LEARNING EFFECTS IN THE CONNECTED SPEECH TEST

Robyn M. Cox, Debra M. Zima, and Carole A. Leinberger
Department of Veterans Affairs Medical Center and Memphis State University, Memphis, TN

ABSTRACT

The Connected Speech Test (CST) employs speech passages to measure intelligibility. This study evaluated the effects of two types of learning on CST scores: (1) learning for the test itself, and (2) learning of passage content. Normal-hearing subjects attended four test sessions over a period of 12 weeks. There was significant, though small, learning for the test itself, thus, there was a gradual improvement in scores over time. In addition, there was significant learning for passage content, although these effects were also small. Passage learning was statistically insignificant after 7 weeks. *(Supported by funding from the Department of Veterans Affairs Rehabilitation Research and Development Service).*

INTRODUCTION

To assess hearing aid benefit, many audiologists would prefer to use a speech intelligibility test featuring speech that is as similar as possible to everyday conversations.

The Connected Speech Test (CST) (Cox. et al, *Ear and Hearing* 10:29-32 1989) attempts to achieve this ideal by using scoring units that consist of passages of speech.

Each passage is about a single familiar topic, spoken by a talker whose intelligibility is average.

There are 48 passages, each containing 25 scoring words.

Despite the large number of passages, there are sometimes not enough equivalent forms for a particular purpose.

As a result, users of the CST may be tempted to administer passages more than once to a given subject.

This is undesirable because of the potential for learning effects to influence intelligibility scores when passages are used repeatedly.

However, it seems likely that learning effects for passages would fade with time. If so, it would be possible to re-use passages after a sufficient period of time has elapsed.

This investigation was conducted to explore the effects of learning on CST scores as a function of time.

METHOD

Subjects:

20 young normal-hearing listeners with less than 1 year of college education.

It was felt that these individuals would learn the CST at least as well as the elderly hearing-impaired persons that would usually be seen in a clinic.

Procedure:

- Monaural testing via insert earphone.
- Presented at the level of normal conversation.
- Constant signal-to-babble ratio of -4 dB.
- No visual cues.
- Non-test ear plugged.
- Test sessions = 4
- Time between sessions = 3, 4, and 5 weeks.
- Total time = 12 weeks.
- The 48 passages were divided into 6 sets of 8 passages each.
- One set of 8 passages (200 words) was used per score.
- 8 practice passages were delivered at the beginning of each test session.

Testing schedule:

|	Set Number					
Week	1	2	3	4	5	6
0	☆	☆	☆			
3	☆			☆		
7		☆			☆	
12	☆	☆	☆	☆	☆	☆

This design allowed us to measure two types of learning:

1. Learning and remembering the content of passages.

2. Learning other things about taking the test such as how to understand the talker.

RESULTS
Effect of previous exposure to passages

If listeners can remember the content of passages, this should result in increased scores relative to passages that have never been heard before.
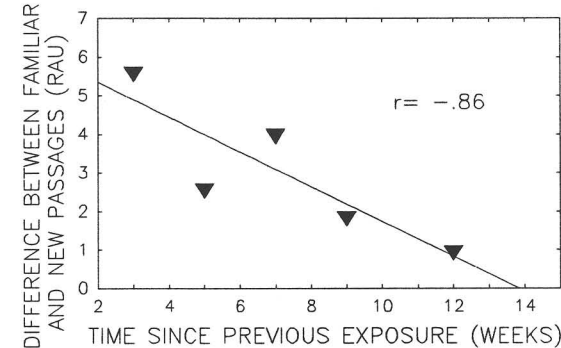

This Figure shows the difference between scores for previously heard passages and those for new passages tested on the same day. This difference is a measure of how much previous exposure to passages improved scores.

- For passages that were previously heard 3 weeks ago, mean scores were improved about 5.5 rau (similar to 5.5 %).
- The effect of previous exposure on score decreased at the rate of about .5 rau per week.
- The regression line suggests that the effect would be zero after about 14 weeks.
- Statistically, the effect was insignificant after 7 weeks.

Learning About Taking the Test

Feedback is not provided when subjects take the CST. Nevertheless, with repeated exposures to the test, it is possible that subjects learn how to improve their scores.
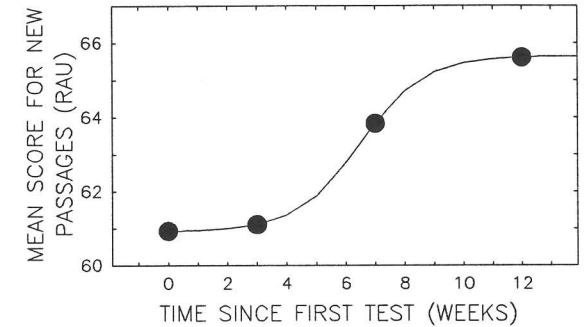
This figure shows mean scores for new CST passages as a function of time.

- Over the 12 weeks of the study, mean scores improved even though the subjects had not previously heard the passages presented.
- The improvement in score from the beginning to the end of the experiment was small but statistically significant (p < .05).
- The curve empirically fit to the data suggests that a "breakthrough" in learning to take the test occurred during the third exposure, at week 7, when scores suddenly improved.
- It seems likely that this learning effect was the result of the listener's suddenly mastering some idiosyncrasies of the talker's speech.

CONCLUSIONS

1. Previous exposure to CST passages is associated with increased scores, presumably due to learning of passage content. This learning effect is fairly small and gradually fades as time passes.

2. Scores on the CST can continue to improve slightly over an extended period of time, due to increasing familiarity with the test.

3. These conclusions are limited to the case where there is only ONE previous exposure to the passages. The effects of multiple exposures would probably be greater.

4. These data have implications for clinical and research use of the CST and may well apply to other tests using connected speech passages.