

*Influence of Number of Hearing Aid  
Compression Channels on Spatial  
Release from Masking*



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# Objective

- Determine the extent to which manipulating the number of compression channels with hearing aid amplification impacts spatial release from masking (SRM)

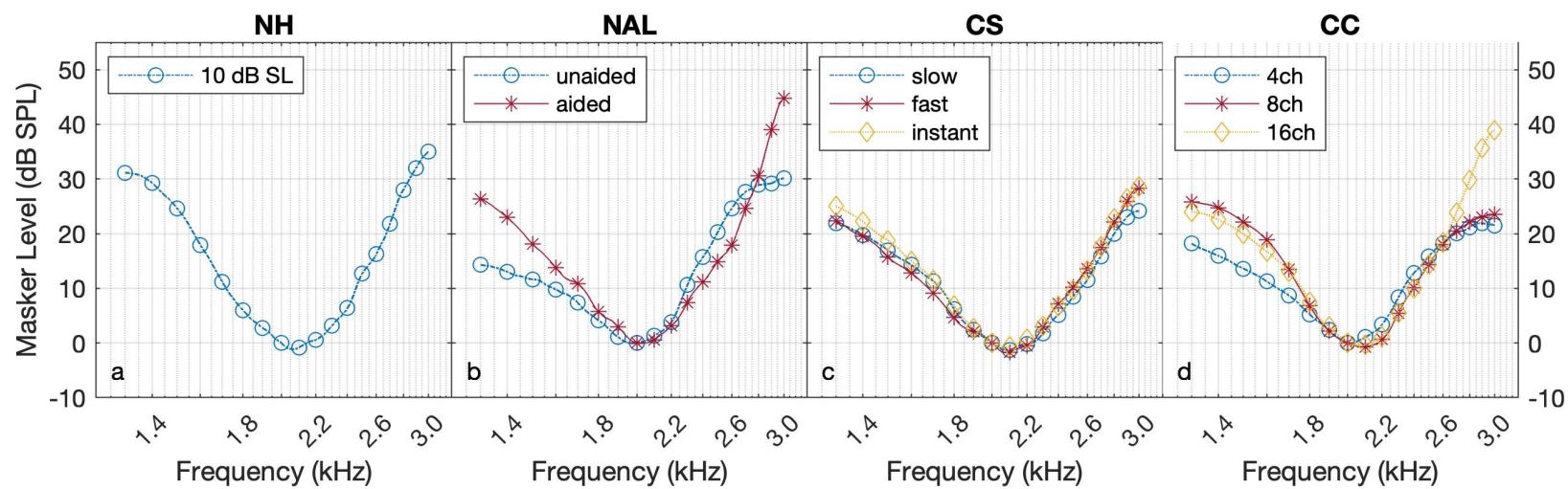
# Rationale

- **Spatial release from masking (SRM):** difference in speech recognition from collocated to separated talkers
- Cues for SRM/sound segregation include
  - Interaural phase difference (IPD)
  - Interaural level difference (ILD)
  - Spectral cues
- SRM is larger for an informational than energetic masker
- SRM tends to be less for **older** adults and adults with **sensorineural hearing loss (SNHL)**.
- Loss of audibility and spectral cues could be contributing factors

Arbogast 2005; Best 2011; Dawes 2013; Gallun 2003; Glyde 2015; Levy 2015; Marrone 2008

# Rationale

- Higher number of compression channels improves audibility and spectral resolution

