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# Timing and Speech: inherent or distinct?

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## Abstract

Our sense of hearing rests on the processing of events that unfold in time. Acoustic events form patterns of varying formal and temporal complexity extending from the clicks of a metronome and morse-code to musical notes and speech. Formal structure reflects characteristics such as pitch, timbre, loudness, while temporal structure gives rise to the concepts of succession and duration. Both are independent sources of information in auditory cognition. However, perceived regularity in either dimension can be used to generate predictions regarding the future course of events. Such predictions instantiate a powerful mechanism that allows for proactive behavior in cognition and action. Here we propose that auditory processing, and speech processing in particular, interfaces with dedicated temporal processing systems such as the cerebellum, the supplementary motor area, and the basal ganglia in order to exploit temporal regularity and to predict the temporal locus of important events. The emerging integrative subcortico-cortical framework models speech processing as a dynamic process and provides a novel perspective regarding the development, optimization, and functional loss of speech processing capacities.

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