

SIMPLE & EFFECTIVE



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Short-Term Auditory Memory Training (STAMT)

Some 40 years ago when I was working at Menorah Medical Center in Kansas City; I evaluated a child who was regressing in school. I know now, and perhaps knew then, that if a child regresses it is an alarming sign.

As I recall she was a sweet but very quiet child to evaluate. On the SSW for one item I waited for her response and when I looked up to see what the matter was, she was looking at me. I cued her by asking her what she heard, but she indicated she hadn't heard it yet.

On a previous occasion when I had a similar experience, I referred the child to a neurologist. Despite a normal neurology exam, on the EEG they found frequent small petit mal seizures (I think petit mal is now referred to as absence seizures). The same problem was found for this child and fortunately the doctor was able to control the seizures with medication. If she had a seizure, or two, at an important time she may have missed the item altogether.

The family returned to us because school was still very difficult for the child. They wanted to know if we could help her get back on track academically. Their main concern was her extremely poor short-term memory. I think she was 9-years-old, likely in the third grade but could not remember three numbers or words. That's when I started working on auditory memory. By the way I believe that the seizure disorder was not directly related to her severe memory problem, but I thought you would find that aspect interesting.

Over the years, from time to time, I have worked with children and adults with memory problems, but only those who were pretty severe because I was concerned due to my own limited memory span. Fast forward to the present - almost two years ago I received two phone calls within a week from the parents of children I had worked with three years before. Each parent reported that for two years the child did very well in school but in the third year the child was "struggling". The specific struggles were all associated with short-term memory in both cases. For this reason I got into the memory business and will never go back to the way I practiced.

Purpose:

1. The purpose of STAMT is to address short-term auditory memory problems at a basic level. As an audiologist I feel that my domain is basic and not higher cognitive function. Each person needs to define his or her limits. I work comfortably with rote digit and word memory excluding compensations/strategies such as visualization and chunking. However, I violate my own rules by treating working memory problems, which I don't see as so basic.
2. I try to increase a person's skill by one unit. For example, if the person can perform well on three digits but not well on four; I try to get the child to handling four digits well. Of course, if I have time I might then work from four to five digits.

I don't work on compensations/strategies, at least at first, for two reasons: they tend to gloss over the problem because the child seems to be more successful than they actually are, and because it is a more cognitive approach. After the child's memory is stretched they can always use strategies to give them even higher potential.

Pre-Testing and Planning:

I developed my own digit-memory procedure called STAMT that has 10 items for 3, 4 and 5 digit items and 5 items for 6 digits. I also use Woodcock-Johnson tests #17 for words and #9 for working memory to get an idea of where the child is functioning. While it is of interest to me if the child is within normal limits, very often they have been trained in compensations (especially for digits) so they may still have memory issues. It is a good idea to lookout for compensations the person may be using and as Carl Weitman indicated recently, you can tell the child that it is a very good way to help yourself but just for now not to use it.

I look for how many digit, word and working memory units a person can handle well, and the next longer one that is a challenge for the person. For example, 3 digits = 100%, 4 digits = 90% and 5 digits = 20%. In this case we would use therapy worksheets from 4 to 5 digits. The Woodcock-Johnson tests consider both an error as well as an out of sequence response as a mistake. But in this case for therapy purposes we look at memory and sequencing separately. We generally, consider digits first, words next and working memory last. If time is short I have the family work on digits while I work in words and/or working memory.

Therapy Procedure

The same approach that is used for the other Simple and Effective procedures is used for memory. We provide memory therapy in small doses over time and work from easy to hard. While the procedure may be simple you will see that it is quite effective. One can make work sheets starting with e.g., 3 digits and ending with 4, or starting with 4 words and ending with 5 etc. I organize the the various sublists by levels of difficulty. The easiest sublist is A and the hardest of the four sublists is D. Each list has 10 items. An easy item is “1, 2, 8, 9” and a harder one is 7, 3, 0, 8. Units are presented at about one per second. In training we sometimes check where there is a challenge whether a slightly faster or slower pace would provide better performance. Those of you who have my therapy book (Katz, 2009) can use the ones provided.

