

Rebecca Carroll^{1,2}, Anna Warzybok^{1,3}, & Esther Ruigendijk^{1,2}

¹ Cluster of Excellence "Hearing4all", University of Oldenburg • ² Institute of Dutch Studies, U Oldenburg • ³ Medizinische Physik, U Oldenburg

MOTIVATION

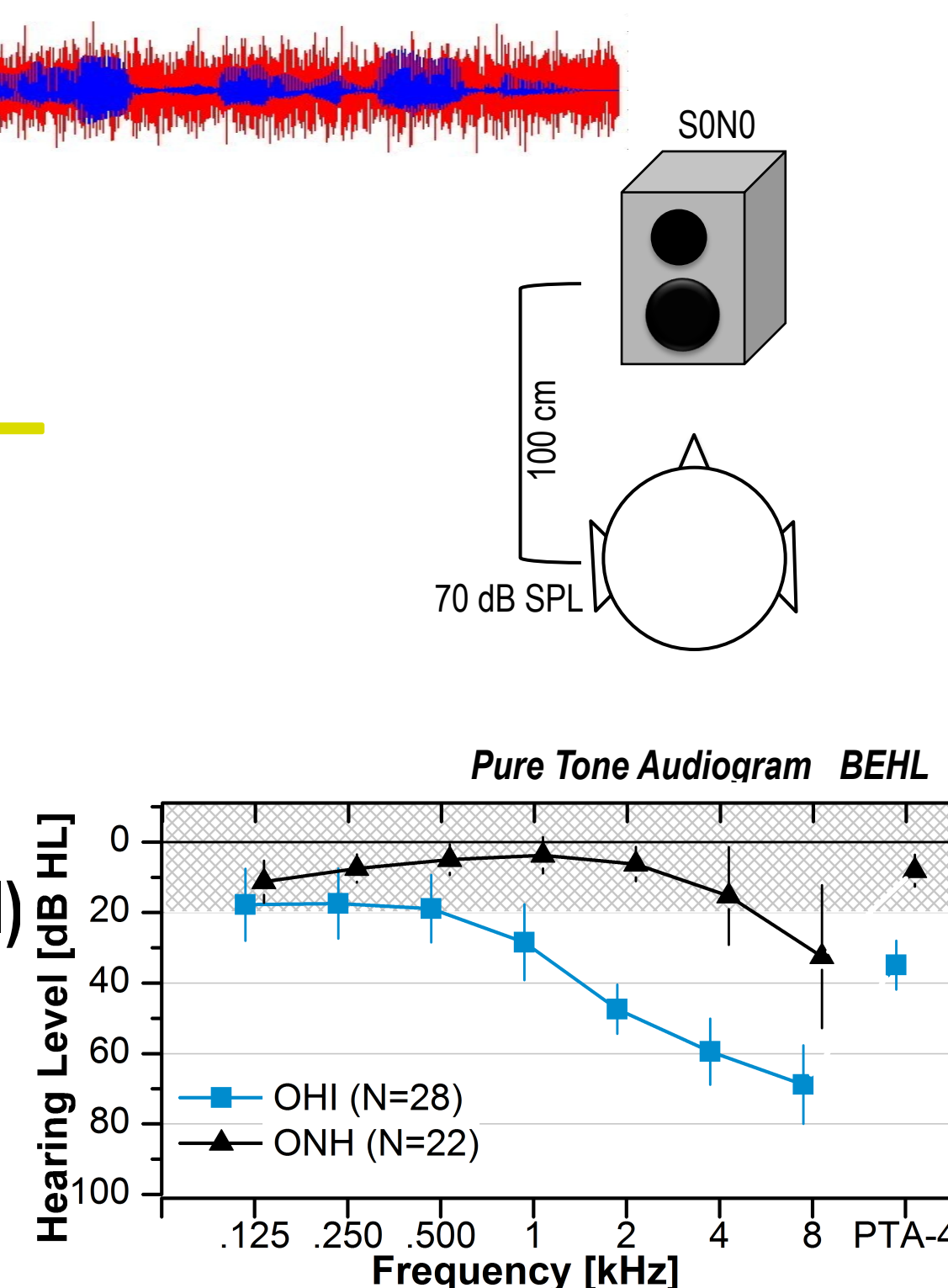
- Vocabulary size** has been considered a useful measure of linguistic skills, and a **predictor** for speech recognition scores (e.g., Benard et al., 2014; Carroll et al., under revision)
- A **large lexicon** requires more fine grained **discriminatory knowledge** (McAuliffe et al., 2013), both semantic ("top-down") and phonetic ("bottom-up").
- **H1: Word recognition and lexical access time** should be **efficient (relatively fast)** to guarantee **successful speech processing**.
- ALTERNATIVELY**, speech recognition tests allow offline processing. **Slow lexical processing** can only result in successful speech recognition performance if the sentence can be kept in **memory** during the lexical search.
- **H2: Correlation of working memory and vocabulary size, speech recognition scores**
- Prolonged **reduced auditory input** (e.g., hearing impairment; HI) may **change word recognition mechanisms**. Lexical representations may be less detailed, activation patterns may have changed (e.g., Janse & de Bree, 2015).
- **H3: Differences** in lexical access time/ efficiency, or working memory for HI
- **H4: Different predictors** for speech recognition thresholds in HI

