

Dataset for: "Evaluating the role of age on speech-in-noise perception based primarily on temporal envelope information"

Jonathan Regev, Andrew J. Oxenham, Helia Relación-Iborra, Johannes Zaar, and Torsten Dau

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This dataset supports the findings outlined in Regev, J., Oxenham, A. J., Relación-Iborra, H., Zaar, J., and Dau, T. (2025). "Evaluating the role of age on speech-in-noise perception based primarily on temporal envelope information." Hearing Research, 460, 109236, <https://doi.org/10.1016/j.heares.2025.109236>

This file describes the contents of the dataset.

The dataset contains data for 14 young and 14 older listeners with normal hearing (young and older NH listeners).

The data collected were:

- Population data: age and tested ear
- Audiograms
- Amplitude modulation (AM) detection thresholds
- Masked-threshold pattern (MTP)
- Q-factors fitted to the individual MTPs
- Speech-reception thresholds (SRTs) using tone-vocoded speech

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Population Data

Dataset giving the population information for the 28 participants (*tp*), split into young NH and older NH (*group*), tested in the study. The data summarizes the participants' *age* and tested ear (*ear*). The age is given in years and the tested ear is indicated by either *L* (left) or *R* (right).

Audiogram

Audiometric thresholds (*thresh*) were collected for 28 participants (*tp*), split into young NH and older NH (*group*), at frequencies (*freq*) of 0.125, 0.25, 0.5, 1, 2, 3, 4, 6, and 8 kHz. The thresholds are given in dB Hearing Level (HL).

Amplitude Modulation (AM) Detection

28 participants (*tp*), split into young NH and older NH (*group*), were tested. Detection thresholds (*thresh*) were collected at a target modulation frequency (*fmod*) of 4 Hz. A complex tone consisting of 12 pure tones, spaced from 375 to 6237 Hz in steps of 2 Cams, was used as the carrier.

At least three repetitions (*repetition*) were collected for each condition. If the standard error across repetitions exceeded 2 dB, additional repetitions were added until that limit was met. The thresholds are given for the target modulation depth on a dB scale: $M = 20\log_{10}(m)$, where m is the modulation depth on a linear scale.

Masked-threshold Pattern (MTP)

28 participants (*tp*), split into young NH and older NH (*group*), were tested. Masked thresholds (*thresh*) were collected at a target modulation frequency (*fmod*) of 4 Hz, and seven different masker-modulation center frequencies (given as octaves relative to the target modulation frequency, *mask_oct*) at -5, -4, -2, -4/3, -2/3, 0, +2/3, +4/3, and +2 octaves. A complex tone consisting of 12 pure tones, spaced from 375 to 6237 Hz in steps of 2 Cams, was used as the carrier.

At least three repetitions (*repetition*) were collected for each condition. If the standard error across repetitions exceeded 2 dB, additional repetitions were added until that limit was met. In case a threshold was not obtainable in one of the repetitions, the *thresh* entry specifies "NaN". The thresholds are given for the target modulation depth on a dB scale: $M = 20\log_{10}(m)$, where m is the modulation depth on a linear scale.

Q-factors fitted to the individual MTPs

Q-factors were fitted to the MTPs obtained from 28 participants (*tp*), split into young NH and older NH (*group*). All MTPs were collected for a target modulation frequency (*fmod*) of 4 Hz. The Q-factors (*Q_fit*) were fitted using the method detailed in Regev *et al.* (2024b): The best-fitting linear approximation was obtained for each skirt of the MTPs, with each linear fit constrained to cross the on-target masked threshold. The Q-factor was then derived from the 3-dB-down points on the fits obtained for each skirt. The mean-squared error (*MSE*) of the fits (where the error is the difference between fitted and real thresholds of the MTP) is also reported, in dB.

Speech-reception Thresholds (SRTs)

Speech-reception thresholds (*SRT*) at the 50%-correct point were collected for 27 participants (*tp*), split into 14 young NH and 13 older NH listeners (*group*). One of the older NH listeners (TP28) did not participate in this experiment. The SRTs are given in dB signal-to-noise ratio (SNR). The test used the Danish Hearing in Noise Test (HINT; Nielsen & Dau, 2011) and used tone-vocoded target speech. A detailed description of the processing stages employed in the tone vocoder is available in the article.

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Seven different maskers (*conditions*) were used:

1. a vocoded speech-shaped noise (*Voc SSM*)
2. an unmodulated complex tone (*Unmod CT*)
3. a complex tone modulated with a $\frac{1}{2}$ -octave wide bandpass noise centered at 2 Hz (*Mod 2 Hz*)
4. a complex tone modulated with a $\frac{1}{2}$ -octave wide bandpass noise centered at 4 Hz (*Mod 4 Hz*)
5. a complex tone modulated with a $\frac{1}{2}$ -octave wide bandpass noise centered at 8 Hz (*Mod 8 Hz*)
6. a complex tone modulated with a $\frac{1}{2}$ -octave wide bandpass noise centered at 16 Hz (*Mod 16 Hz*)
7. a complex tone modulated with a $\frac{1}{2}$ -octave wide bandpass noise centered at 32 Hz (*Mod 32 Hz*)

A detailed description of each masker is available in the article. For each condition, the SRT was assessed once using a specific list (*list*) from the target speech corpus. The order in which each condition was presented to the participants is reported in the column *order*.

TP numbers across datasets

Some of the participants in this study previously provided similar data (i.e., MTPs and AM detection thresholds) reported in the study by Regev *et al.* (2023) and the corresponding dataset by Regev *et al.* (2024a). This sheet provides the correspondence of the TP numbers between this dataset (*tp*) and that of Regev *et al.* (2024a; *tp_Regev_2024*), for each listener group (*group*). The sheet states *NA* in case the participant was not included in the previous dataset.

Ethical statement

All listeners were financially compensated for their time and gave written informed consent. Ethical approval for the study was provided by the Science-Ethics Committee for the Capital Region of Denmark (reference H-16036391).

References

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Regev, J., Zaar, J., Relación-Iborra, H., & Dau, T. (2024a). Dataset for: "Age-related reduction of amplitude modulation frequency selectivity." Technical University of Denmark, Dataset. <https://doi.org/10.11583/DTU.25134527>

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Corresponding article:

Regev, J., Oxenham, A. J., Relación-Iborra, H., Zaar, J., and Dau, T. (2025) "Evaluating the role of age on speech-in-noise perception based primarily on temporal envelope information." Hearing Research, 460, 109236. <https://doi.org/10.1016/j.heares.2025.109236>.

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