					Errors	rev
1	2	3	9		•	R
2	3	7	8		•	R
3	1	4	6		•	R
4	3	5	7		•	R
5	1	2	6	7	•	R
6	3	1	4	2	•	R
7	5	8	9	1	-/•	R
8	4	6	7	2	•	(R)
9	3	4	9	0	-	R
10	7	3	8	1	-	R
			Totals		70%	1
Sample memory worksheet 3 to 4 digits						

We see as we work on the easier sublists and succeed, then when we get to the harder sublists their previous successes tend to carry over and often do as well or better on the harder sublists. I generally give just one sublist per session.

I ask the family to pitch in when I have insufficient time to address the various memory problems. I give them an appropriate work sheet and ask them to do two sublists at different times during the week but not more than 3 times a week. When they bring back the scored sheet I ask them to do the next two sublists or to review the previous ones depending on the scores. Again we mark down an incorrect sequence (by circling the R) but don't consider them errors.

Repair Procedures

When the person makes a mistake the first time around I generally mark it down but otherwise make not attempt to remedy it. But on the second time around, if it is in error again or if there are other errors I often see if it can be improved. Often the second try is enough to improve the score but if an item is in error, indicate, "Let's try that again". This time I may just give it again or emphasize the word that was in error. I might give it one more shot if the child is getting close and then go on.

At times you will be determined that the child will get an item correct so you will do it by hook or by crook. For example, you may tell the person you forgot the "7" or if more help is needed, "It was 4, 3, 7, 9". Another approach in desperation is to show the item written out. Hook or by crook is not just making believe this is improving memory. Just saying the 4 digits and gaining in confidence will likely have a positive effect on later items especially over time.

Results

The results of memory training have been good and seem to carry over into other memory activities.

Figure 1 shows the performance curves for four digits. The Pre curve shows the means for the initial presentations of the four sublists (A through D). The Post curve shows the means for the last time the person tried the memory task. Sublists A represent the 4 digit words on that sublist. We look to see if the harder sublists show poorer scores or if therapy may have caused subsequent lists to be no more difficult than the easier sublists. We are also interested to see if progress was made on the subsequent trials.

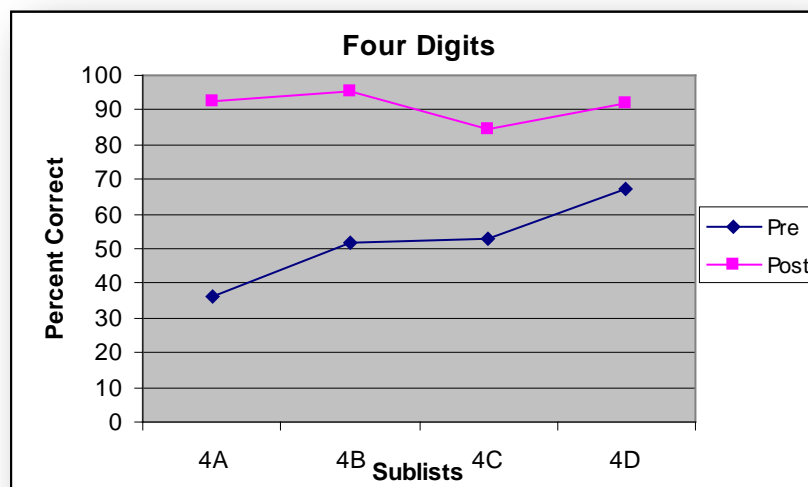
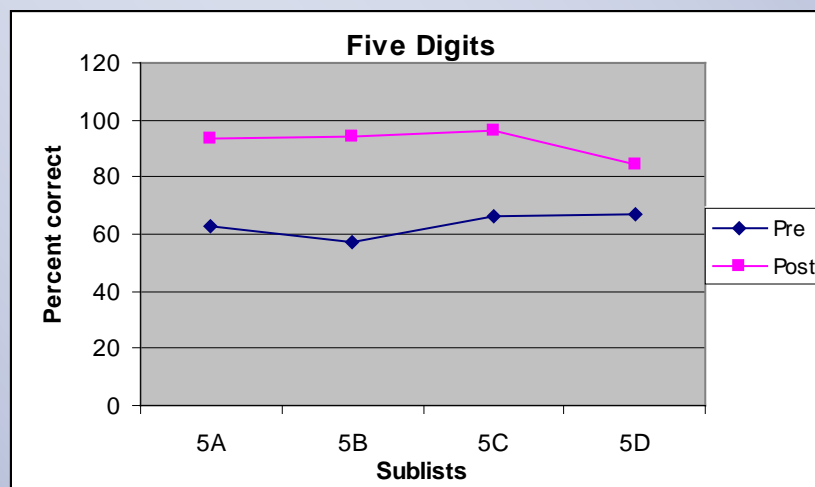


