



*Develop America's Medical Airmen Today ... for Tomorrow*

# **Using LACE (Listening and Communication Enhancement) Software with CAPD Patients**

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# Overview



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- Introduction to LACE
- Role of LACE as a CAPD treatment option
- Case studies
- Findings
- Summary

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# LACE



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- What is LACE?
  - An adaptive program
  - Made of 20 sessions, 1 session per day for 35 to 40 minutes
  - Degraded Listening Tasks
    - Speech in Noise Tasks
    - Rapid Speech Tasks
    - Competing Voice
  - Memory Tasks
    - Target Word Memory Tasks: Short and Long Term Memory Training
    - Missing Word Tasks: Improves speed of processing and use of contextual cues

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# LACE



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- Who can you use LACE with?
  - Hearing aid patients
  - PTSD
  - TBI patients
  - CAPD patients



# LACE scoring



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- Daily Training Task Performance Summary
  - Speech in Noise
  - Competing Speaker
  - Rapid Speech
  - Missing Word
  - Target Word
- Weekly Standardized Testing
  - QuickSIN Test
  - Competing Speaker Test
  - Rapid Speech Test

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# LACE Scoring



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Training Task	Scoring Trends To Look For	Patient Counseling Notes	Other Considerations
<b>Speech-In-Noise</b> ↓	A <b>decrease</b> in score indicates an improvement. The average patient has about a 2.5 point decrease in score during training.	A normal hearing listener will have a score of about 2 dB SNR or less, with good speakers. High scores may indicate the need for directional microphones or assistive technologies.	Reflects the ability to follow speech in a noisy background. It can be affected by hearing loss and the ability to block out background noises (this ability decreases in normal healthy aging).
<b>Rapid Speech</b> ↑	An <b>increase</b> in score indicates an improvement. The average patient has about a 0.2 increase in score during training.	A score of 1.0x means the patient can only follow speech at slow conversational speeds. A score of 2.0x means that the patient can follow speech at 2 times the rate of slow conversational speeds.	Reflects the ability to follow fast speech with some of the speech information removed. It can be affected by hearing loss and by the effects of normal aging (slower processing speed).
<b>Word Memory</b> ↑	An <b>increase</b> in score indicates an improvement. The lowest score possible is a 1.0 and the highest score possible is a 6.0.	A low score (lower than 3) indicates either significant difficulty remembering spoken information or difficulty understanding speech in a quiet background.	Reflects the ability to understand and remember specific speech information (auditory memory). It can be affected by normal aging (working memory skills) and by hearing loss.
<b>Competing Speaker</b> ↓	A <b>decrease</b> in score indicates an improvement. The average patient has about a 3 point decrease in score during training.	A normal hearing listener will have a score of about 1 dB SNR or less, with good speakers. High scores may indicate the need for directional microphones or assistive technologies.	Reflects the ability to block out a single speaker and focus on another. It can be affected by hearing loss and by the ability to block out unwanted signals.
<b>Missing Word</b> ↑	An <b>increase</b> in score indicates an improvement. This score factors speed and answers correct.	This task is included to remind the patient that they do not need to hear every word to understand the message. Non-native speakers may have more difficulty with this task.	Reflects the ability to fill-in words that were missed. It is an easy training session for most patients.
<b>Composite Scores</b> ↑	An <b>increase</b> in score indicates an improvement. All patients start with a score of 90, regardless of their performance. The average improvement is 50 points (140 total)	This score only indicates overall improvement and it is presented as a single score. It does not indicate the patient's specific performance level.	Reflects the improvement made on all tasks.



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# LACE



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- <https://www.neurotonepro.com>
  - Track scores from remote website using a secure log in
  - Software Demo
- HIPAA Policy
  - **As part of the Health Insurance Portability and Accountability Act of 1996 ("HIPAA"), the Department of Health and Human Services has established certain standards to protect the privacy of individually identifiable health information (the "Privacy Regulations"). This Policy is intended to ensure that Neurotone, Inc. complies with the Privacy Regulations by explicitly including its standards and requirements as part of Neurotone, Inc's operating policies and procedures.**



# Case Studies



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- 35 yo male, Active duty dependent
- Pt initially noticed problem in 1995 but symptoms worsen in 2002 after brainstem surgery paralyzed a nerve and left the left side of head paralyzed in hopes of relieving pain
- Pt also has a neuro implant in brainstem
- Pt's main complaint: Problems hearing when background noise is present



# Case Study 1



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- September/October 2008
  - Normal peripheral hearing
  - Referred for CAPD testing
    - SCAN-A: Abnormal composite score, Borderline normal Filtered Words Subtest, Abnormal Auditory Figure Ground Subtest, Abnormal Competing Words Subtest, Abnormal Competing Sentences Subtest
    - Dichotic Digits: 80% LE, 75% RE, Abnormal finding
    - BKB-SIN: Mild SNR loss



# Case Study 1



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- Counseling
- Treatment
  - Discussed different treatment options: FM system, mild gain hearing aids, LACE
  - Pt decided to try LACE, issued home version CD
  - Schedule f/u at the end of LACE sessions



# Case Study 1



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- LACE results
  - 9 sessions completed
  - Test
    - QuickSIN Increase
    - Competing Speaker Test Increase
    - Rapid Speech Test Increase
  - Training
    - Speech in Noise Training Decrease
    - Competing Voice Training Decrease
    - Rapid Speech Training Increase
    - Word Memory Training Increase



# Case Study 2



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- 40 yo male, active duty Air Force
- Pt has history of noise exposure, Firing range instructor for 19 years
- Pt noticed hearing loss since 1995, pt had stroke
- Specific complaint: Problems hearing multiple talkers in quiet and noise
- Pt reports doing well on tasks but is noticing increased difficulties in completing tasks but is still doing well



# Case Study 2



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- April/May 2008 showed normal peripheral hearing and normal ABR findings
- July 2008 referred for CAPD evaluation
  - SCAN-A: Normal composite score, normal Filtered Words Subtest, normal Auditory Figure Ground Subtest, normal Competing Words Subtest, normal Competing Sentences Subtest
  - Dichotic Digits: 100% LE, 95% RE, normal findings
  - BKB SIN: 0 dB SNR loss (normal) in soundfield



# Case Study 2



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- Counseling
  - Pt was doing extremely well before stroke in 1995 but now noticing deficits even though still in normal range
- Treatment
  - Discussed different treatment options: FM system, mild gain hearing aids, LACE
  - Initially issued pt FM pocket talker and scheduled f/u August 2008
  - August 2008 f/u:
    - Pt likes pocket talker but still had difficulties hearing multiple talkers
    - Recommended LACE Home Version



# Case Study 2



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- LACE results
- Completed only 2 sessions
- Will continue to track scores from remote LACE professionals website
- Schedule f/u at the end of LACE sessions



# Findings



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- Treatment/LACE comprehensive training
  - Should be cost effective
  - Be accessible (able to be preformed in the privacy of patient's home)
  - Produce results that the clinician can verify via remote or datalogging
  - Integrate listening training along with communication repair strategies
  - Give pt the opportunity for participating in the rehab process
  - Must be adaptive so that the patient can be trained near his/her learning threshold
- Dr. Robert Sweetow, Hearing Journal, Volume 58, Number 6, 2005  
Page Ten, Training the Adult Brain to Listen
  - <http://www.neurotone.com/pdf/HearingJournal-PageTen-Sweetow.pdf>



# Summary



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# 59th Medical Wing

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