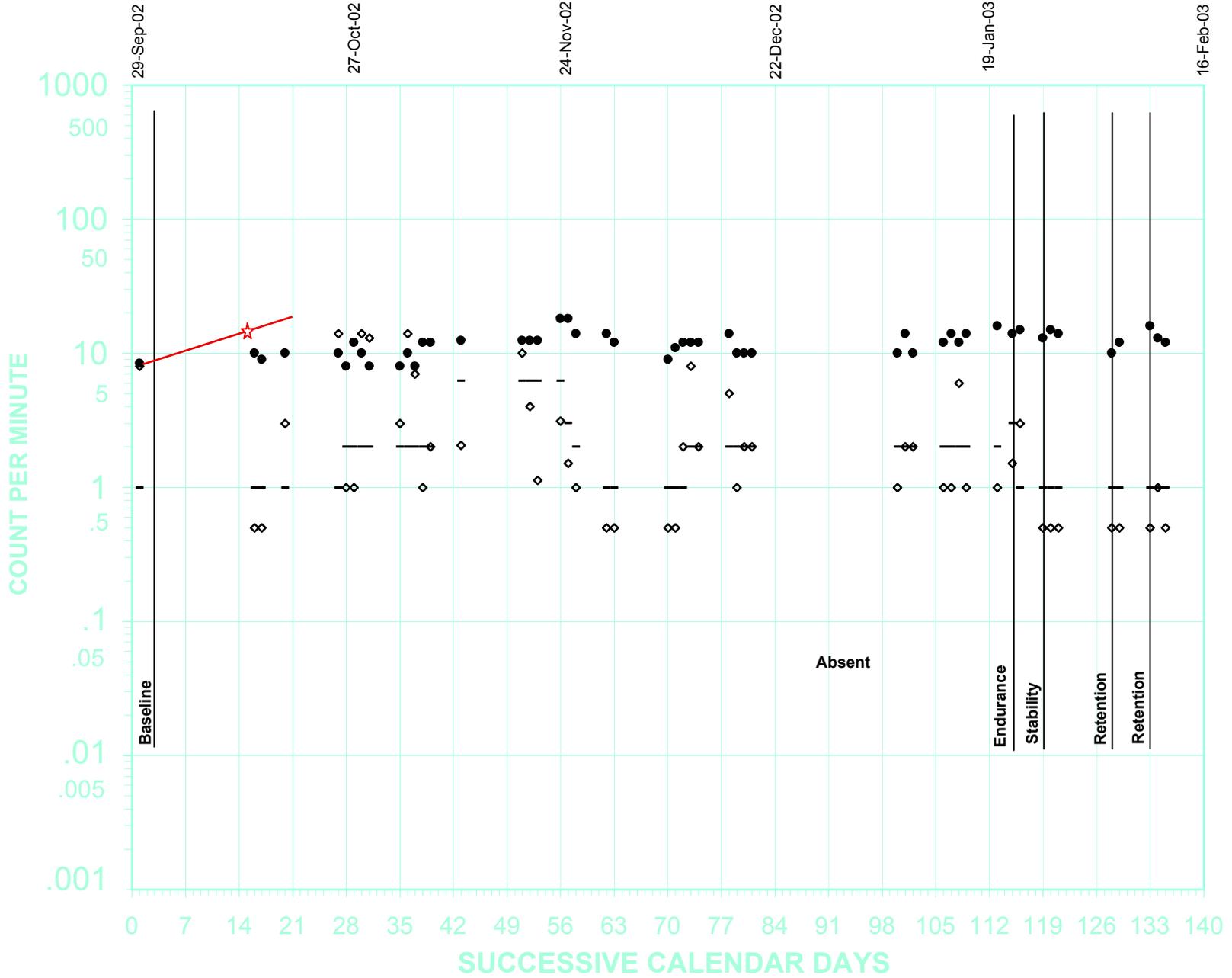
Rate of celeration for mail sorting and the corresponding decreasing rate of self-injury and aggression (total behaviors combined) can be seen in Chart 4. The chart shows the rate of envelope stuffing increasing from 7 per minute to an average of 21 per minute and rate of self-injury and aggression decreasing from 2 per minute to 0 per minute over the course of 6 weeks. This replicates for a second time, the effect of decreased challenging behavior in response to achieving performance standard for a third clerical skill.

