The acquisition and maintenance of reading skills
by intellectually handicapped deaf students
K. Richard Young
Richard P. West
Adrian Crawford

Aim*Star wars: episodes II and III
Owen R. White

About PT
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THE ACQUISITION AND MAINTENANCE OF READING SKILLS BY INTELLECTUALLY HANDICAPPED DEAF STUDENTS

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A major goal in the education of severely multiply handicapped students is the acquisition of behavior that will enable independent living (Perske & Smith, 1977). Learning to read words commonly encountered in the community is an important step toward independence. Brown (1973) stated that "basic reading skills are crucial to survival in a community setting" (p. 8). One of these basic reading skills is recognizing and comprehending the meaning of words on street signs (stop, walk, don't walk), building signs (danger, men, women, open, push, exit, entrance), and warning signs (poison, do not enter, private). The ability to read those words is a survival skill in our word-dependent community.

Children with adequate hearing typically learn to read words through the "oral method." They see the written word and say the word. Multiply handicapped, profoundly deaf adolescents require a different instructional approach emphasizing signs, fingerspelling, and gestures. When a deaf child reads a written word, he shows that he recognizes it with appropriate hand shape and hand movements (see-to-sign approach).

Students are taught to recognize words and to know their meanings, but this is not enough. They must continue to display these skills over time. This may be referred to as maintenance or retention. Haring (1978) defined maintenance as the ability of the learner to "perform the behavior accurately and fluently after some interval [time] without practice" (p. 16). Despite its obvious importance, only a small percentage of applied research has formally investigated the maintenance of behavior over time (Hayes, Rincover, & Solnick, 1980). Whitman and Scibak (1981) reviewed 280 behavioral studies with mentally retarded students and found that only 21 percent (59 of the studies) assessed maintenance. Hayes et al. (1980) and Whitman and Scibak (1981) concluded that additional research is needed to identify strategies that teachers could use to facilitate the maintenance of behavior they teach to handicapped students.

Haring (1978) stated that retention improved as children became more fluent in reading sight words (up to 60-80 words per minute), however, he reported no data. White and Haring (1981) suggested that maintenance of behavior would result when students respond fluently. Again, no data were presented. Liberty (1974) demonstrated a correlation between students' high fluency levels and skill maintenance. A study by Young, West, Howard, and Whitney (in press) also supports the relationship between fluency and maintenance of behavior. In that study, students were taught to dress themselves at frequencies that were fluent and appropriate to the situation. The frequencies were established after sampling the performance of nonhandicapped same age peers, and handicapped peers who were rated as competent in the dressing skills. Response levels continued at treatment levels both in accuracy and frequency, even thirty or more days following the suspension of training. Other research strongly suggests that overlearning (Krueger, 1929) and repetition (Ausubel & Youssef, 1965; Eaton & Swenson, 1972; Gilbert, 1957; Stinnet & Prehm, 1969) improves retention of learned skills. However, relatively few researchers have addressed the presumed relationship between fluent responding and retention or maintenance of performance over time.

The study reported here builds upon previous research dealing with fluency and retention, by investigating the effect of increasing the frequencies of multiply handicapped deaf students' reading recognition and comprehension tasks on the maintenance of the tasks. The study also examined the effects of direct instructional techniques and precise measurement strategies (which emphasized frequency of responding or fluency) on the ability of multiply handicapped deaf students to perform a see-to-sign reading task at frequencies of 85 signs per minute and demonstrate their understanding of the meaning of the words (see-to-match task). The study also measured the maintenance of the learned words following four months without instruction.

METHOD

Participants and Settings
We conducted this study in a classroom serving multiply handicapped deaf students at the Utah School for the Deaf. One female and one male student participated in the study.

The first student was 16 years old at the time of the study. She has a severe
congenital, bilateral sensorineural hearing loss associated with brain damage. She is mentally retarded (intellectual functioning in the trainable range, with an IQ of 35). Her score on the Stanford Achievement Test, reading subtest, was 1.1 grade level.

The second student was a 15 year old male with a severe congenital bilateral sensorineural hearing loss. He has a history of emotional and behavioral problems, including aggressive and destructive behaviors, high levels of distractibility, and lack of attention to social or environmental stimuli. He had an IQ of 53. He scored at the 1.1 grade level on the reading section of the Stanford Achievement Test. Both students were nonvocal and communicated by sign language; both were ambulatory, and neither suffered from deficiencies in finger or hand dexterity.

**Procedures**

**Word Lists.** We constructed two lists with five terms (words or phrases) on each list. We selected the terms from master lists prepared by the school. School officials considered these terms to be important for independent community living. Before the study began, both students learned to sign terms from the master list. The students had also learned some of these terms during previous years. The teacher reported that the students had not retained most of the terms. However, none of the terms that had been previously taught on the lists were used in this study.

We constructed two lists by randomly assigning words and phrases that were unfamiliar to the students to each of the two lists. The words and phrases in each list and the number of signs needed to represent each word or phrase are presented in Table 1. We used the terms on the two lists in two different reading tasks: a reading recognition task (see-to-sign) and a reading comprehension task (see-to-match).

