The Neural Encoding Model System

R01EB028155 - Tools for modeling state-dependent sensory encoding by neural populations across spatial and temporal scales.
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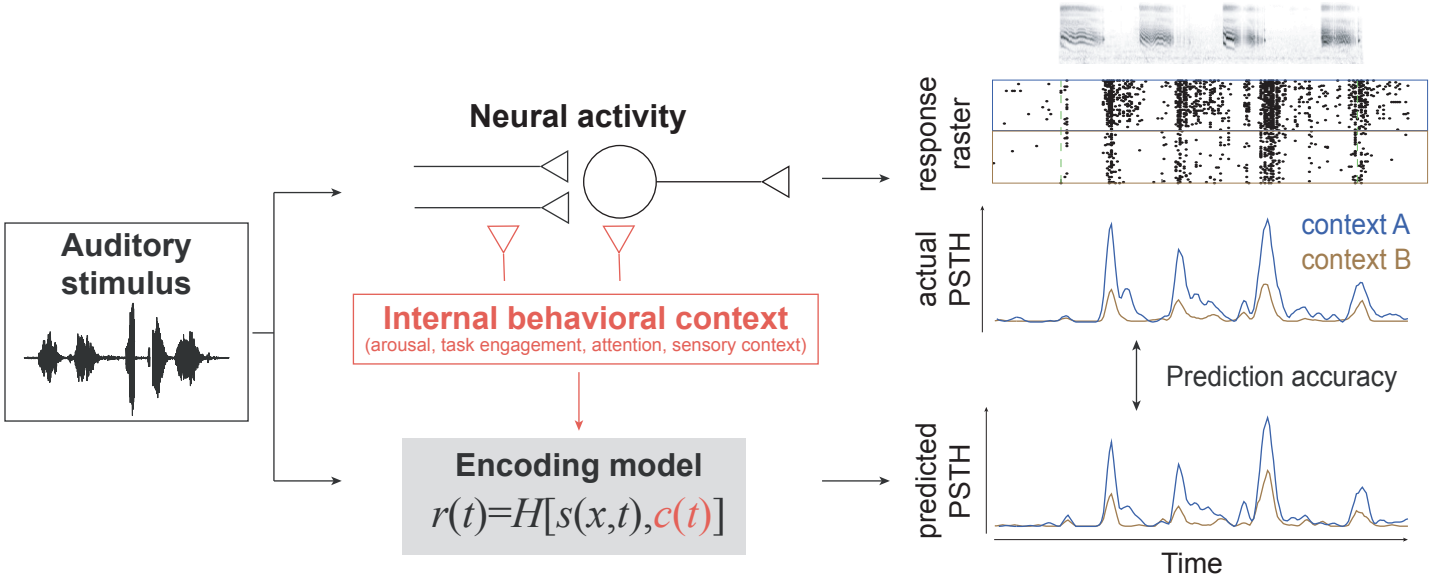
Can we develop computational models of how the brain represents complex natural sounds across changing behavioral contexts?



Encoding models that characterize the relationship between sensory stimuli and neural activity form a fundation of sensory neuroscience. Convolutional neural networks (CNNs) and related machine learning tools permit new and more powerful encoding models. However, widespread adoption is limited by several factors:

1. Implementation. Fitting and evaluating CNNs is difficult for non-experts.
2. Interpretaton. While CNNs may outperform simpler tradition models, it is often unclear why.
3. Equivalence. Many complex models have been proposed. Do they describe the same functions?
4. State dependence. Most sensory encoding models assume the brain is a static signal processor.

To address these limitations, we have developed the Neural Encoding Model System (NEMS), a python-based toolkit for analysis of sensory neurophysiology data with both traditional and machine learning models.

Poster: **TDA13**
Source code and documentation at: **https://github.com/LBHB/NEMS/**