Speech Recognition Performance After Long-Term Hearing Aid Use

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• 108 participants
SUBJECTS

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- 15% non-hearing aid users
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- Hearing aids set as normally worn, including adjustments in background noise
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- 108 participants
- 15% non-hearing aid users
- Hearing aids set as normally worn, including adjustments in background noise
- Hearing decreased an average of 10 dB re: original study
METHODS

- NU-6 in quiet (sound field)
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- CST in quiet and in multitalker babble (sound field)
METHODS: NU-6

- 50-word list, female speaker
METHODS: NU-6

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- In quiet at 62-dB SPL and 0° azimuth
METHODS: NU-6

- 50-word list, female speaker
- In quiet at 62-dB SPL and 0° azimuth
- Unaided (n = 108) and aided at use gain (n = 95)
METHODS: CST

- 48 test passages; 8-10 related sentences
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- The test passages are paired to produce 24 test passages with 50 key words
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- Five conditions
  1. 2 presentation levels (62- and 74-dB SPL)
  2. 2 S/B levels (-3 and 3 dB)
  3. quiet at 74-dB SPL
METHODS: CST

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- Five conditions
  1. 2 presentation levels (62- and 74-dB SPL)
  2. 2 S/B levels (-3 and 3 dB)
  3. quiet at 74-dB SPL
- Multitalker babble at 45° to left and right of center
METHODS: CST

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  1. 2 presentation levels (62- and 74-dB SPL)
  2. 2 S/B levels (-3 and 3 dB)
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- Multitalker babble at 45° to left and right of center
- Reference S/B produced 50% performance on CST at 62-dB SPL (mean = 58 dBA) in original study
METHODS: CST

- 48 test passages; 8-10 related sentences
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- Five conditions
  1. 2 presentation levels (62- and 74-dB SPL)
  2. 2 S/B levels (-3 and 3 dB)
  3. quiet at 74-dB SPL
- Multitalker babble at 45° to left and right of center
- Reference S/B produced 50% performance on CST at 62-dB SPL (mean = 58 dBA) in original study
- Unaided (n = 107) and aided (n = 91)
RESULTS: NU-6

NU-6 PERFORMANCE

CORRECT RECOGNITION (rau)

UNAIDED  |  AIRED  |  BENEFIT

ORIGINAL | FOLLOW-UP
RESULTS: NU-6

- In the follow-up study, both aided and unaided performance decreased by an average of 12% in comparison with the original study.
RESULTS: NU-6

- Aided word recognition on the NU-6 improved by an average of 33% for the 95 subjects tested in both aided and unaided conditions. Three of the subjects, however, had poorer performance aided than unaided.
RESULTS: NU-6

- Hearing aid benefit (aided-unaided performance) was the same in both studies.
RESULTS: NU-6

NU-6 PERFORMANCE FOR HEARING-AID USERS AND NON-USERS

CORRECT RECOGNITION (%)

AIDED
UNAIDED

USERS NON-USERS
RESULTS: NU-6

On the aided condition, word-recognition performance by the hearing aid users was not significantly different from the performance by the non-hearing aid users.
On the unaided condition, word-recognition performance by the hearing aid users was significantly poorer than the performance by the non-hearing aid users.
RESULTS: CST

CST PERFORMANCE

FOLLOW UP STUDY

ORIGINAL STUDY

CORRECT RECOGNITION (raw)

CONDITION

AIRED
UNAIRED
RESULTS: CST

- Speech recognition was better in quiet than in background noise for both aided and unaided conditions.
RESULTS: CST

- Hearing aids provided benefit both in quiet and in background noise
RESULTS: CST

Performance decreased over the past 5 years, particularly for the more favorable 3-dB S/B
RESULTS: CST

HEARING-AID BENEFIT ON CST

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>ORIGINAL</th>
<th>FOLLOW-UP</th>
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</thead>
<tbody>
<tr>
<td>62/3</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>62/3</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>74/3</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>74/3</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>74/Q</td>
<td>12</td>
<td>18</td>
</tr>
</tbody>
</table>
RESULTS: CST

- Hearing aid benefit is greater at the lower presentation level than at the higher presentation level.
RESULTS: CST

- Aided and unaided performances were not significantly different at the higher presentation level.
RESULTS: CST

For the 74/3 condition, 42% of the subjects performed poorer in the aided than in the unaided condition.
RESULTS: CST

- For the 74/-3 condition, 24% of the subjects performed poorer in the aided than in the unaided condition.
The greater hearing-aid benefit in the follow-up study for the 62/3 and 74/Q conditions probably reflects the 10 dB decrease in hearing sensitivity by the subjects since the original study.
RESULTS: CST

CST PERFORMANCE FOR HEARING AID USERS AND NON-USERS

CORRECT RECOGNITION (%)

74/Q 74/3 74/3 62/3 62/3 74/Q 74/3 74/3 62/3 62/3
AIDED UNAIDED
RESULTS: CST

- Unaided performance (right half) was better for non-users than for hearing aid users.
Aided performance (left half), however, was better for hearing aid users than for non-users.
RESULTS: CST

- None of the differences were significant.
Summary

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- Hearing aid benefit was greater for the lower presentation levels.
- Recognition performance was greatly affected by the addition of background noise, especially at the higher presentation levels.
- As in the original study, aided recognition performance in noise decreased as presentation level increased.
- Non-users tended to perform better unaided than users.
- Performance on both NU6 and CST decreased since the original study.
  - The average hearing sensitivity decreased 10 dB.
  - The hearing aid gain was below target.