**Reading Recognition Task.** For the reading recognition (see-to-sign) task, we constructed a practice sheet for each word list. The practice sheet for Word List I is displayed in Figure 1. The terms were listed in random order, with each term appearing six times on the practice sheet. A comparable practice sheet was constructed for Word List II. Starting at any point on the practice sheet and repeating the five terms ensured that the students would encounter each of the terms with equal probability and in no predictable sequence.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Word Lists and the Number of Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Word List I</strong></td>
<td><strong>Number of Signs</strong></td>
</tr>
<tr>
<td>bus stop</td>
<td>2</td>
</tr>
<tr>
<td>gentlemen</td>
<td>1</td>
</tr>
<tr>
<td>ladies</td>
<td>1</td>
</tr>
<tr>
<td>no smoking</td>
<td>2</td>
</tr>
<tr>
<td>taxi</td>
<td>1</td>
</tr>
<tr>
<td><strong>Word List II</strong></td>
<td><strong>Number of Signs</strong></td>
</tr>
<tr>
<td>down</td>
<td>1</td>
</tr>
<tr>
<td>fire alarm</td>
<td>2</td>
</tr>
<tr>
<td>handicap</td>
<td>1</td>
</tr>
<tr>
<td>up</td>
<td>1</td>
</tr>
<tr>
<td>wash hands</td>
<td>2</td>
</tr>
</tbody>
</table>

The teacher gave a practice sheet to each of the students and asked the student to read each word or phrase and make the sign as rapidly as possible. The student was given one minute in which to perform the task. If the students reached the bottom of the page, s/he started over at the top. At the end of the one-minute timing, the teacher counted the number of terms signed correctly and incorrectly (the dependent variables) and charted the frequencies on the Standard Celeration Chart. This procedure was repeated for the second practice sheet.

We established an aim of 85 signs per minute for the see-to-sign reading task. We decided on this aim after sampling the performance on the same task of five deaf students, of the same age as the participants in the study, whom the teachers believed were excellent readers. These students performed on grade level, and did not manifest any reading problems. They performed the see-to-sign task and the median response frequency of the five students was selected as the aim.

The intervention consisted of 20 minutes of direct instruction and practice per day, five days per week. The direct instruction involved the presentation of a card by the teacher to the student. Upon the card, the teacher had written a term (word or phrase). Initially, the teacher presented the card, signed the word and had the student sign the word. After the first session, the teacher presented the card, the student looked at it and signed the term written on it. The teacher then showed another card with another term written on it. The procedure continued until all terms from the word list were completed. During instruction, the students were given immediate positive feedback for correct responses, and all errors were
Figure 1
The Practice Sheet for Word List I
Used in the See-to-sign Reading Task

Name __________ Date ______ Count: Correct ___ Error ___ Time: ___ Min.
Word List I
bus stop gentlemen ladies no smoking taxi (5)
ladies taxi bus stop gentlemen no smoking (10)
gentlemen bus stop no smoking taxi ladies (15)
taxi ladies gentlemen bus stop no smoking (20)
bus stop no smoking taxi ladies gentlemen (25)
no smoking gentlemen ladies bus stop taxi (30)

START AT THE TOP

Figure 2
Illustration of the Multiple Probe Design*

Word List I [--------] [Direct Instruction]

Word List II [---] [---] [-----] [-----] [Direct Instruction]

* Baseline and baseline probes are indicated by a dotted horizontal line. A vertical line indicates the introduction of an independent variable. A solid horizontal line indicates an independent variable is operative. The independent variable is indicated just below this line.
corrected by stopping the student, telling him/her that the response was incorrect, modeling the correct response, and requiring the student to make the correct sign.

The students also practiced reading (see-to-sign) the words directly from the practice sheet used in the daily timings. After 20 minutes of instruction and/or practice on signing the terms, the teacher gave the students the practice sheets and asked them to read and sign as many terms as they could during two one-minute timings. The data from these daily, one-minute timings were used to evaluate the students' progress and the effects of the independent variable (direct instruction). The teacher also showed the students their data on the Standard Celeration Charts and praised their efforts and performance improvements.

When the students' performance reached 85 terms per minute on List I, five other terms that the students had learned prior to the study (don't walk, exit, girls, library, restaurant) were added to List I and referred to as List Ib. The teacher felt that this would be a further test of reading mastery. The students practiced list lb until they could respond with 85 terms correct per minute. List IIb was also created, but was used only with the second student because of lack of time at the end of the school year.

Reading Comprehension Task. For the reading comprehension (see-to-match) task, the teacher prepared two 5 x 8 inch cards for each of the terms on the list. Upon each card, the teacher drew a picture depicting the meaning of one of the terms or something closely related to the meaning of the term. Each term had two different 5 x 8 picture cards. For example, the term "fire alarm" was printed on two 3 x 5 word cards and two pictures were drawn on 5 x 8 cards, one of a fire and one of an alarm in a school building. The teacher placed the cards with the terms printed on them in slots on a 3 x 3 slot board. She then displayed the picture cards on a table in front of the student and instructed him/her to place the pictures under the appropriate word or phrase cards. Direct instruction procedures (the independent variable) were used to teach the see-to-match task. These procedures included: explaining (via sign language) the relationship between the word cards and their corresponding picture cards, modeling the performance of the matching task, having students practice matching, and providing positive, corrective feedback. After a ten-minute practice session, the students performed the task during a one-minute timing. The teacher counted the number of correct and incorrect responses during the timing and charted the frequencies on the Standard Celeration Chart. The aim for the see-to-match comprehension task was 25 matches per minute. We determined this aim by timing the same students on this task that assisted us in establishing the aim for the see-to-sign task. The aim was set at the median performance level of the "capable" hearing impaired students.

