

**DOUBLES, NEIGHBORS AND
TWO HOUSES AWAY:
A QUICK TRIP TO AIM
ON ADDITION FACTS**

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Teachers in resource rooms often find children who are quite accurate in their addition facts, but seem to "plateau" far below the aim set for them. They learn the smaller sums (1+1, 2+3) with facility, but the larger sums (9+7, 7+8) bring out the fingers. Motivation and extra drill do not seem to increase the frequencies significantly and both the teacher and the student become frustrated and discouraged.

Last year, while observing a student teacher in a resource room, Anne Lankenau, I noticed she was using a procedure with great success to get beyond that plateau to fluency. It was a method of curriculum slicing which she and her cooperating teachers called "doubles, neighbors, and two houses away."

Precision teachers are familiar with curriculum slicing. Hansen and Lovitt(1973) described program slicing as a procedure to individualize instruction. Teachers, faced with poor performance on mixed addition facts or facts with sums 11 to 18, have frequently sliced back to the +6s or the +7s and asked the student to reach aim frequencies on each small slice before moving on. Collections of practice sheets, such as those from the Great Falls Precision Teaching Project, often have many different versions of finely sliced curriculum in math, as well as reading, spelling, and writing.

Claudia Partlow and Kay Hermann, Anne's cooperating teachers, decided to slice their curriculum a little differently. They noticed that the children seemed to have an easier time remembering the doubles (6+6, 8+8, 5+5 etc.) than the random combinations. They borrowed an idea from a fellow special education teacher, Pat Richardson-Bieber, and devised a practice sheet which contained only the doubles(see Figure 1). They prepared two other practice sheets which capitalized on the students' facility with the doubles. The first, called "doubles and neighbors", contained the double problems mixed with others in which the two numbers only differ by one(see Figure 1). The final sheet,

called "doubles, neighbors and two houses away", included the doubles and neighbors mixed with problems in which the digits differed by two (i.e. two numbers away from the doubles). Samples of these problems would include 7+7 (double), 7+6 (neighbor) and 5+7 (two houses away). When all these practice sheets are learned to aim, there are only 8 facts("exceptions") and their reciprocals which the child still needs to learn in order to perform the addition sums 11 to 18 sheet (see Figure 1).

The first step in using the "doubles, neighbors, and two houses away" procedure was to teach the children all the double combinations. Standard drill and practice instruction procedures were used including one minute timed drills and/or peer assisted SAFMEDS.

After reaching aim on the "doubles" sheet, the children were taught using the following "neighbors" learning strategy:

