The Role of Initial Frequencies in Evaluating Student Performance in Curricular Sequences with Infinite Ranges

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That a student's performance reaches a certain frequency aim should not be the only criteria used to determine whether or not to end or change intervention with a particular skill. While frequency aims—especially aims empirically linked to important instructional outcomes like retention, endurance, stability, and application—certainly play central and important roles in Precision Teaching in determining when a student might have mastered a particular skill, clinicians and teachers should also consider other variables when trying to evaluate whether students have learned a given skill. In many situations, curricular complexity and skill agility are also very important considerations. By curricular complexity, we mean an adequate range of instructional items to delineate sufficient coverage of the subject matter; by skill agility, we mean the degree to which children's data show "better and better responses" to increasing curricular demands, often through data patterns such as rises in initial frequencies across curricular changes (climbing bottoms) or steeper acceleration of correct responding across progressively more difficult curricular steps.

To better understand the importance of curricular complexity in instructional programming for children with disabilities, we discriminate between tasks with two different types of curricular ranges: infinite and finite. For some skills, the range of instructional stimuli that should come to occasion responding by students is inherently finite, or limited. Naming family members, saying the names of classmates, and repeating sounds of a language are all examples of skills with finite curricular ranges—the number of items to be taught for each skill is inherently restricted to a manageable, real number. For skills with finite curricula ranges, empirically-derived frequency aims can serve as signposts that help inform when frequency building may be stopped. As an example, when teaching a child to repeat sounds (Hear/Say Sounds), a teacher might consider ending instruction once their students could repeat all sounds in the English language (or whatever the child's native language happened to be) at empirically-derived frequency aims (Fabrizio & Moors, 2003; Binder, 1996).

For other skills, however, the range of instructional stimuli that should come to occasion responding by the student is infinite—that is, there exists no finite, easily identifiable range of things to teach. Answering basic informational questions during conversations, repeating sentences, and reading words are all examples of skills whose range of instructional stimuli is either infinite or so large that it precludes easily including the full range within instructional programs. Who can say how many words a child needs to be able to repeat fluently? Students should be able to repeat any word containing sounds and sound combinations they have mastered—not just words directly taught to them. How many sentences should a student be able to repeat? A student should be able to repeat any sentence they hear.

Because we cannot easily specify the range of instructional materials across which we should measure a student's frequency of responding to help us determine when a student might be ready to end timed practice for skills with infinite (or at least functionally infinite) curricular ranges, we must turn instead to other measures such as skill agility. As Lindsley (2001) as cited in Neely (2004) pointed out, in measuring skill agility, we may focus on two features of a child's charted performance data: climbing bottoms and celeration.

The data we present here show an example of climbing bottoms in the word reading (See/Say Words) of a child with multiple disabilities. The curricular range of See/Say Words is functionally infinite in that clinicians and teachers would be hard pressed to recount the entire list of words that a child should be able to read quickly and easily. Such a list begins quite small in Kindergarten, but grows geometrically larger with each year of schooling. It would prove a very difficult task for any piece of specially designed instruction to keep up with such growth demands. Accordingly, clinicians and teachers might set rapid and easy acquisition of novel items from whatever curricular range they want the child to learn as the goal of instruction with this skill and other skills with infinite curricular ranges.

The chart we present here shows Tyler's timed practice performance on See/Say Words across a 20-week period. Tyler, who was diagnosed with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) secondary to Pallister-Killian Mosaic Syndrome (a rare genetic disorder), was four years and two months old when he began practicing this skill. Tyler's in-home instructional team began teaching him to read from the text Teach Your Child to Read in 100 Easy Lessons (Engleman, Haddox & Bruner, 1986). Once Tyler learned 10 new words from 100 Easy Lessons, those 10 words became a practice set for his daily See/Say Words frequency building. Each practice set contained words arranged on practice sheets with approximately 70 words per sheet that Tyler practiced until he could say the words at a frequency of 70 words per minute.

Cumulative slices (for example, "Cum 1-3," "Cum 1-4") consisted of words from each slice within the specified range. If the phase name was "Cum 1-3," Tyler practiced the words he had previously practiced in sets one, two, and three. If the phase name was "Cum 1-10," Tyler practiced the words he had previously practiced from sets one through ten.

The dots within each phase of the chart show Tyler's frequency of correct responding on that day's timed practice and the X symbols represent his error frequency. We have enlarged slightly Tyler's initial correct frequencies during the first day of timed practice for each phase on the SCC to help the reader's eye detect the climbing bottoms pattern in the data. Throughout the course of frequency building, Tyler practiced between one and four times each day until he reached a pre-determined daily improvement goal. The first day of each new phase, however, he practiced three times only without an improvement goal as a way of establishing baseline performance for that phase on the chart.

Across Tyler's 16 weeks of timed practice on See/Say Words, the number of days of timed practice he required to reach the frequency aim of 70 words read correctly per minute decreased, even when new sets of words were introduced. Tyler initially required six days of timed practice to reach the frequency aim of 70 words per minute, but the number of days to aim decreased steadily across sets of new words and cumulative slices, a result of the "climbing bottoms" seen in his data. When introduced to the new words for sets 14, 15, 16, and 17, he reached the 70 corrects per minute frequency aim during the first day of timed practice on each of these sets.