Experimental design. We utilized a multiple probe variation of the multiple baseline design to establish experimental control for both the see-to-sign and the see-to-match tasks (Horner & Baer, 1978). Gast, Skouge, and Tawney (1984) described the multiple probe design:

The multiple probe design is similar to the multiple baseline design in that the independent variable is systematically and sequentially introduced to one behavior (or in one setting or with one subject) at a time. Unlike the multiple baseline design, baseline data are not collected on a continuous basis on behaviors that have not yet been introduced to the intervention. Rather, probe trials (i.e., trials that are operationally identical to preintervention baseline trials) are conducted intermittently on behaviors "to be trained." These probe trials, which may be interspersed within instructional sessions or across observational periods, provide the applied researcher with data that can be used to evaluate whether a student is improving prior to the introduction of the independent variable (p. 269).

The requirements of demonstrating experimental control with both variations of the multiple probe design are identical to those required with multiple baseline designs. That is, if subject responding remains at or near preintervention (baseline) levels across intermittently conducted probe trials and/or probe sessions, and a targeted behavior improves only after the independent variable has been applied, a functional relationship between the independent variable
and behavior change has been demonstrated (p. 207).

Based on the results of this study, we suggest that teachers employ direct instruction strategies, a variety of practice exercises, and set high aims for multiply handicapped students. The high frequencies produced by these techniques will probably result in greater retention. The maintenance data suggest a relationship between fluency and retention, although this study was not designed to show such a functional relationship.

There is a logical argument for the possible existence of a functional relationship. In order to maintain over time it must be reinforced. If a child is not proficient at performing the behavior, the probability of the behavior occurring diminishes and the opportunity for that behavior to come in contact with reinforcement also diminishes. Many educational programs for severely handicapped students teach them to perform a new behavior correctly for a few trials, but fail to strengthen the behavior to the point that it can be performed in a fluent, effortless manner. Training on the particular skill is terminated and teachers move on to new skills. The newly acquired, but nonfluent, behavior does not occur in the natural environment and, therefore, has no opportunity to be reinforced and strengthened by the natural environment. The behavior eventually extinguishes and requires retraining. Fluency development increases the probability that the child's newly learned behaviors will generalize to nontraining conditions and be maintained over time by coming in contact with natural communities of reinforcement. Even though the data are not conclusive, we believe that instructional programs for the severely handicapped should not be considered complete until the teacher moves the student from the acquisition stage of learning through fluency development to proficiency.

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Chart 2. The see-to-sign performance and learning of the first student on List II.
Chart 3. The See-to-Match Performance and Learning of the First Student on List 1
Chart 4. The See-to-Match Performance and Learning of the First Student on List II.
Chart 5. The See-to-Sign Performance and Learning of the Second Student on List I.
Chart 6. The See-to-Sign Performance and Learning of the Second Student on List II
Chart 7. The See-to-Match Performance and Learning of the Second Student on List I
Chart 8. The See-to-Match Performance and Learning of the Second Student on List II
Eaton, M., & Swenson, A. (1972) Difference in maintenance rates on additional probes of pupils held to criteria on one, two, or three days. In N. G. Haring (Project Director), Annual report: A program project for the investigation and application of procedures of analysis and modification of behavior of handicapped children. Copies on file at the Experimental Education Unit, Child Development and Mental Retardation Center, University of Washington; and at the National Institute of Education, Department of Health, Education, and Welfare.


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AIMSTAR WARS

[Setting AIMS that COMPETE]

Owen R. White
University of Washington

Episode II: Return of the Learner

In Part I of this serial we made friends with young Eric, Learner Knight, and followed the exploits of Uncle Owen as he struggled to discover the secret of the Learner Force that Eric had mastered. Owen had decided that aims should allow a learner to (A)dvance to a level of (I)dependence with a skill and
Maintain the skill over time at a level which will provide a service of value to the learner. You will recall also that Ruth Mundt discovered the true meaning of AIMS from her pupil Patsy, along with the fact that "normal is not always nice." Patsy, in turn, had used the Learner Force to reach superfluency in her see/say sounds, defeating forever the ghost of speech problems which had plagued her even when she had embraced normal fluency in saying her sounds correctly. The monstrous Normie Deathstar had been defeated.

In this episode we will probe deeper into the Learner Force in an attempt to discover just why Patsy needed her superfluency. Uncle Owen will try to keep up, hoping to learn how the possible need for superfluency might be predicted before a program begins.

The key, as you may recall from the previous episode, lies somewhere in the notion that a learner's peers might not be the only source of competition.

