A perceptual-learning investigation of selectivity in the amplitude-modulation domain

Robin Gransier
KU Leuven, Department of Neurosciences, ExpORL, Belgium

Temporal envelope modulations (TEMs) are the primary cues that cochlear implant (CI) users utilize to perceive speech. The ability of the electrically stimulated neural ensembles to encode TEMs is important for speech perception with a CI, especially in adverse listening situations. Behavioral measures of TEM encoding (i.e. modulation detection thresholds) have shown that the ability to encode TEMs varies across the electrically stimulated neural ensembles. Furthermore, this variability in TEM encoding is associated with the speech perception outcome with a CI. However, it is poorly understood how this TEM encoding is represented at the different stages of the auditory pathway. Electrophysiological measures of the neural encoding of the temporal envelope can provide more insight in this processing and may aid the development of new signal processing strategies for CIs.

We will present an overview of a number of recent studies originating from our lab where we investigate how the neural TEM encoding can objectively be assessed in CI users by means of electrophysiological measures. We will discuss the technical challenges, the association of these measures with behavioral outcomes, and its potential future applications.