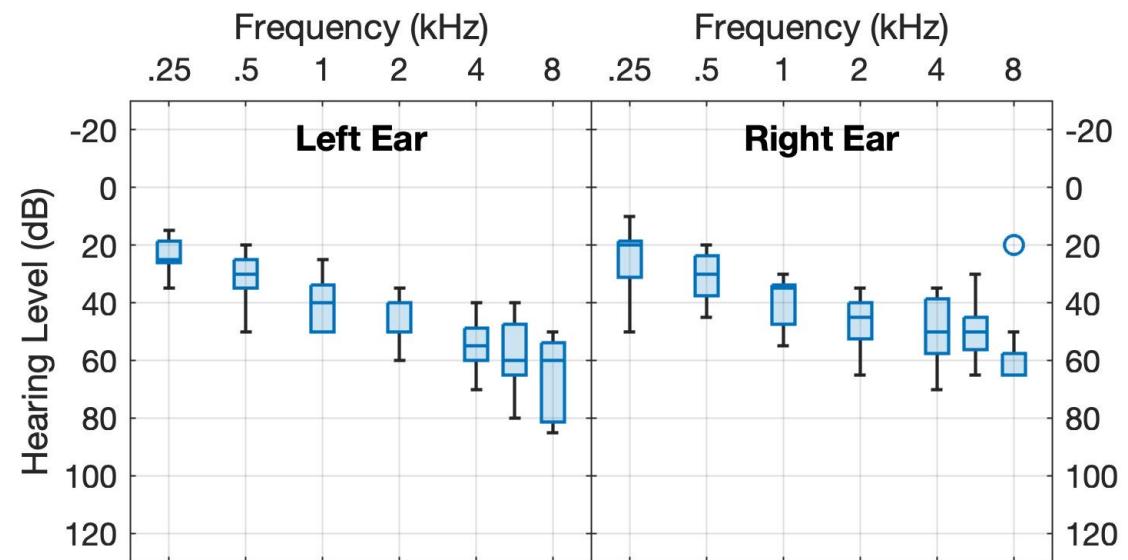


# Hypotheses

- Due to increased audibility of spatial cues and less energetic masking, SRM will increase
  - with hearing aid amplification and
  - with 16 relative to 4 compression channels.

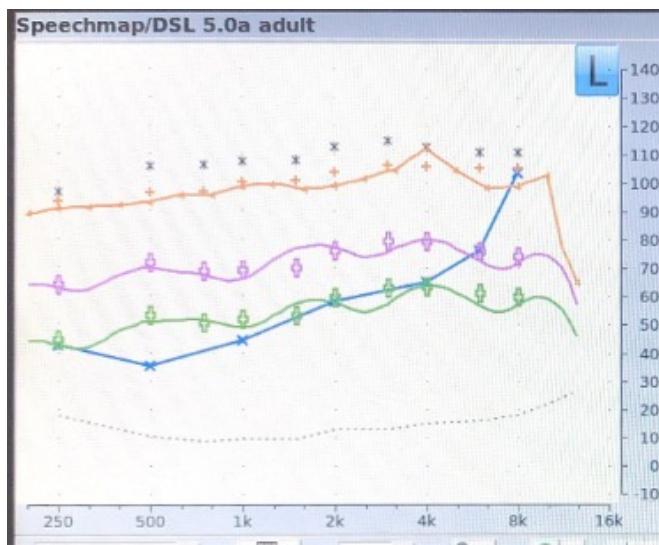
# Methods

- N=2 young adults with **NH**
- N=9 adults with **SNHL**, 60-76 years of age
- MoCA, reading span
- clinicaltrials.gov
  - NCT03850678



# Tympan

- 4 or 16 compression channels
- 5-ms attack time, 50-ms release time
- DSL-A
- 30 dB SPL kneepoint (linear below)



Compressor Bank

Choose Ear: **LEFT** **RIGHT**

Choose Parameter:

- EXPANSION COMP RATIO**
- EXPANSION KNEEPOINT**
- LINEAR GAIN** (highlighted in green)
- COMPRESSION RATIO**
- COMPRESSION KNEEPOINT**
- LIMITER KNEEPOINT**

LINEAR GAIN (dB)			
1	-	34	+
2	-	34	+
3	-	42	+
4	-	34	+

# Methods

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## Distractor speech

- Female speaking the rainbow passage (Starkey, 2013)
- Location: 0, -60°
- Level: 50, 70 dB SPL