Figure 1

Figure 1 shows that on the easiest sublist the average person had about 35% correct for four digits (sublist 4A). When attention was turned to 4B performance was better instead of poorer as we would expect on the harder items. Performance on sublist 4D was better yet. So it seems that with therapy, at this level with digits, there was a favorable effect from prior training that showed up on subsequent sublists. The next question is whether there was improvement on the items of the sublist themselves. It appears that there was improvement to a ceiling level or near ceiling with a mean of better than 90%. Please note that we have almost double the number of children for each condition than we had in the figures of the therapy book.

The 5-digit task was more challenging for these than the 4-digit sublists. The Pre curve in Figure 2 shows instead of poorer scores compared to 4-digits they are better. These children appear to have benefited from the prior training with 4-digits as their initial mean score was about 60% correct of all four sublists. Following therapy the Post curve was near 100% except for the hardest sublist D that was closer to 80%. It should be understood that most of the children received only 2 tries per sublist because of lack of time.

Figure 2



We put greatest emphasis on memory for words. Figure 3 shows the means for 4-words.

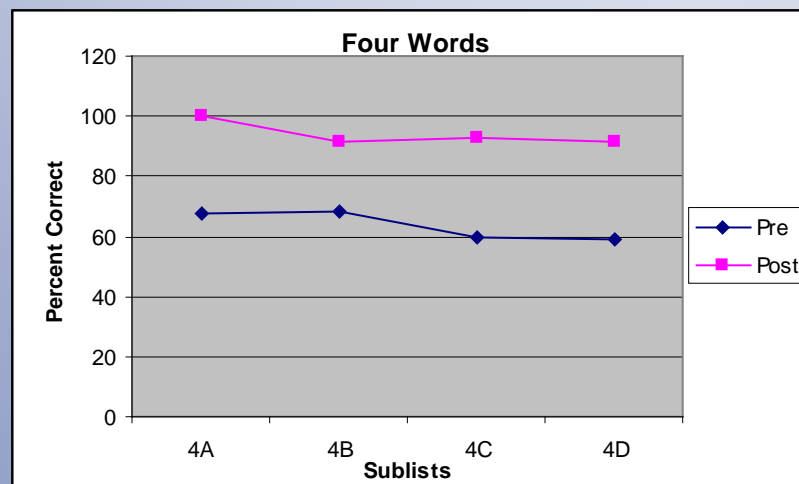


Figure 3

The Pre curve for 4-words show the first 2 sublists are slightly better than 5-digits but slightly poorer than 4-digits. This may be because words are generally more difficult than digits. But for the harder sublists (4C and 4D) there was a slight decrease in initial performance. But with further trials they made good progress (better than 90%) but limited by the ceiling effect.

For 5-words quite a difficult task the Pre curve show the increasing challenge for the first 3 sublists and then on the hardest one they got the best score. This suggests that 5-words were not much more challenging (based on the mean score) than the 4-words. But subsequent sublists started off poorer until the hardest sublist 5D where there was a decided improvement. The Post means are similar to the previous tasks that we discussed. Performance improved to about 90%. They were as effective at 5-words as they were with 4. That was pretty much the case with digits as well.