Other Behaviors in the Learner's Repertoire

Patsy already had a way of speaking. It was not entirely correct, but it worked. People generally understood her, and most were kind enough not to draw attention to her problem. The skill which Ruth wanted to develop in Patsy was in direct competition with Patsy's existing behaviors—behaviors which had been in Patsy's repertoire and practiced for several years. Had a formal assessment been made of the frequency with which Patsy could say the sounds incorrectly, it might have revealed that she was at the "right frequency" but with the "wrong behavior." When Patsy was specifically directed to form the sounds (during instruction), she was able to do so. When she was not specifically directed to speak correctly (outside instruction), she did what was easiest and most efficient for her to do—she said the sounds incorrectly. In retrospect, it makes sense that Ruth would eventually have to set an aim that competed effectively with that old behavior pattern—an aim that made it much easier for Patsy to speak correctly than incorrectly.

Similar situations abound in education. It is often the case that we are trying to provide learners with alternatives to old skills. In most cases our alternatives will prove much more useful "in the long run," but, from the learner's perspective, the new skills we have to offer are just harder ways (for now, at least) to do old things. An "add fact" is not simply another way of counting. Simply saying, "10" as the answer to "3+7" in a single step is much more efficient (in the long run) than having to count 3 objects or dots, 7 objects or dots, and then counting them as a whole group to get the answer. However, when we first present addition to the learner, basic counting strategies are likely to be much more efficient than our alternative. Which do you think will "win out?" What do you suppose the absolute minimum aim for add facts should be? How fast can the learner count? To gain reasonable confidence that we can really beat the competition and break old habits, it would probably be wise to set the absolute minimum aim at a frequency equal to at least twice the frequency with which the learner can count.

What would be a minimum frequency aim for eating with a spoon? How fast can the learner eat without a spoon?

What would be a minimum frequency aim for typing? How fast can the learner write or print?

With a little thought, it is often possible to identify competing behaviors which are already in the learner's repertoire. By assessing the fluency of those behaviors (and multiplying by 2), it should be possible to estimate reasonable minimum performance aims for the new skills we wish to teach. Once the learner achieves that frequency aim, it should be much easier to use the new skill than the old alternative. That, in turn, should encourage the child to use the new skill whenever it is appropriate. This should lead to even more practice and greater fluency.

This aim strategy may not always be sufficient. It is probably wise to extend the concept of "competition with own behavior" to a consideration for possible "future behavioral alternatives." For example, the learner may count rather slowly, so doubling that frequency to set an aim for basic math skills may still result in a relatively low aim. That may be acceptable for initial "transition to the new skill" ("abandonment of old habits"), but it may not compete effectively with alternatives, such as calculators, which could be made available to the learner later.

As noted earlier (Horton, in progress), most adults really won't use basic math fact skills. They turn to what, for them, is a much more efficient alternative—pushing buttons on a calculator. Even if that alternative is not actually available to the
young learner, it might be a good idea to prepare for the day when it is. "Competent button-pushing adults" could be assessed to determine their fluency in solving simple (below fourth-grade) math problems. That fluency could be used as the minimal aim for our learner's "see/say" behaviors. Then, if one really wanted to shoot for the aim-stars, "adult button-pushing frequencies" for much more complex problems (47 column, 200 term addition of square roots?) could be used as the maximum aim. We would work with the learner until at least the minimum aim was reached, and keep working beyond that point until the learner either went flat or reached the maximum aim.

"Beating the less desirable alternatives" can be a very useful strategy for establishing individualized performance aims. There are times, however, when "beating" is really not the issue. There are at least some times when it is more important to simply "meet" the competition and put various behaviors within the learner's repertoire into better balance. Chris' hopping program (see Charts 2, 3, and 4) provides a good example.

Chris wasn't a physically handicapped child, but he was clumsy enough to become one if something wasn't done. He was constantly tripping over his own feet, falling down, and generally banging himself up something fierce. Ms. Travato could have implemented a standard "takes steps without destroying himself" program, but decided instead to look more carefully at Chris' individual behaviors. After a brief inventory (Chart 2), it became obvious that Chris had a problem with the strength and/or agility of his left leg. What should the teacher do? Should she build strength and agility in using the left leg? What aim should be used? Normal folk of Chris' age hop in the range of 40 to 150 per minute (Rae-Johnson, personal communication, 1979)—much better than Chris even with his strong leg. Ms. Travato could have set those normal fluencies as her aim, but wisely decided to use Chris' own behavior for at least a starting point. She used Chris' right leg performance as the aim for his left leg. Following a brief but very interesting program, the aim was reached (see Chart 3). To make sure that her standard of comparison wasn't changing, she also monitored the right leg. By the end of the program, right and left leg frequencies are virtually identical (hold Charts 3 and 4 up to the light). Chris is still less than "normal," but he's in balance. Ig he still tripping? Tripping the light fantastic would be more like it. He moves with the grace of a gazelle (well, perhaps not quite), and undoubtedly is now considering defection to the U.S.S.R. (United Soviet Star Republic) to make up for all the ballet artists we've gotten from them.

Sometimes we may need to use Normie standards. It seems reasonable, however, in many cases to simply try and beat less desirable alternatives in the child's own repertoire, or to bring different behaviors in the child's repertoire into better balance. Put faith in the Learner Force.

Unfortunately, there are still a few types of competition to be considered. Learners are not always masters of their own destinies, as Uncle Owen will discover in the next episode.