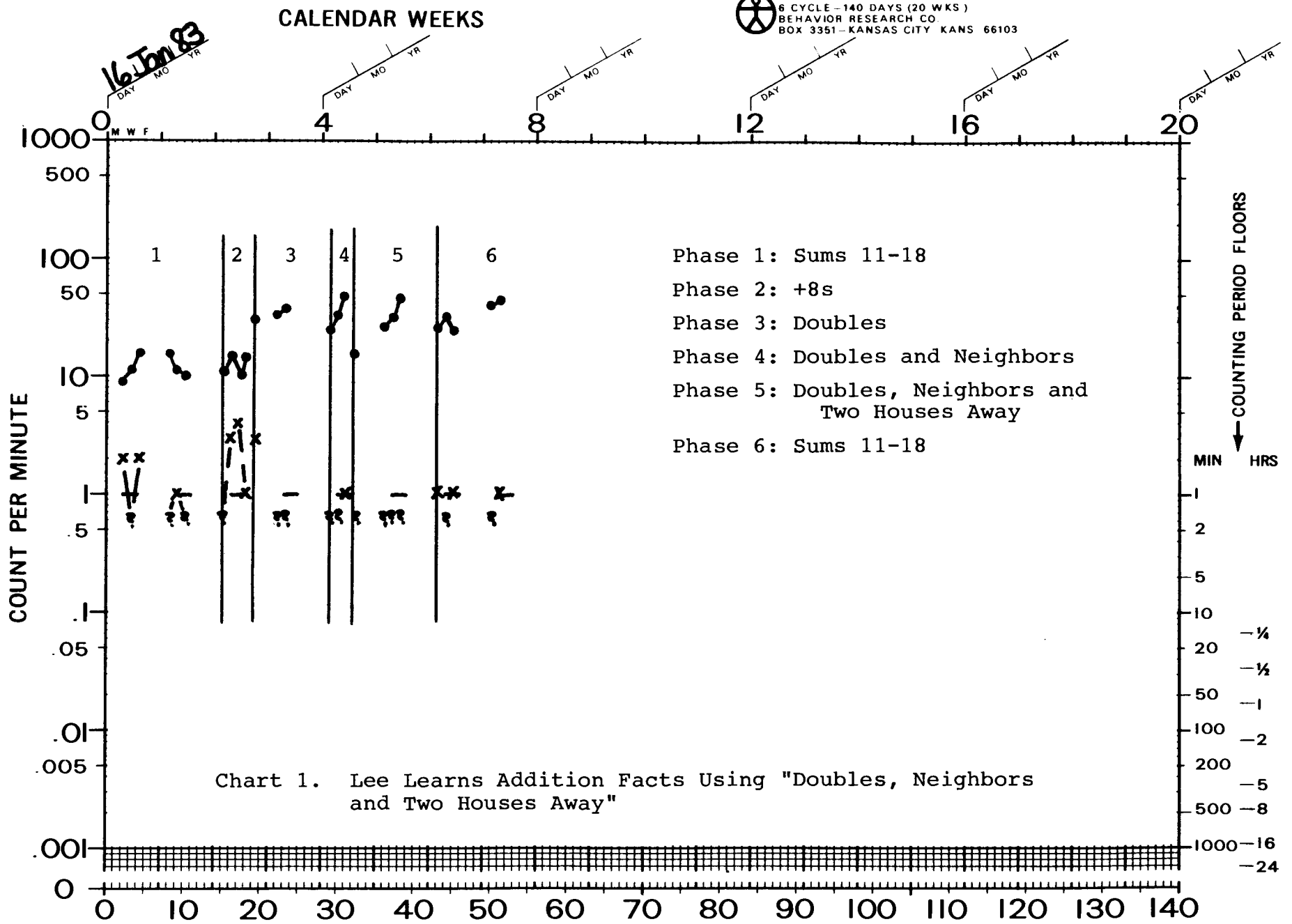
1. Look at each problem;
2. Are the numbers "neighbors"? (that is, consecutive numbers such as 4+5, 3+2);
3. Find the smaller of the neighbors;
4. Double it;
5. Add 1 to your answer;
6. Write your new answer below the problem.

This procedure short cuts teaching reciprocal problems (i.e. 5+6, or 6+5) because the children learn to ignore the order of presentation of the numbers. In "two houses away" the children followed a similar method. They first identified the problem as a "two houses away" problem, then found the smaller number, doubled it and added two. Although this procedure seems lengthy, the data these teachers collected indicated that it helped their students move from low frequencies to aim and fluency.

Charts 1 and 2 show the data from two typical children in this resource room. Both are primary aged students referred for learning problems and both had difficulty reaching fluency in their addition facts with sums 11 to 18. Lee was an ESL (English as Second Language) student and also had some mild learning problems. He showed dramatic improvement as soon as the doubles sheet was introduced(see Chart 1). His correct frequency jumped from a median of 13 digits per minute to a median of 32 digits per minute. He went on to easily reach his aim of 40 digits per minute on the "doubles and



DAILY BEHAVIOR CHART (DCM-9EN)
 6 CYCLE - 140 DAYS (20 WKS)
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Eaton	Partlow	Lankenau	Lee	9	see/write
SUPERVISOR	ADVISER	MANAGER	BEHAVIOR	AGE	digits--
Bellingham Public Schools	Bellingham, WA		COUNTER	CHARTER	LABEL
AGENCY					COUNTED
					addition facts