## Target speech

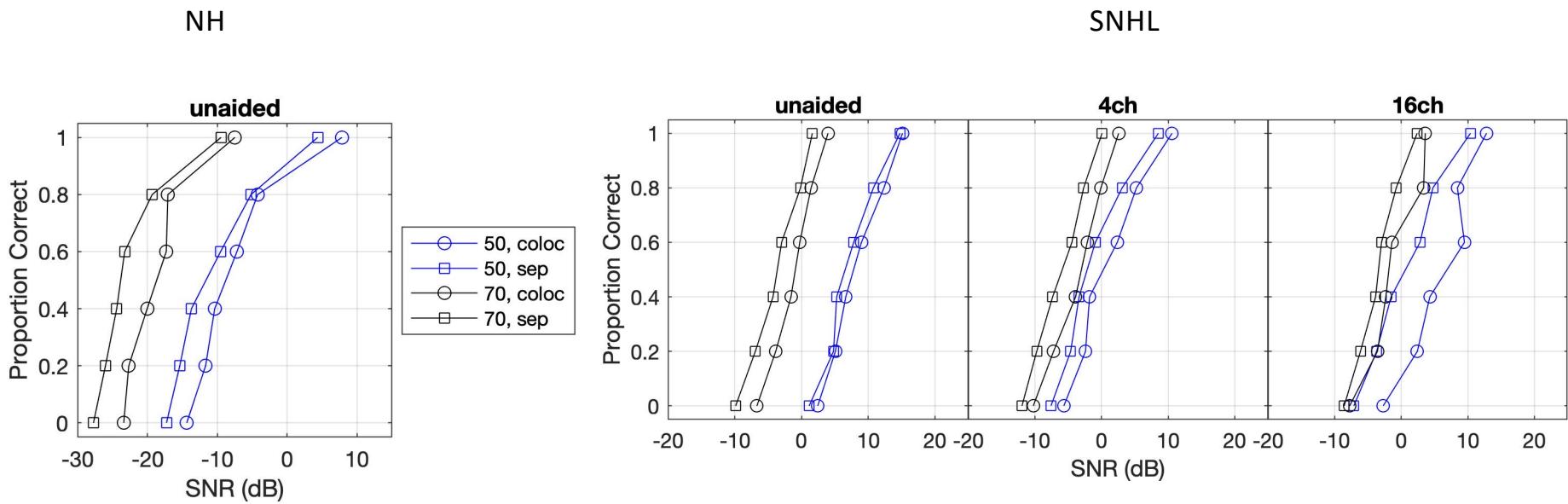
- IEEE sentences
- a LARGE SIZE in STOCKINGS is HARD to SELL
- 0°
- Adaptively varied level, interweaved 30/70%



