Toward a non-linguistic measure of auditory processing deficits in older and younger monolingual and bilingual adults

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Understanding speech is difficult, especially in noisy contexts.

Alain et al., 2018; Killion et al., 2004; Zekveld et al., 2010
Understanding speech is difficult, especially in old age.

Humes & Dubno, 2010; Gosselin & Gagné 2011
Understanding speech is difficult, especially in your second language.

Kroll et al., 2012; Borghini & Hazan, 2018, 2020
Assessing speech-in-noise comprehension relies on language.

### TRACK 21

**Practice List A**

<table>
<thead>
<tr>
<th>Practice Sentence</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The lake <strong>sparkled</strong> in the red <strong>hot</strong> sun.</td>
<td>S/N 25</td>
</tr>
<tr>
<td>2. <strong>Tend</strong> the sheep <strong>while</strong> the dog <strong>wanders</strong>.</td>
<td>S/N 20</td>
</tr>
<tr>
<td>3. <strong>Take</strong> two shares as a <strong>fair</strong> profit.</td>
<td>S/N 15</td>
</tr>
<tr>
<td>4. North winds <strong>bring</strong> colds and fevers.</td>
<td>S/N 10</td>
</tr>
<tr>
<td>5. A <strong>sash</strong> of <strong>gold silk</strong> will <strong>trim</strong> her <strong>dress</strong>.</td>
<td>S/N 5</td>
</tr>
<tr>
<td>6. <strong>Fake</strong> stones <strong>shine</strong> but <strong>cost</strong> little.</td>
<td>S/N 0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
</tr>
</tbody>
</table>

Practice sentences used in the Quick Speech-in-Noise (QuickSIN) test.
Assessing speech-in-noise comprehension relies on language.

Mendel & Widner, 2015
(see also Bidelman & Dexter, 2015)

Gordon-Salant & Fitzgibbons, 1993
Bilingual advantages in the brain and in executive function.

- Increased gray matter density and white matter integrity. 
  Li et al., 2014

- Improved task-switching and conflict resolution abilities. 
  Adesope et al. 2010

- Better interference inhibition and sustained attention. 
  Costa et al., 2008

- Greater cognitive reserve in older adults. 
  Woumans et al., 2015

Bialystok, 2017, 2021; Schweizer et al., 2012; Gold, 2015
If bilingualism provides advantages in non-linguistic aspects of executive function, why do bilinguals underperform in assessments of speech-in-noise comprehension?

Reliance on linguistic stimuli, which may be a confounding factor.

Do bilinguals perform similarly to monolinguals in non-linguistic auditory stream segregation tasks, or even outperform them?

Does performance change with age?
Toward a non-linguistic measure of auditory stream segregation.
Toward a non-linguistic measure of auditory stream segregation.

- Temporally incoherent random background tones.
- Temporally coherent repeating figure chord.
Toward a non-linguistic measure of auditory stream segregation.

- Electroencephalography (EEG)
- Pupillometry
- Magnetoencephalography (MEG)
Toward a non-linguistic measure of auditory stream segregation.

Music-in-Noise Task (MINT)
Quick Speech-in-Noise (QuickSIN)
Hearing-in-Noise Task (HINT)
Working Memory
English Fluency
Self-Rated English Proficiency
Musicianship
A sneak peek from one bilingual young adult!
A special thank you to the Brain & Behavior Institute for sponsoring this research and to our pilot participant.