Episode III: The Normie Empire Strikes Back

In the First episode, "The Deathstar," Uncle Owen reviewed several methods for establishing performance aims and begrudgingly admitted that there may be times when Normie standards are useful. However, we also learned from Patsy, a Learner Rebel, that for an aim to facilitate (A)dvancement to a level of (I)independence and (M)aintenance which will provide a (S)ervice for the learner, it is sometimes necessary to become superfluent—achieve a level of performance much higher than Normies. In the last episode, "Return of the Learner," Uncle Owen considered Learner Rebel Patsy's need for superfluency and concluded that she had to be much better than Normies in saying sounds correctly in order to "beat" her old and fluent habit of saying the sounds incorrectly. We also met Chris who, unlike Patsy, only needed to bring the fluency with which he was able to use each leg into better balance in order to overcome a problem with tripping. Chris' aim for the "poor leg" was lower than that for a Normie, but it did match his "good leg," and solved his immediate problem with tripping. In both cases, the issue was one of competing with one's OWN behavioral alternatives or fluencies, not the standards so often imposed by the evil Normie Empire.

In this episode we will follow Uncle Owen's struggle and learn how the Normie Empire often responds to the idea of rejecting its standards. There is, it seems, another Deathstar.

Manager Expectations and Patience

Thus far, adults and peers have been considered only as models of competent performance. In addition to representing abstract standards of comparison, peers and adults often assume the role of "manager" and
Chart 2. An Assessment of the Balance/Strength of Chris' Legs/Feet

Hopping range reported by Rae-Johnson (personal communication, 1979)
Chart 3. Chris Learns to Hop on His Left Foot

Hopping Range Reported by Rae-Johnson (1979)

Special Practice with Right Foot on Block; Class Cheers

Class Cheers Only

Count per Minute

Successive Calendar Days

Hops on Left Foot/

Right Foot Touches Ground
Chart 4. Chris Hops on His Right Foot
determine the extent to which the learner is
given the opportunity to use a skill.

One possible role of a manager is to "do for
the learner if the learner does not do for
him/herself." An infant's parent will
provide for dressing, feeding, locomotion and
virtually all of the infant's needs. The
parent relinquishes control over such chores
as the infant grows older and more competent,
but often the transfer of control is slower
than necessary.

I am the father of two fine young sons
(Shaffer the Super and Heston the Hero) who
are Learner Rebels. Both are quite capable
dressing independently (albeit, socks and
shoes are a toss-up). However, they dress
themselves only when I allow it. On
weekdays, when I must rise early, take them
to preschool and get off to work myself, I
usually assist them through most of the
 dressing routine. I am impatient as a
manager. I do not want to rise forty minutes
earlier to allow the boys sufficient time to
do everything themselves. I am selfish. I
am not unusual. The boys and I do have
"dressing races," when time allows, and they
are becoming more fluent. Someday, when they
can beat my time, I will allow them to do
what they can already do.

What is the minimum fluency aim for dressing?
How fast can the manager dress the learner?
(Multiply the manager's frequency by 1.5 or
2.0 just to make sure.)

What is the minimum fluency aim for eating?
How fast can the manager feed the child? How
long does it take the manager to clean up if
the child does it alone? (Put both those
times together, increase the frequency by a
factor of 1.5 to 2.0 to be on the safe side.)

What are the minimum fluency and endurance
aims for walking? How fast does the manager
walk with a normal stride? How far does the
manager want to walk on most occasions?
(Don't increase those standards by any
factor. You might even decrease them a bit.
After all, the alternative is that the
manager has to carry the child, unless there
is a stroller or wheelchair lurking in the
background.)

What are the minimum fluency and intelligi-
bility standards for talking? How long are
most managers willing to wait before they
begin to try and "guess" what the child is
saying? (Increase the standard to provide a
safe margin.)

If the learner exceeds the limits of the
manager's patience, then the learner will not
be afforded the opportunity to practice the
skill, even if the learner is otherwise
basically "competent." That, in turn, will
lead to disuse of the skill, possibly a
reduction in competence, and the skill will
either not be incorporated into the learner's
regular behavioral repertoire (outside
instruction) or will be integrated into that
repertoire much more slowly than would
otherwise be possible.

Managerial patience is often tied to the age
of the learner. Imagine a very young child
approaching a stranger on the street (under
the careful gaze of the child's parent) and
saying, "...hi-e-e-e-ee...da-da..." More often
than not, the stranger will smile, pat the
child on the head, and struggle to decipher
the child's next utterances. Put the same
dysfluent verbal behaviors into the body of a
severely handicapped young adult. The
stranger turns hurriedly away and pretends
not to notice. The very young child is
engaging in age appropriate behavior which,
while dysfluent, is likely to be reinforced.
The older individual fails to meet minimal
age expectations and is consequential in a way
which is likely to lead to a deceleration of
the newly emerging skill.

The idea that a skill should be "age appro-
priate" has been well advanced, especially in
the literature concerning the education of
severely handicapped learners. More often
than not, the concept is reduced to an
important, but rather vague notion of "human
dignity"—learners should not be taught
things which will make them stand out as
"behaviorally immature." As illustrated
above, however, the value in learning age
appropriate behaviors and fluency has very
practical implications as well.

