

“COMPLEXITY OF NEURONAL RESPONSES IN PRIMARY AUDITORY CORTEX: EVIDENCE FOR AUDITORY SCENE ANALYSIS?”

by

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Abstract

One goal of sensory physiology is to identify neuronal 'integration functions': the transformation from sensory input to neuronal output. In the auditory system, such integration functions are reasonably well understood for neurons in early stations, but starting at least from the inferior colliculus, neuronal transformations are complex and in particular context-sensitive. In primary auditory cortex, responses of the same neuron to pure tones on the one hand, and to complex, naturalistic sounds on the other, are often hard to reconcile. Thus, spectro-temporal context, even almost instantaneous, may strongly affect the responses of a cortical neuron.

I will discuss two findings that illustrate this complexity. First, I will discuss the sensitivity of cortical neurons to interaural time differences (ITDs) in high-frequency auditory cortex. Such ITD sensitivity is based on processing sound envelopes, and we show that some cortical neurons show exquisite sensitivity to envelope ITD. However, the same neuron may or may not show ITD sensitivity depending on the parameters of the sound. Second, I will summarize our studies of the coding of bird songs in cat auditory cortex. These studies suggest that cortical neurons are sensitive to particular ethologically-relevant components of sounds, rather than to specific acoustic features. I will argue that these examples, as well as others, suggest that the complexity of processing in auditory cortex has to be understood in the framework of the overall function of the auditory system, that of performing auditory scene analysis.

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All are welcome