METHOD

- Individual differences measures focusing on the **mental lexicon** (→ visual presentation only)
- Speech recognition scores using Göttingen Sentence Test (GÖSA; Kollmeier & Wesselkamp, 1997)
- S0N0** free-field presentation via RME Fireface UCX, in sound attenuated booth
- GÖSA** sentences measuring SRT₅₀, SRT₈₀
- Unaided** and **NAL-R** amplified

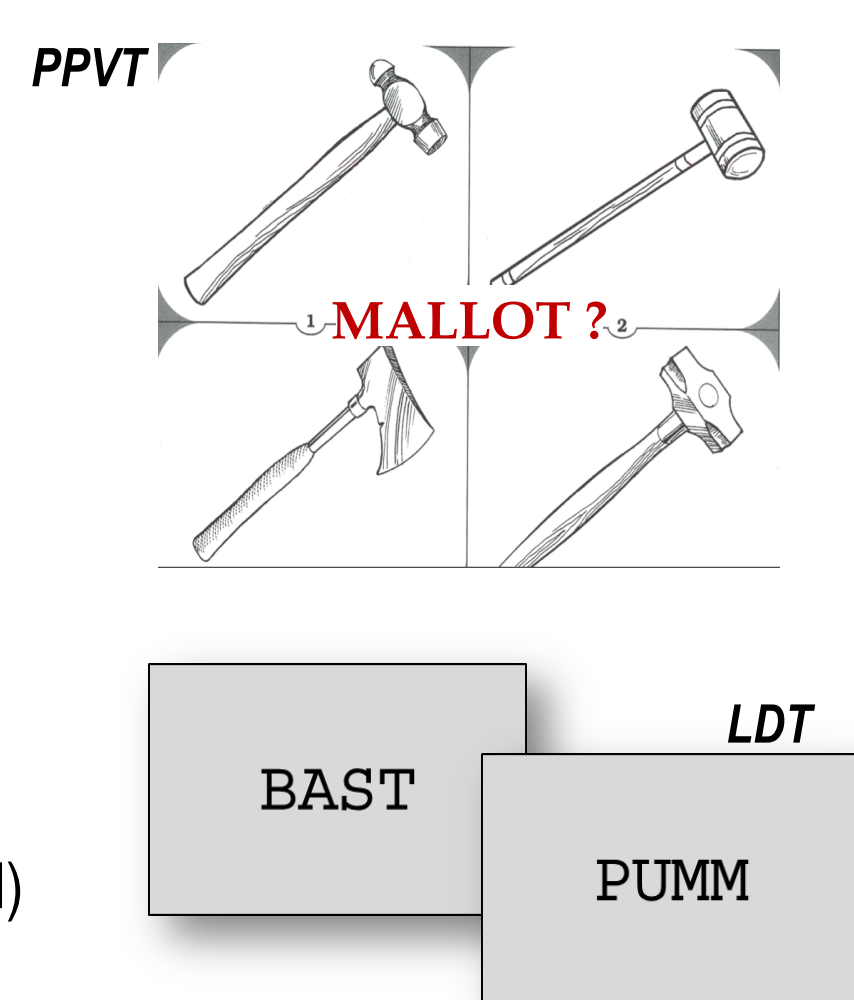
Participants

- Older native listeners of **German**
- 22 Listeners with normal hearing (ONH)**
 - 61-78 yrs (ø 67.7); 15♀ 7♂
 - PTA-4 = 8.36 ± 4.54 dB
- 28 Listeners with symmetrical hearing loss (OHI)**
 - 60-80 yrs (ø 71.9); 6♀ 22♂
 - PTA-4 = 34.86 ± 6.93 dB
 - 11 hearing aid users