Other learner attributes may also affect a
potential manager's expectations. Most
people will wait patiently for a person with
obvious physical disabilities (chronic or
temporary) to maneuver into an elevator. Put
the same slow gait into the body of an
obviously healthy child and people quickly
lose patience with the "dawdling." Similarly,
most parents are quite supportive when
their child has an occasional "accident"
while eating, but are much quicker to lose
their patience with the child who consis-
tently spills milk or drops food on the
floor.

Managerial expectations are of special
significance when trying to "mainstream" a
learner, that is, when trying to more fully
integrate a handicapped learner into an environment populated primarily by nonhandicapped learners.] On the one hand, a "regular teacher" is likely to have a host of expectations developed over the years on the basis of interactions with nonhandicapped learners. The time allowed for certain activities (e.g., reading an assignment, completing math worksheets) may be unrealistic for the handicapped learner who has not already been brought to a level of fluency commensurate with 'Normie' standards.

On the other hand, many teachers who have not worked with the "handicapped" hold unrealistically low performance expectations and will make counter-productive concessions to the mainstreamed child. The mainstreamed child may be given much more time than is necessary to complete assignments, assignments might be "watered down," and the curriculum excised of all challenge and significance.

Aside from rather specific expectations based on a learner's age, obvious physical attributes, or "history," the most important variable in determining a manager's patience is likely to be time. It might not be the fluency (or dysfluency) with which the learner attempts to demonstrate the skill that is critical, but rather the time which the manager must invest in order to permit the learner to demonstrate the skill. The fact that it might take my sons thirty or forty minutes to dress is not the problem, it is the fact that I must rise early enough to prompt them to begin, and keep popping back to prompt them to continue that is a problem. In most cases it is unreasonable to expect a manager to invest more than a few extra seconds (all at once, or spread out over a much longer period) to allow a learner the opportunity to perform a skill.

Counterbalancing the investment of time, in at least some cases, is a potential savings in the energy or work which a manager might have to expend if the learner does not perform the skill. As mentioned earlier, for example, a manager might allow a very young child to walk independently even if it takes longer to get somewhere. The alternative is usually the much more effortful task of carrying the child. Similarly, a parent might be more inclined to put up with a child's slow eating behavior if it means that the parent is free of the task of scooping the food for the child every few seconds (interfering with the parent's own eating). If allowing the learner to practice a skill means an increase in the manager's workload, on the other hand, patience is much more likely to wear thin. Being free of the task of scooping the child's food is of little value if the task of cleaning up after the meal becomes much more involved; putting the learner into easily removed "big boy pants" instead of diapers to allow the practice of independent toileting may try the manager's patience if the more effortful task of cleaning up "accidents" without diapers is too frequent.

Finally, the importance of all the factors outlined above—expectations, time and effort—can be altered significantly by two additional concerns: other demands placed upon the manager, and the subjective "worth" of the learner's attempts to demonstrate and develop the skill. At times a parent may be willing to slow down and allow the child to toddle along, at other times it will be necessary to reach some destination quickly and the parent will carry the child. At times I am willing to allow my children to dress themselves. At other times I must get to work quickly and cannot afford the luxury. Parents and teachers might place a high value on the development of new skills in their children and be willing to put up with initial dysfluency. Other potential managers in the learner's world are less likely to be as tolerant.

So, it would seem, it is not always possible to completely ignore the standards of the Normie Empire. While other standards may bring a learner to a level where the skill is of personal use and importance, Normie Commander Managers in the learner's world will still often have the power to determine whether the learner is allowed the opportunity to practice and use a skill. We may rely to a certain extent on the good will of some managers (especially parents and teachers) to perceive dysfluent approximations of a skill to be of significant worth, but even the most benevolent of managers will often have unrealistic expectations or special demands on their time. We must set our aims high enough to ensure that other people in the Learner's world will ALLOW the skill to be demonstrated. That means that the skill and fluency with which it is demonstrated must be:

[Age appropriate or otherwise expected; take only a
Little of the manager's time or
Lessen the manager's own workload and
Other demands on the manager's time...OR...it must be of special
Worth to the manager.

The well meaning (but often evil) Normie Empire may strike back at the Learner Rebel,
prohibiting or discouraging the demonstration of skills within the Learner's repertoire. There is another Deathstar protected by the forcefield of limited manager patience and competitive demands. If Learner Knights are to defeat that system, they must attend to Normie expectations and the demands placed on the managers themselves. There is hope! With a little nudge, the power of that forcefield can sometimes be turned from the Dark Side. The saga of Learner Rebel Paul shows the way.

Paul would not have been welcome at Princess Learna's table. He grabbed for food in a most unseemly manner. In last year's class he had been taught to ask for the food he wanted in a more appropriate manner (by pointing, since he was nonvocal), but the new behavior failed to generalize and maintain. This is a common story. Handicapped learners are "noted for their forgetfulness." However, what if the desired behavior was still really there, lying dormant beneath the concealing blanket of an older, more fluent behavioral alternative? We might try to increase the fluency of the pointing responses so it could compete more effectively with grabbing. However, when you get right down to it, what could be quicker than simply grabbing what you want? What if we made the old behavior pattern less useful? What if we unleashed the power of the inhibiting manager forcefield on the grabbing response? Charts 5 and 6 tell the story.

