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"Temporal primitives in auditory cognition and speech perception"

Generating usable internal representations of speech input, or an auditory scene more generally, requires, among other operations, fractionating the signals into temporal units/chunks of the appropriate granularity. Adopting (and adapting) Marr's (1982) approach to vision, a perspective is outlined that formulates linking hypotheses between specific neurobiological mechanisms (for example cortical oscillations and phase-locking) and the representations that underlie auditory cognition (for example syllables). Focusing on the implementational and algorithmic levels of description, I argue that the perception of sound patterns requires a multi-time resolution analysis. In particular, recent experimental data from psychophysics, MEG (Luo & Poeppel, 2007), and concurrent EEG/fMRI (Giraud et al., 2007) suggest that there exist privileged time scales that form the basis for constructing elementary auditory percepts. These 'temporal primitives' permit the construction of the internal representations that mediate the analysis of speech and other acoustic signals.