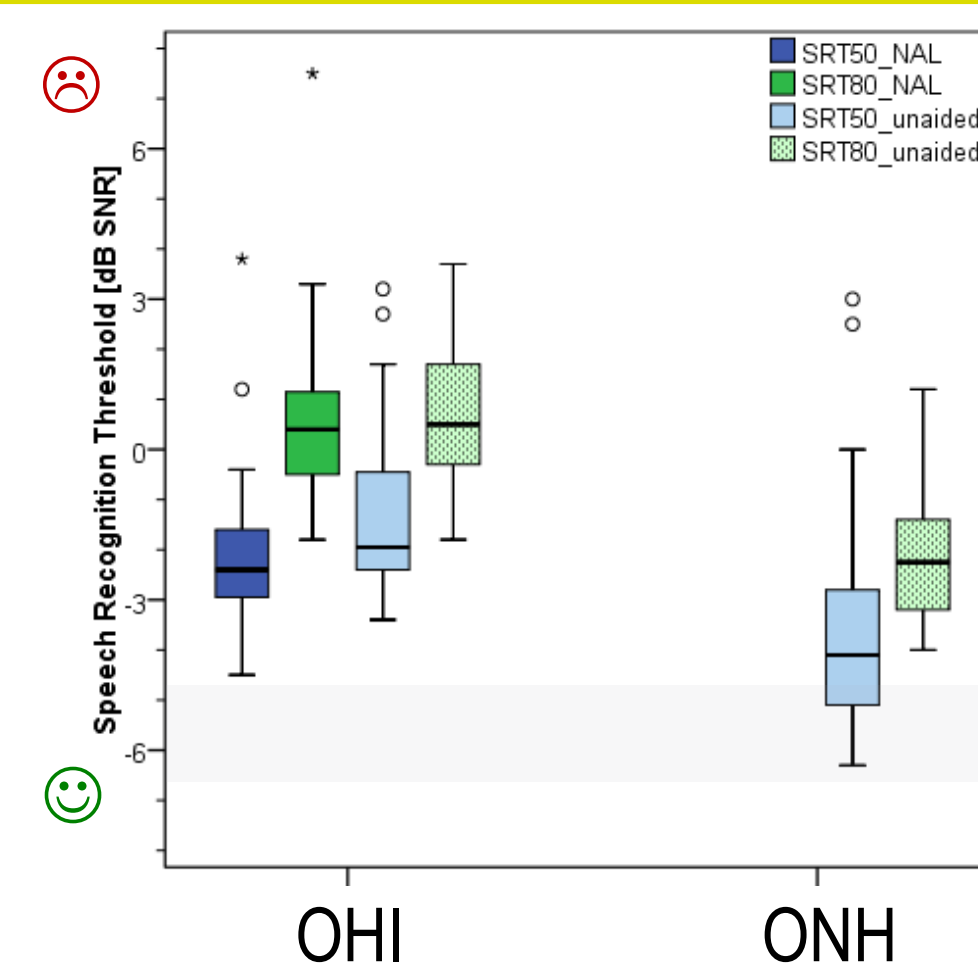
Individual Differences Measures

- PPVT: Vocabulary size (meaning)**
German version of Peabody Picture Vocabulary Test (Buhlheller & Häcker, 2003)
- WST: Vocabulary size (word form)** (Schmidt & Metzler, 1992)
Rutsur - Torastal - Turtos - ~~Tortur~~ - Korut - Tektorb
- LDT: Lexical Access** Lexical Decision Test (RTΔ Non-Word - Word)
- RST: Verbal Working Memory:** German Reading Span Test (Carroll et al., 2015a)