## DISCUSSION

Most behavior reduction research has focused on functional assessment and the effectiveness of various interventions (Carr & Durand 1985, Cary & Bucher 1981, Iwata, Pace, Cowdery & Miltenberger 1994, and Vollmer, Iwata, Zarcone & Mazaleski 1993). The literature regarding vocational training as related to behavior reduction

# CALENDAR WEEKS

LIKENESS OF DAILY PER MINUTE STANDARD CELEBRATION CHART  
 6 CYCLE - 140 DAYS (20 WEEKS)  
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 BOX 3351 - KANSAS CITY, KS 66103 VM: 913-362-5900  
 WWW.BEHAVIORRESEARCHCOMPANY.COM

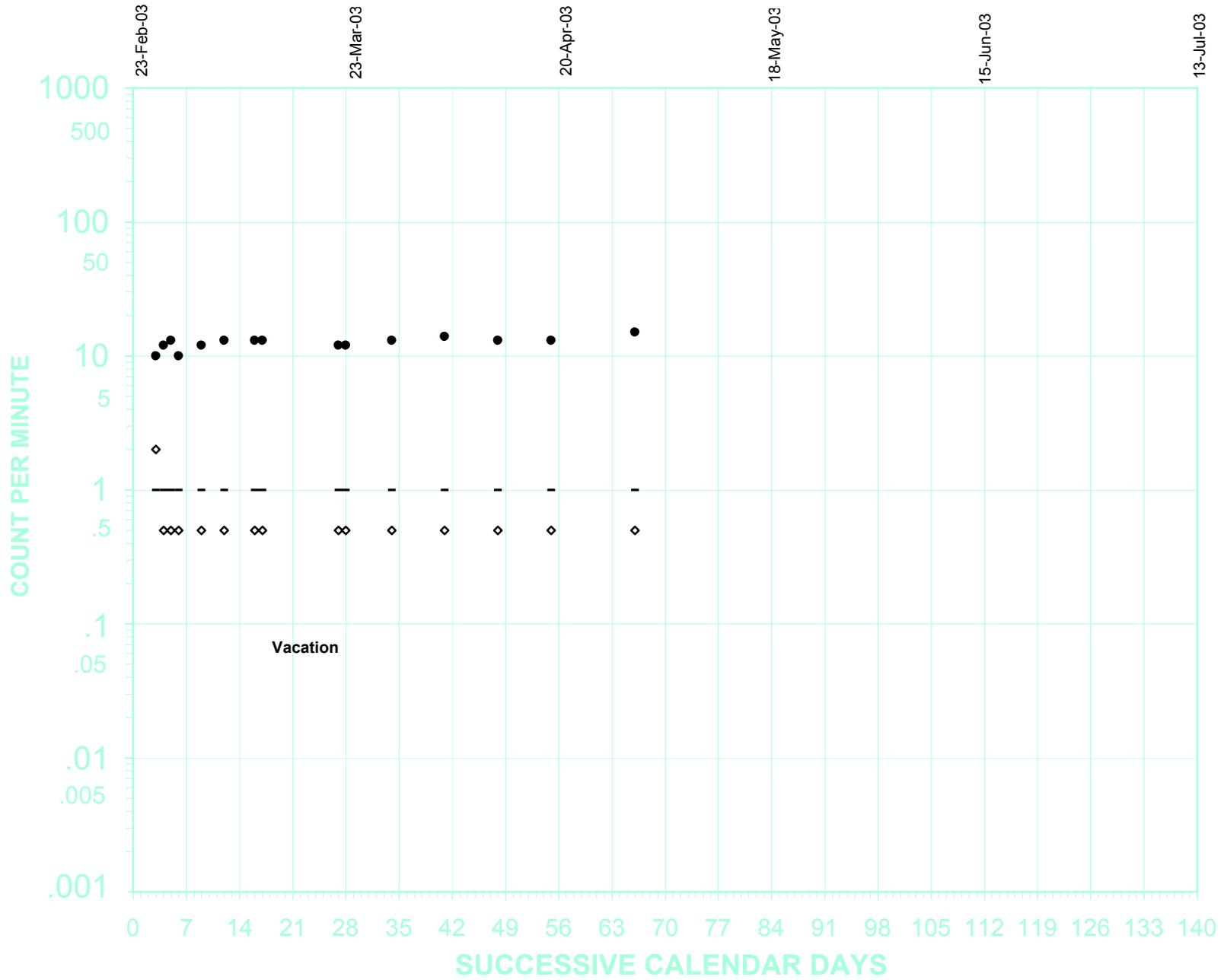


● See-Do Trifolds Sheets of Paper ◆ Aggression and Self-Injurious Behavior - Record Floor

Chart 1.

# CALENDAR WEEKS

LIKENESS OF DAILY PER MINUTE STANDARD CELEBRATION CHART  
 6 CYCLE - 140 DAYS (20 WEEKS)  
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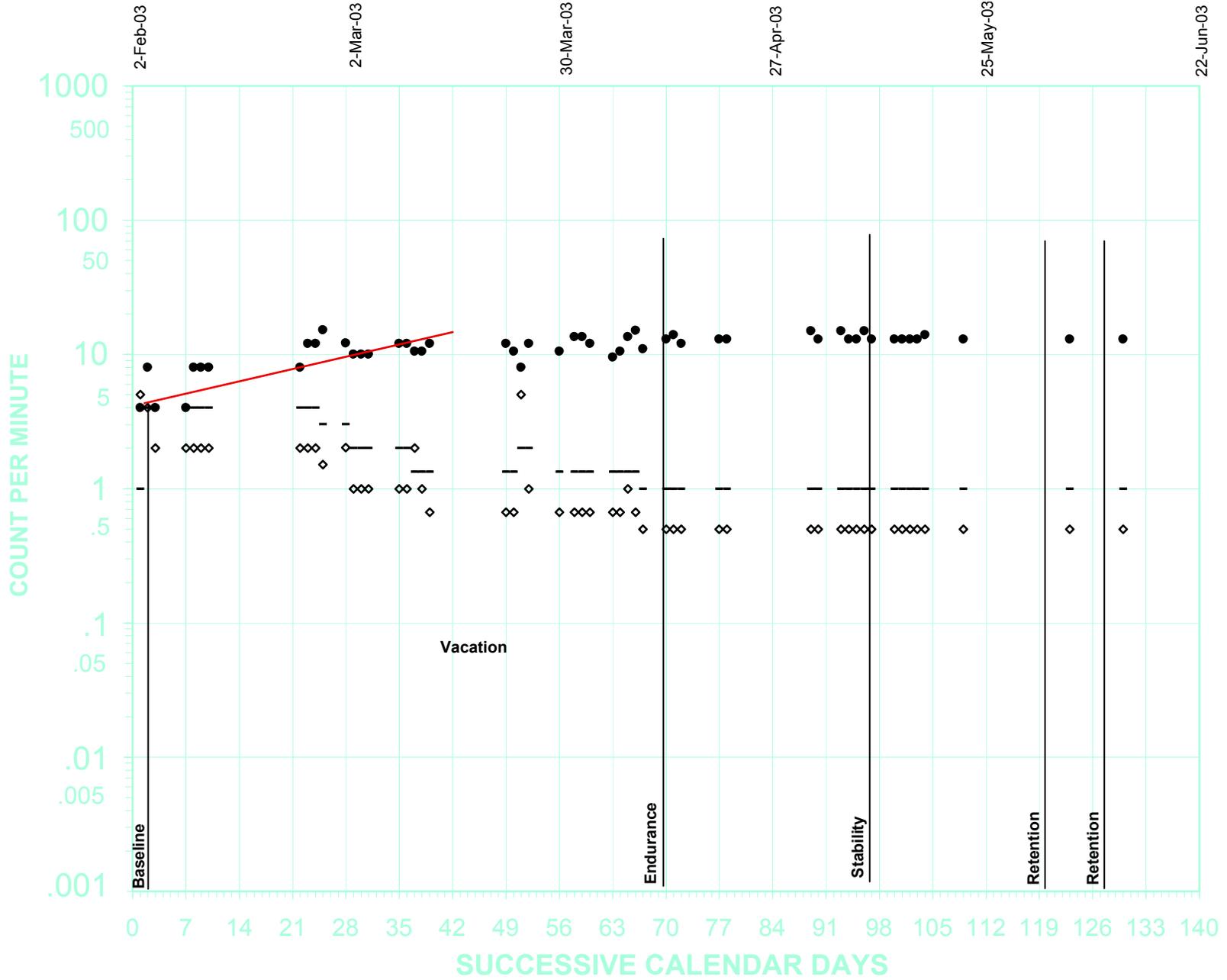