In the first few days of Paul's program he never pointed to the food he wanted, he just grabbed. Learner Knight Billingsley (in progress) and Laura Dickenson (Paul's manager) then decided to put a forcefield around the grabbing behavior during lunch time. No "instruction" was provided—Paul was never told or shown what he should do (after all, he had been taught all that a year ago), he was only prevented from getting the food he tried to grab. After a few confused days (see Chart 5), the light of the good side of the Learner Force shone through and Paul began to consistently point to the food he wanted with the same fluency he used to display in grabbing food.

Snack time was another matter (see Chart 6). Encouraged by success in one setting, the forcefield was turned against grabbing during snack time. The desired behavior appeared almost immediately, without specific instruction, just by preventing the old behavior from being effective.

With a minimum of effort, the power of that Normie villain Decel-Vader that lurks in all managers can be turned from the Dark Side. The mask can be ripped away, revealing the caring Learner Knight and unveiling the true power of the Learner Force that lies within the frequencies of all Learner Rebels.

In the next episode, "Scouts, Flankers and Rear Guard," Uncle Owen returns to the question of aims which will allow the Learner Rebels to advance quickly through the curriculum.

REFERENCES

Billingsley, F. The effects of competing behaviors on skill generalization. Part of an ongoing series of studies being conducted by the Washington Research Organization (in progress).


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About PT

AN ANNOUNCEMENT

P.T. TIMES, a newsletter about Precision Teaching, is now available. Two issues are already in circulation, with the third and final issue for the 1984-85 school scheduled to be distributed in May. Five issues are planned for the 1985-86 school year. This publication is exclusively for teachers and is being made available at no cost.

P.T. TIMES is distributed through a network of persons who have agreed to make copies and distribute them in their part of the world. If you can serve as a distributor, please call or write Gary Myerson, 13626 Twin Peaks Road, Poway, CA 92064, 619-748-0010, ext. 250(work), 619-747-0888(home). If you would like to receive the first two issues, as well as subsequent issues, contact either Gary Myerson or one of the following distributors:

Walter Berard  Skip Bergquam
Kim Besel  Abigail Calkin
Chart 5. Paul learns to point to food during lunch.
Chart 6. Paul Learns to Point to Food during Snacktime.
A publication like this requires contributions from its readers. We welcome your contributions!

NOTES FROM THE EDITOR

Patrick McGreevy

This issue marks the end of Volume V. If you would like to renew your subscription without a delay in receiving the next issue, please mail the renewal form (attached to the inside front cover) with a check or purchase order as soon as possible. If you have suggestions or concerns about JPT, please feel free to express them on this form.

With the beginning of Volume VI, we will have a number of new consulting editors. Some of the present consulting editors will also be asked to continue in that capacity. If you would like to nominate a consulting editor, please do so on the renewal form.

A special thank you goes out to those who have already subscribed to Volume VI. Please use the renewal form for suggestions and nominations. I would also like to thank all the authors, contributing editors, consulting editors and reviewers for their valuable assistance, without which there would be no journal.

I would encourage all of you to support P.T. TIMES. Gary Myerson, your efforts are greatly appreciated!

Journal of Precision Teaching

STANDARD GLOSSARY AND CHARTING CONVENTIONS*

Fourth Revision (January, 1985)

Accelerating Target — a movement the behaver, manager, advisor, or supervisor expects to accelerate; the frequency is symbolized by placing a dot on the Chart.

Accuracy Improvement Multiplier — the measure of change in accuracy over time; celeration correct/celeration incorrect.

Accuracy Multiplier — the measure of accuracy: distance from frequency incorrect to frequency correct; the value by which the frequency incorrect is multiplied or divided to obtain the frequency correct; also called the accuracy ratio.

Accuracy Pair — two movements, usually correct and incorrect, charted simultaneously.

Add-subtract Scale — any measurement scale on which adding and subtracting by a constant amount is represented by a constant distance; the "up and left" scale on an equal interval chart.

Advisor — the person who advises the manager, usually viewing Charts on a weekly basis.

Behaver — the person whose behavior is displayed on the Chart.

Behavior Floor — the lowest daily frequency possible for a particular behavior; 1/number of minutes behavior can occur; symbolized by drawing a solid horizontal line on the Chart.

Bounce Around Celeration — up bounce and down bounce combined; the range of deviations of frequencies from the celeration line.

Calendar Dates on the Chart — dates written across the top of the Chart specifying the date of every fourth Sunday for 20 weeks; a day/month/year format is used as follows, 15/Jan/84.

Celeration — the basic unit of measurement of behavior change over seven or more frequencies; change in frequency per unit time.

Celeration Aim — the expected celeration for a given movement.

Celeration Envelope — an envelope formed by the construction of two lines parallel to a celeration line; one line passes through the frequency farthest above the celeration line and one line passes through the frequency farthest below the celeration line; the bounce around celeration is the vertical distance along any day line from the bottom to the top of the envelope.
Celeration Line — a best-fit, solid straight line constructed through seven or more continuous frequencies of a given movement on the Standard Celeration Chart.