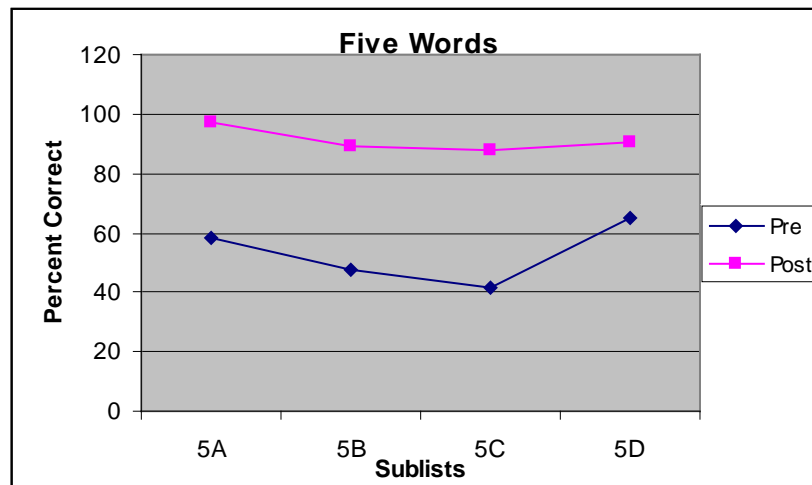


Figure 4

The biggest surprise for me was Figure 5. Working memory refers to some task that involves short-term memory about also some other task. In this case the task was listen to the words and numbers (e.g., shoe, 8, car, house, 2) and then say the numbers first in serial order and then say the words in the order that they were heard. In this case the correct answer is “2, 8, shoe, car, house”. This is far more difficult than repeating digits or words. Therefore, I expected very poor performance in APD kids because so many of them have difficulty multitasking, plus (likely) memory and Decoding difficulties as well. So, one would expect that these scores would be very poor.

I am amazed that the means are not nearly as poor as I had expected. I believe that it can be explained, in part, by the fact that if we have time in therapy for working memory it is given toward the end of the 14 sessions and after the person has had digit and/or word memory training. In addition they are close to the end of their Decoding training so they are in the best position to perform pretty well.

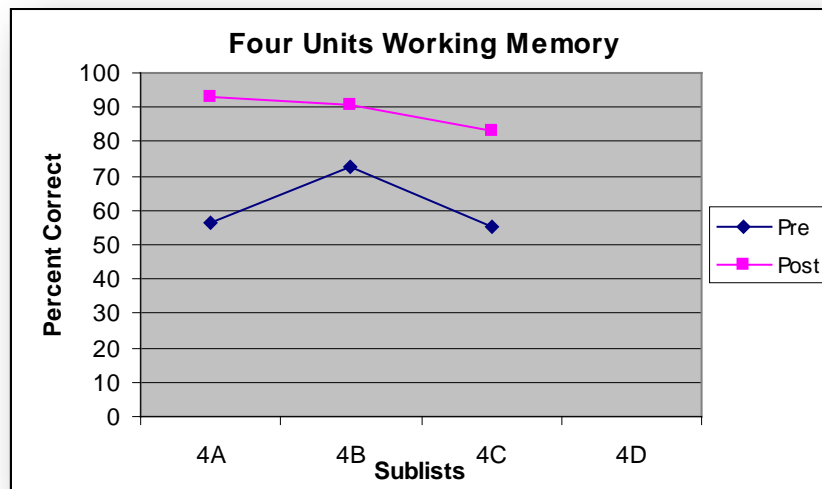


Figure 5

The Pre curve started at a pretty good level and then a surprising improvement by about 15%, but then a drop back to the original level for 5C. There is no 5D because there were no data as we ran out of time. The Post curve was impressive as well averaging almost 90%.

I am very impressed that with so little work on memory these children have demonstrated so much improvement looking across successive Pre sublists as well as comparing Pre and Post scores. I have not separated out the parent-teacher rating data for the children who have received memory therapy vs. the others. We do see some improvement even without memory training for a number of reasons, but it will be interesting to see if we can discern further improvement with therapy.

Summary:

Auditory memory training has been a rather new venture for me but it's been more successful than I had anticipated. I am sure that this is so, in part, because of the Decoding and other therapies they are receiving. We spend relatively little time on memory so there is a danger that this skill will not be as deeply entrenched in the children's brains as Decoding and Speech-in-Noise. Therefore more training or home supplement training may be in order.