• See-Do Trifolds Sheets of Paper    ◊ Aggression and Self-Injurious Behavior    - Record Floor

Chart 2.

# CALENDAR WEEKS

LIKENESS OF DAILY PER MINUTE STANDARD CELEBRATION CHART  
 6 CYCLE - 140 DAYS (20 WEEKS)  
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 WWW.BEHAVIORRESEARCHCOMPANY.COM



• See-Do Stuffs Envelopes   ♦ Aggression and Self-Injury - Record Floor

Chart 3.

# CALENDAR WEEKS

LIKENESS OF DAILY PER MINUTE STANDARD CELEBRATION CHART  
 6 CYCLE - 140 DAYS (20 WEEKS)  
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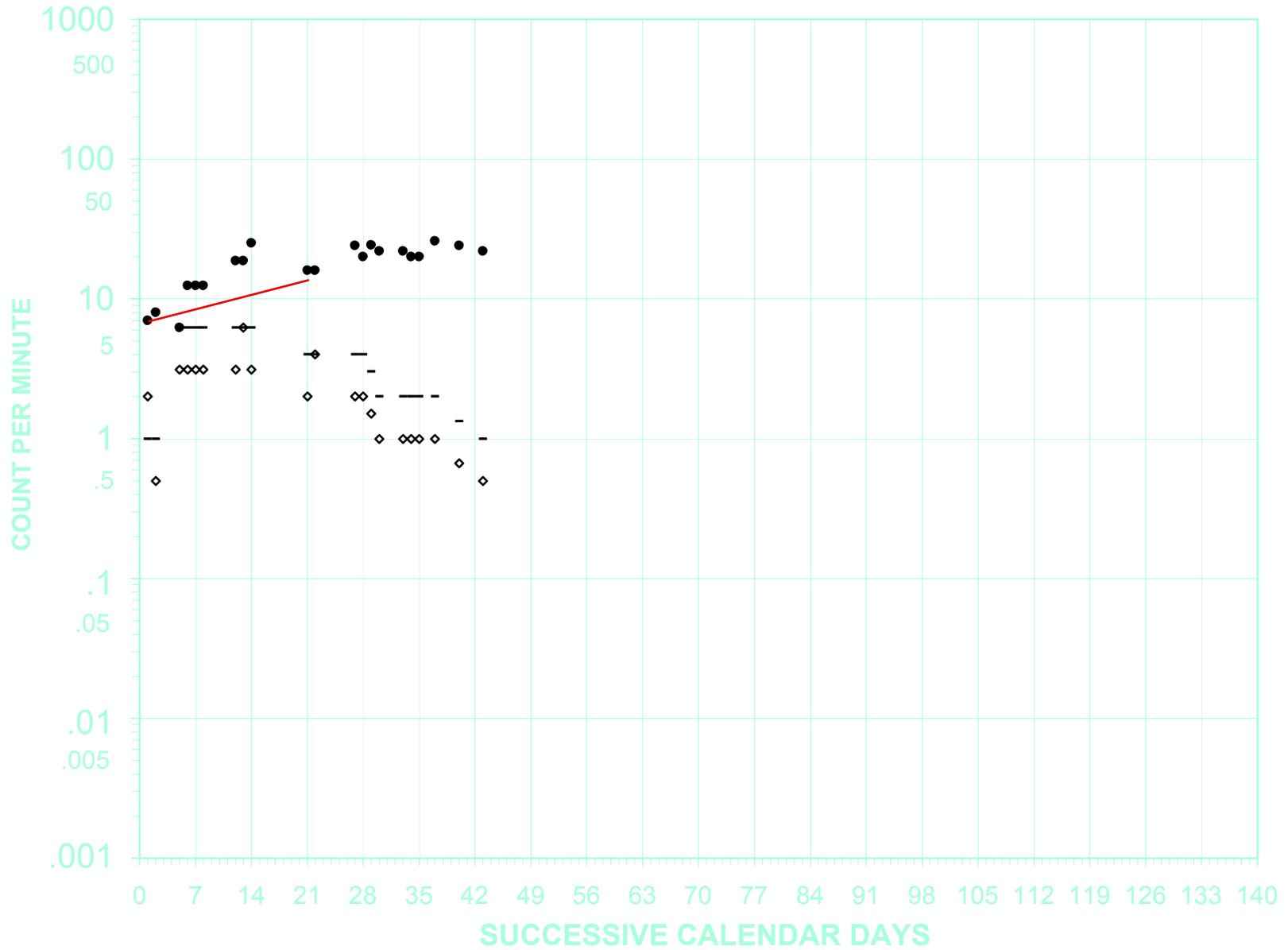