Especially when working in curricular areas with infinite instructional ranges, watching for climbing bottoms in students' performance data can help inform instructional decisions; given the appearance of this pattern, teachers may elect to suspend frequency building on a skill or may elect to move children through curricula at a faster pace. In the example data we present here, after Tyler finished set 17 we began using sets comprised of 20 new words rather than 10. The wealth of decisions that teachers can make using the SCC goes well beyond decisions based solely on frequency of correct responding; as a comprehensive, self-contained, and highly flexible display for student performance data, the SCC offers us myriad levels of information about how our students are doing under the conditions of instruction that we arrange for them.

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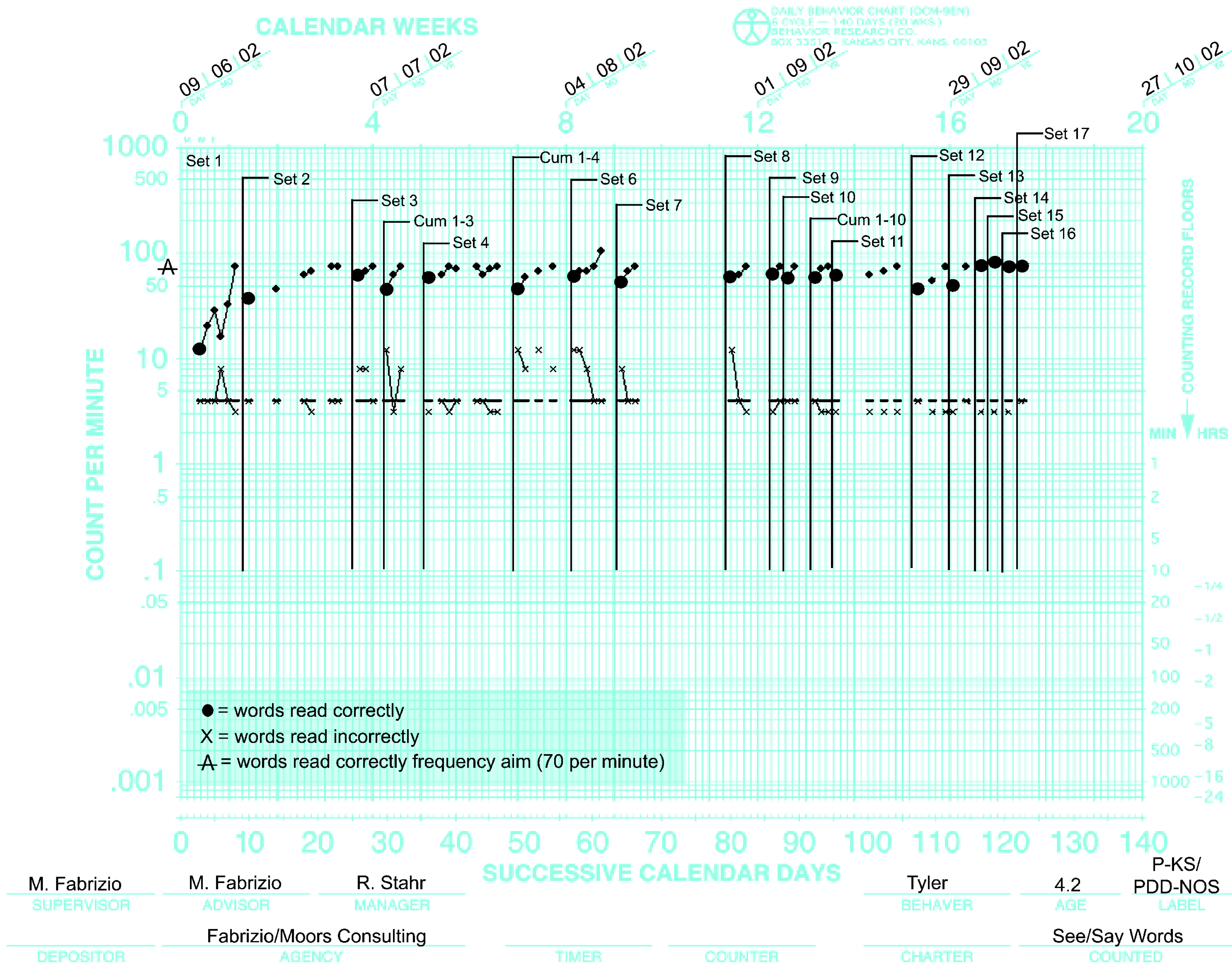
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09 06 02
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04 08 02
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COUNT PER MINUTE
COUNTING RECORD FLOORS
SUCCESSIVE CALENDAR DAYS
Set 1
Set 2
Set 3
Cum 1-3
Set 4
Cum 1-4
Set 6
Set 7
Set 8
Set 9
Set 10
Cum 1-10
Set 11
Set 12
Set 13
Set 14
Set 15
Set 16
Set 17
● = words read correctly
X = words read incorrectly
A = words read correctly frequency aim (70 per minute)
M. Fabrizio
SUPERVISOR
M. Fabrizio
ADVISOR
R. Stahr
MANAGER
Tyler
BEHAVER
4.2
AGE
P-KS/
PDD-NOS
LABEL
DEPOSITOR
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AGENCY
TIMER
COUNTER
CHARTER
See/Say Words
COUNTED