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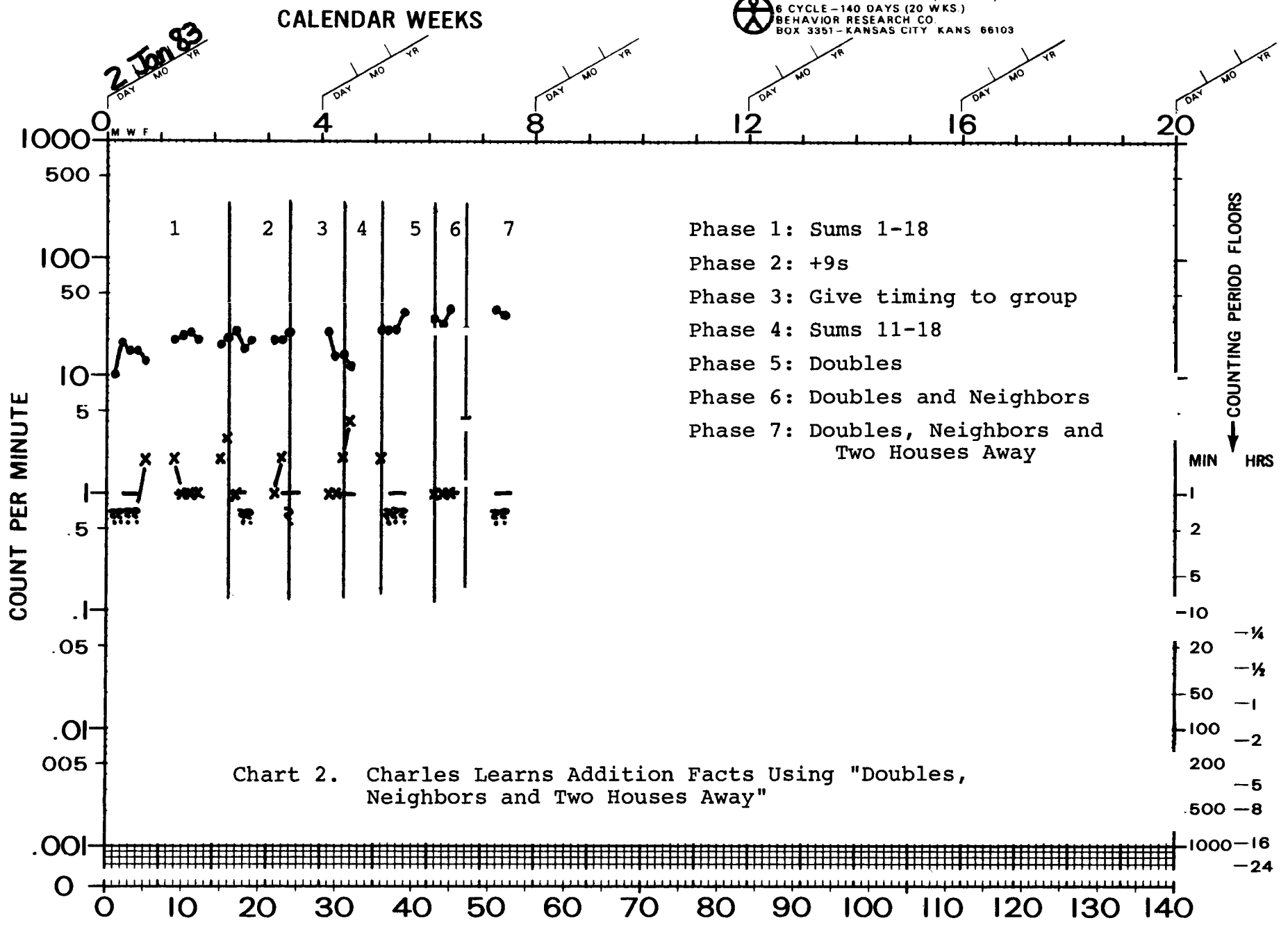