Chart 4.

• See-Do Sorts Mail   ♦ Aggression and Self-Injury   - Record Floor

has focused on the effectiveness of such interventions as preference assessment and choice making (Parsons, Reid, Reynolds & Bumgarner 1990). This study expands the literature base for interventions that build desired competing behavior and increase skills that are related to employment. The data suggest that by increasing the rate of performance for clerical skills, one can decrease the rate of challenging behavior in older students with autism. This finding first shown with the intervention of Precision Teaching with rate building procedures of trifolding (using a trifold machine) is further strengthened by replication of the results for an additional two clerical skills, envelope stuffing and mail sorting. This suggests that competent performance and the occurrence of challenging behavior are incompatible. This result holds promise for other adolescents who present behavioral challenges. Precision Teaching with rate-building procedures has the added benefit of being time efficient. Each fluency instruction session took a maximum of 15 minutes and results were achieved in as little as six weeks.

One collateral effect noted was that the student demonstrated a more positive affect during the intervention once competence was established. This was noted through the observation of videotape recorded during the beginning sessions, middle sessions, and last sessions. The videotaped intervention sessions were viewed in random temporal order. Eight independent observers were asked to rate affect during each videotaped segment. The evaluation consisted of a five-point Likert scale with a rating of 1 being negative, 2 being somewhat negative, 3 being neutral, 4 being somewhat positive and 5 being positive. The mode for the first frequency-building session was compared to the mode from the final intervention session, with the mode for the first being 2 and for the last being 4. Future research should focus on further quantification this aspect of instruction as satisfaction with one's own performance relates to improved quality of life.

*Study Limitations.* Implementation of the first phase of the study resulted in many challenges. The use of a mechanical device (trifold machine) lead to a procedural ceiling due to failure of the machine to operate consistently and correctly. Although implementation of the intervention for skills requiring the use of a machine might be of

importance, it is recommended that future studies avoid this potential confound. The length of time necessary for the student to achieve competent performance for trifolding was significantly greater than for envelope stuffing or mail sorting. Rates of aggression and self-injury may have been impacted by the student's frustration in using a device that malfunctioned on numerous occasions.

One additional confound in this study is the effects of practice on the reduction of challenging behavior. Although the student had been exposed to typical instruction for a year prior to fluency-based instruction, typical instruction was performed only a few times per week. We are unable to determine if similar results could be achieved if typical instruction were performed more frequently.

A single baseline was collected for each clerical skill targeted for intervention. There is the possibility that other variables may have contributed to the reduction in challenging behavior as multiple baseline measures were not collected to validate the skill performance as stable performance prior to intervention.

*Research Recommendations.* Further research holds much promise for a population of individuals that were previously considered to have reached a plateau in the educational/training process. Additional research could examine the effects of interventions meant to improve transitions from adolescence to early adulthood, particularly for vulnerable young people (i.e., learners with autism), and examine the changes to systems, organizations, and programs, with particular emphasis on results that are durable (longitudinal data collected in our future studies). Increasing the understanding and use of the behavioral sciences could influence change in educational practice.

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