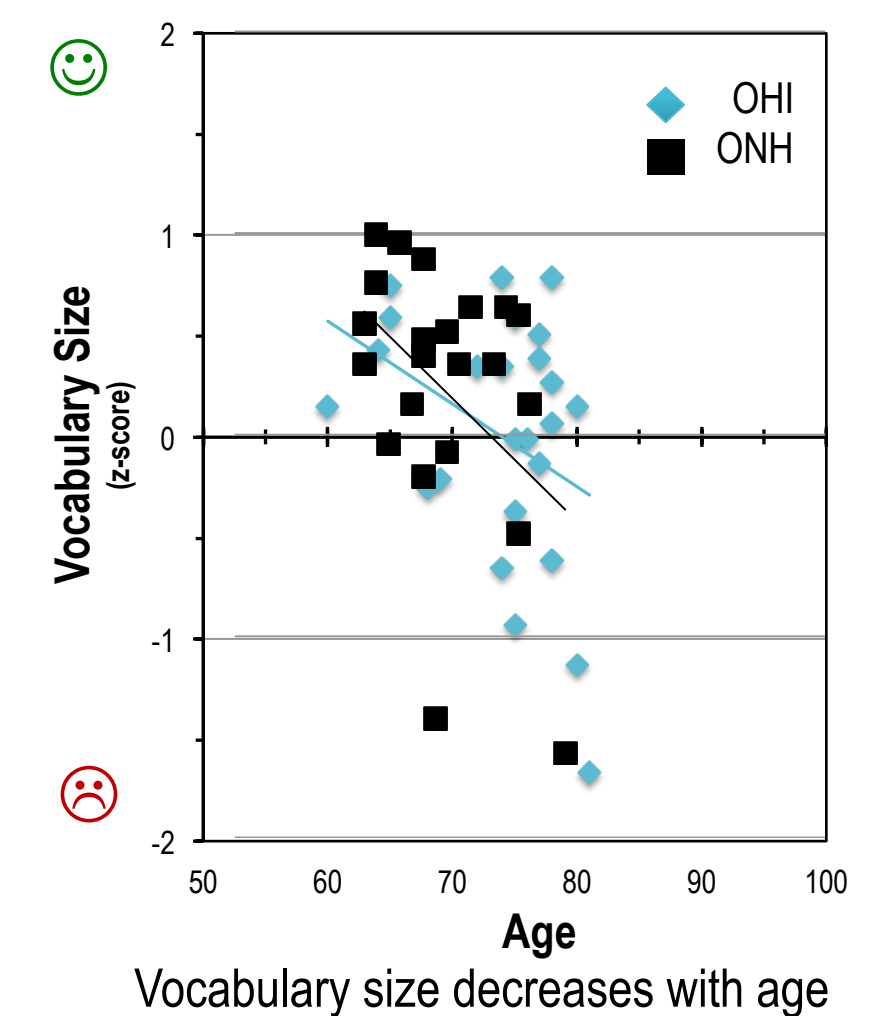


RESULTS

A. Speech Recognition Scores



- **Group Differences in SRT**
 - Despite audibility (NAL-R)
 - Irrespective of SRT