Chart 2. Charles Learns Addition Facts Using "Doubles, Neighbors and Two Houses Away"

Eaton	Partlow	Lankenau	SUCCESSIVE CALENDAR DAYS		Charles	10	see/write
SUPERVISOR	ADVISER	MANAGER			BEHAVIOR	AGE	digits--
Bellingham Public Schools Bellingham, WA			COUNTER	CHARTER	addition facts		
AGENCY					COUNTED		

neighbors" and "doubles, neighbors and two houses away" sheets. When he finally went back to the original sums to 18 sheet, his frequencies were much more fluent than previously and he reached his aim in five days (see Chart 1).

Charles was quite severely learning disabled. He typically had a difficult time reaching aim on even simple skills, yet his data were similar to Lee's. He showed some improvement in addition with sums to 18, but he had reached a "plateau". When "doubles", "doubles and neighbors", and "doubles, neighbors and two houses away" were introduced, he quickly reached his aim on all the practice sheets(see Chart 2).

Claudia, Kay, and Anne reported that other children in the class also benefited from this procedure and shared their data and practice sheets at our monthly Precision Teaching gathering. Other teachers in the area began to use the same procedure with similar results.

Sometimes it is not IF you slice curriculum, but HOW you slice it that makes the difference for a child's learning. The area of curriculum evaluation and development is one that can be easily and effectively studied using Precision Teaching. Teachers can learn from the performance and learning of their children the most effective ways to sequence curriculum and to apply learning strategies to help them master basic skills.

REFERENCE

Hansen, C. & Lovitt, T. (1973) Program Slicing: A tool for individualizing instruction. **Education and Training of the Mentally Retarded**, 8, 153-158.

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The Pre-purchase Assessment: Guarding Against Those Nasty Dust Collectors*

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Among the complex needs of multi-handicapped people, deficits in expressive communication are often the most profound. Without a

fluent output channel, effective interaction with their environment is minimized.

Alternative communication systems have existed for years. Sign language, picture and/or symbol systems have, in many cases, greatly enhanced the communicative ability of non-verbal people. Ingenious applications of technology have enabled any reliable, voluntary movement to indicate a discrimination. The overt discrimination can be translated into a unit of information or communication.

The complexity of alternative communication systems ranges from direct selection of an object or its representation on a picture board via an eye gaze or touch (Shane, 1979) to encoding techniques on a personal computer with a voice synthesizer. The expense of alternative systems has an equally broad range. When presented with such a myriad of possible configurations, parents of multi-handicapped, non-verbal people sometimes become overly optimistic about the impact of technology. A complex electronic system can be seen as the magic key that will finally unlock the ability to communicate for their child.

Teachers are responsible for determining what alternative communication system, if any, is most appropriate for a person. Frequently, determining what is appropriate is a guessing game, with the prescription for a communication board based on absence/presence questions. Can he recognize objects? Can he identify photographs? What about line drawings? Without objective rules at the start, the guessing game usually ends with the "pieces", the communication system, in a closet gathering dust. A frequency-based assessment before the purchase may more precisely prescribe a system format to prevent a closet full of dusty magic keys.

Abdul is a 16 year old student in the Merrimack Special Education Collaborative's Basic Skills classroom. His medical diagnosis includes cerebral palsy and severe mental retardation. Spasticity in his extremities limits Abdul's mobility and fine motor performances. He communicates via a combination of gestures, approximated manual signs, and a few words. He identifies objects (hear,see/point), and can demonstrate their use. He can identify Rebus pictures of familiar objects (hear,see/touch), with varying accuracy (Rebus pictures can be obtained from American Guidance Service,

* A special note of thanks to Jim Pollard for his fluent help in preparing this paper.