Celeration Multiplier (turn up or turn down) — the value by which one celeration is multiplied or divided to obtain a second; symbolized by drawing "↑" or "↓" from the first to the second of two celeration lines or from a projected celeration line to a celeration line exactly one week after the two celeration lines intersect or would intersect if extended in either direction.

Change Day — the first day of a phase change; symbolized by drawing a solid vertical line covering that day line on the Chart.

Counting Period Ceiling — the highest frequency observable under a given counting procedure; symbolized by drawing a dash line on the Chart connecting the Saturday and Monday lines.

Counting Period Floor — the lowest frequency detectable by a given counting procedure; 1/number of minutes spent counting; symbolized by drawing a dash line on the Chart connecting the Tuesday and Thursday lines, or a short, horizontal line intersecting with a day line.

Cycle — the distance on the Chart between consecutive powers of 10.

Day line — a vertical line on the Daily Standard Celeration Chart.

Decelerating Target — a movement the behaver, manager, advisor, or supervisor expects to decelerate; the frequency is symbolized by placing an "x" on the Chart.

Double Improvement Learning Picture — both movements of an accuracy pair with celerations in the expected direction.

Down Bounce — the distance along a day line from the celeration line to the frequency farthest below it.

Duration — the amount of time it takes to complete one occurrence of a behavior; 1/number of minutes spent behaving; symbolized by drawing a short, horizontal line on the Chart intersecting with a day line.

Event-following Celeration Line — a celeration line drawn through all frequencies for a given movement just prior to a phase change.

Freehand Method — a method of visually estimating and drawing celeration lines.

Frequency — the basic unit of behavioral measurement; the number of movements per unit time.

Frequency Aim — the expected phase-ending frequency for a given movement; symbolized by drawing an aim star "▲" with the horizontal line at the expected frequency and the point of the star on the day the aim was set.

Frequency Line — a horizontal line on the Chart; also called a counting line.

Frequency Multiplier (jump up or jump dm) — the basic unit of measurement of behavior change between two frequencies; the value by which one frequency is multiplied or divided to obtain a second; symbolized by drawing "▲" or "↓" from the first to the second of two frequencies on the day line of the second frequency.

Geometric Mean — the appropriate method for obtaining an average on a multiply-divide scale.

Ignored Day — a day on which the behavior being measured occurs but is not charted; the frequency immediately preceding and immediately following an ignored day(s) should be connected.

Latency — the amount of time between the occurrence of a signal and the beginning of a movement; 1/time from signal to start of movement; symbolized by drawing a short, horizontal line on the Chart intersecting with a day line.

Learning — a change in performance per unit time; also called celeration.

Learning Picture — the celeration lines of both movements of an accuracy pair viewed together.

Manager — the person who works with the behaver on a daily basis.

Median Celeration — the middle celeration in a celeration distribution; symbolized by drawing a "<" on the Chart.
Median Frequency — the middle frequency in a frequency distribution; symbolized by drawing a "<" on the Chart.

Most Recent Celeration Line — a celeration line drawn through the last 7-10 frequencies for a given movement.

Movement — a recorded behavioral event; usually specified in terms of a movement cycle with a beginning, middle and end.

Multiply-divide Scale — any measurement scale on which multiplying and dividing by a constant amount is represented by a constant distance; the "up the left" scale on the Standard Celeration Chart.

No Chance Day — a day on which the behavior being measured has no chance to occur; the frequency immediately preceding and immediately following a no chance day(s) should not be connected.

Overall Celeration Line — a celeration line drawn through all frequencies for a given movement.

Performance — the number of movements per unit time; also called frequency.

Periodic Celeration Line — a celeration line drawn through all frequencies for a given movement in a specific time period, such as bi-weekly or monthly.

Phase Change — a deliberate alteration made to the behavior's environment in an effort to improve the behavior being measured.

Projected Celeration Line — an expected celeration line based on a current celeration drawn through seven or more continuous frequencies; symbolized by drawing a dash line extending one or two weeks from a celeration line.

Projected Celeration Envelope — an expected celeration envelope based on a current celeration envelope drawn through seven or more continuous frequencies; symbolized by drawing two dash lines extending one or two weeks from a celeration envelope.

Quarter-Intersect Method — a method for computing and constructing celeration lines.

Recorded Day — a day on which the behavior being measured has the opportunity to occur and is recorded.

Single Improvement Learning Picture — one movement of an accuracy pair with a celeration in the expected direction.

Split-middle Line — a line drawn parallel to a quarter-intersect celeration line, such that half the data points fall on or above the line and half the data points fall on or below the line.

Standard Celeration Chart — a standard, six-cycle semi-logarithmic chart that measures frequency as movements/time/time; Daily, Weekly, Monthly, Yearly and Summary versions are available; also called the Standard Behavior Chart.

Supervisor — the person who supervises the advisor and the manager, usually viewing Charts on a monthly basis.

Total Bounce — the distance along a day line from the highest to the lowest frequency; analogous to range of an add-subtract scale.

Trend-following Celeration Line — a celeration line drawn through visible trends for a given movement.

Up Bounce — the distance along a day line from the celeration line to the frequency farthest above it.


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