# Results - SNR

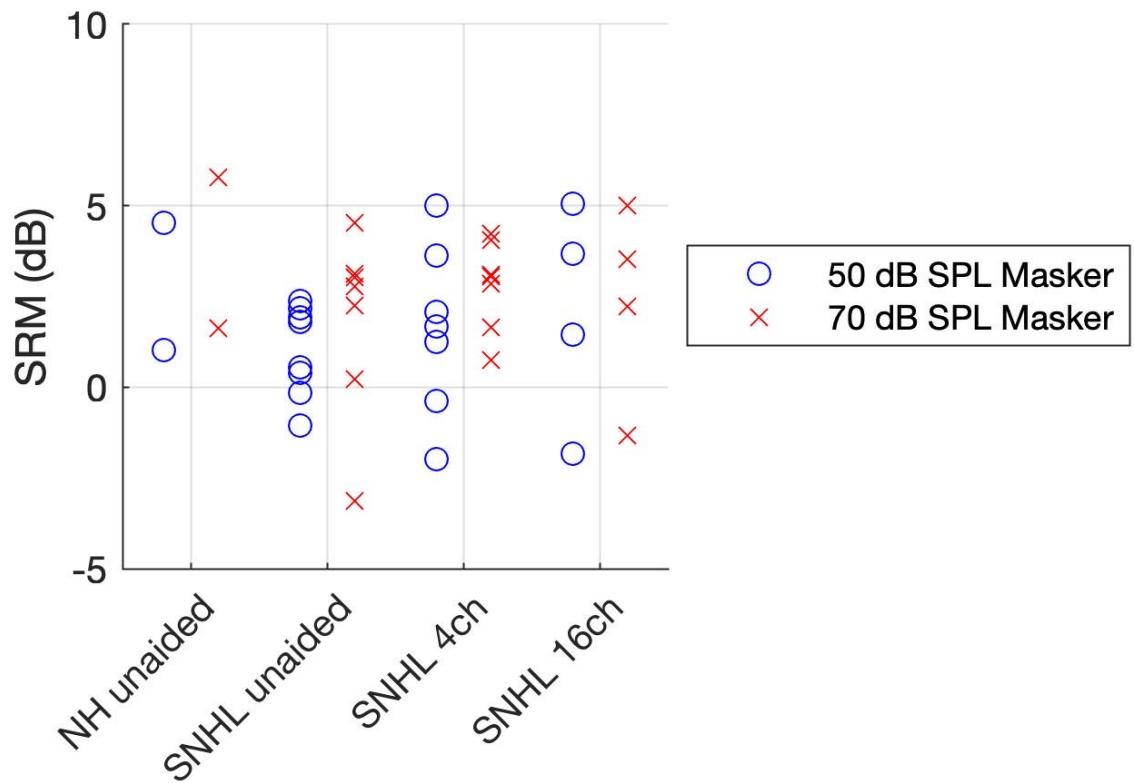
- Lower SNR

- for 70 dB SPL masker
- with NH
- with amplification, especially with 50 dB SPL masker

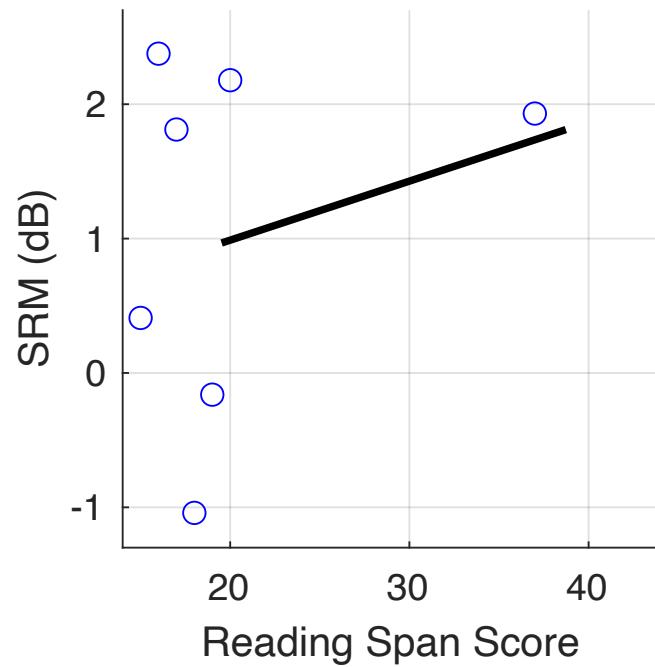


# Results - SRM

- SRM was similar by
  - hearing status
  - masker level
  - amplification



# Reading Span



# Discussion

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- Preliminary results include
  - lower SNR for 70 than 50 dB SPL masker
  - lower SNR for 50 dB SPL masker with amplification
  - small SRM unaffected by amplification
- Why?
  - Higher masker level allows for larger change in SNR
  - Improved low-level audibility with amplification likely resulted in lower SNR
  - Use of different gender limited benefit of spatial separation for sound segregation
  - Improved spectral resolution might be due to increased envelope cue
- Provides proof of concept for Tympan as a Research Platform

Arbogast 2005; Best 2011; Dawes 2013; Gallun 2003; Glyde 2015; Levy 2015; Marrone 2008

# Acknowledgements

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# Literature

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