# Identifying neurophysiological biomarkers of adaptation to noise

Valderrama JT[1,2,3,*], Sánchez-Martínez F[1], Marrufo-Pérez MI[4,5], Lopez-Poveda EA[4,5,6]

[1] Department of Signal Theory, Telematics and Communications, University of Granada, Granada, Spain
[2] Research Centre for Information and Communications Technologies, University of Granada, Granada, Spain
[3] Department of Linguistics, Macquarie University, Sydney, Australia
[4] Institute of Neuroscience of Castilla y León, Salamanca, Spain
[5] Institute for Biomedical Research of Salamanca, Salamanca, Spain
[6] Department of Surgery, Faculty of Medicine, University of Salamanca, Salamanca, Spain
* *Presenting author*

**Topic:** Efferent system.

**Background:** '*Adaptation to noise*' refers to the auditory system's ability to adjust its settings to optimise the neural encoding of sounds in noisy environments, thereby enhancing speech comprehension in challenging acoustic venues such as cafés and shopping centres. Non-invasive biomarkers could provide insight into the neural mechanisms underlying this process, potentially improving the diagnosis of speech-in-noise hearing difficulties. The aim of this study was to investigate behavioural and neurophysiological markers of adaptation to noise, exploring its time course and potential neural origins.

**Methods:** Speech intelligibility thresholds (50% recognition) were measured in 15 normal-hearing adults (8 males; 19–46 years) for words presented at three time points after the onset of speech-shaped noise: 50 ms (early), 800 ms (middle), and 1600 ms (late). Auditory brainstem responses elicited by 50 ms click-trains were compared for trains presented 50 ms and 800 ms after the noise onset at +5 dB SNR.

**Results:** Speech intelligibility thresholds improved by 2.4 dB and 2.9 dB in the middle and late conditions, respectively, compared to the early condition, indicating behavioural adaptation to noise. Neurophysiological data collection is ongoing (2 participants tested, with >10 participants expected by June 2025).

**Conclusion:** The observed improvements in speech intelligibility suggest a significant adaptation effect, and help characterise its activation time constant. Preliminary neurophysiological results support the feasibility of the study design and may provide insights into whether adaptation to noise occurs at the midbrain level or in auditory processing centres.