B. Individual Differences

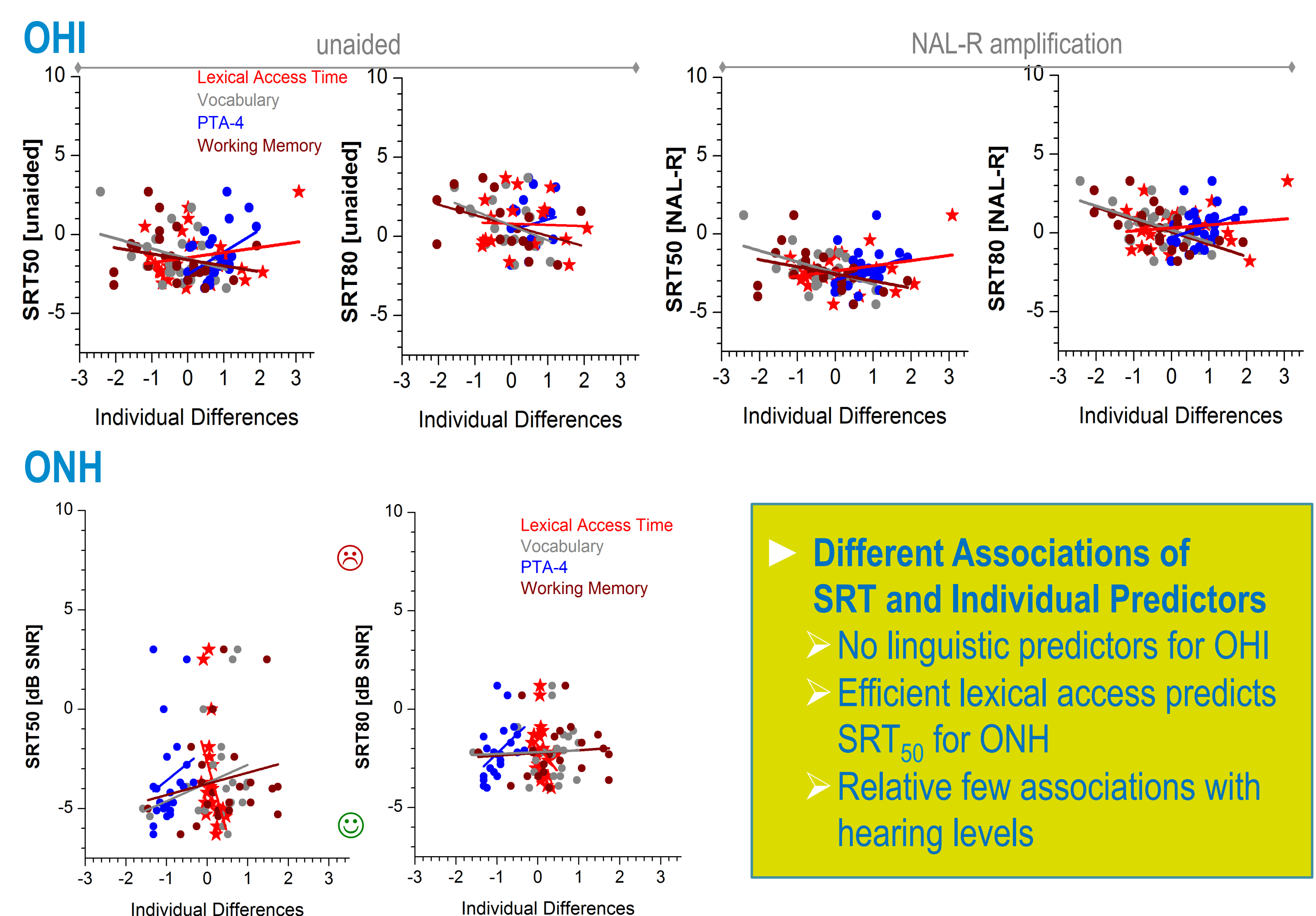
Group	PPVT (max 89)	WST (max 42)	RST (max 54)	LDT
OHI	75.2 ± 8.44	31.8 ± 3.36	18 ± 5.97	3.04 ± 0.08
ONH	78.7 ± 8.01	33.0 ± 4.92	22 ± 6.10	3.02 ± 0.07

Comparison	ONH	OHI
Vocabulary size vs. Lexical access time	r = -0.73 ***	r = -0.60 ***
Vocabulary size vs. Working memory	r = 0.47 *	r = 0.50 **

- **Comparable Group Scores**
- **Linguistic Measures**
- **Word Recognition Strategies?**

- ✓ **Efficiency:** Lexical access time decreases with increasing vocabulary size
- ✓ **Postponement:** Working memory increases with increasing vocabulary size

C. Speech Recognition v. Individual Differences



- **Different Associations of SRT and Individual Predictors**
 - No linguistic predictors for OHI
 - Efficient lexical access predicts SRT₅₀ for ONH
 - Relative few associations with hearing levels

Regression Models ONH

- **SRT₅₀: Lexical access time** (r = .45*)
- **SRT₈₀: PTA-4** (r = .46*)

Regression Models OHI

- **SRT₅₀-NoAmplification: PTA-4** (r = .43*; F(1,26) = 6.04) [PTA-4 + Lexical access time (r = .49*)]
- **SRT₈₀-NoAmplification: Working memory** (r = .39*; F(1,26) = 4.76)
- **SRT₅₀-NAL-R:** [PTA-4 (r = .30; p = .058)]
- **SRT₈₀-NAL-R:** [PTA-4 (r = .30, n.s.)]

SUMMARY

- Hypothesized speech recognition strategy I:** Efficient lexical access predicts GÖSA SRT. Mainly in listeners with **normal hearing (ONH)**. For OHI, lexical access time only predicts unaided SRT₅₀ in combination with PTA.
- Hypothesized speech recognition strategy II:** Offline word reconstruction after sentence presentation;

- retaining sentence in phonological loop.
- ➔ Larger lexicon correlates with higher working memory.
- ➔ No apparent differences between ONH and OHI
- ➔ RST only predicts unaided SRT₈₀ in OHI.

- Group differences** in speech recognition scores **but NO differences** in aspects concerning verbal processing.

- Regression models per group show **different predictors** for speech recognition scores per group & condition.
- ➔ **Different speech processing/ recognition strategies in OHI?**

- Vocabulary size DECREASES with age**
BUT note INcreasing vocabulary size with age in YNH (see Carroll et al., 2015b; Salthouse, 2004; Ramscar 2014 for explanation)

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