BMC Neuroscience

Poster presentation

Open Access

Patterns recognition in the ECoG data of auditory evoked response

Amir Assadi*[1], Arash Bahrami[2], Yang Yang[3] and Hamid Eghbalnia[4]

Address: [1]Department of Mathematics, University of Wisconsin-Madison, Madison, WI 53706, USA, [2]Graduate Program in Biophysics, University of Wisconsin-Madison, Madison, WI 53706, USA, [3]Department of Civil Engineering, University of Wisconsin-Madison, Madison, WI 53706, USA and [4]Department of Biochemistry, University of Wisconsin-Madison, Madison, WI 53706, USA

Email: Amir Assadi* - ahassadi@facstaff.wisc.edu

* Corresponding author

from Sixteenth Annual Computational Neuroscience Meeting: CNS*2007
Toronto, Canada. 7–12 July 2007

Published: 6 July 2007

BMC Neuroscience 2007, **8**(Suppl 2):P132 doi:10.1186/1471-2202-8-S2-P132

We study the evoked potential of the local neuronal circuits of the *left temporal lobe* surrounding the auditory cortex in response to two types of simple auditory stimuli. We wish to gain deeper insight into the *systems-level functional and behavioral consequences* of sensation of a tone that includes a cooperative population of neurons in electrocorticogram (ECoG) recordings. Available experimental data does not have the necessary flexibility and the rich variety of parameter adjustments in the single-electrode recordings needed in order to make the data amenable to conventional analysis. These constraints and potential imperfections in data pose new challenges in the mathematical, computational and statistical aspects of data analysis and modeling. We use the experimental setting called *the odd-ball paradigm*, to collect intracranial electrophysiological recordings using an 8 × 8 grid. The evoked response potentials that are then analyzed using algorithms that utilize methods of information theory. The extracted patterns of auditory response are used to elucidate cortical substrates of "*auditory attention and decision-making*". While data analysis was performed for the cases of attention as well as inattention, the analysis used the data from inattention for statistical purposes to contrast with data for selective attention. This approach was useful to fine-tune optimization parameters, and to exploit a sharper computational rendering of the Principle of Economy of Resources. The main results presented here are: (1) a computational-mathematical methodology to study auditory cortical response to brief tones in the presence of attention; (2) an application of (1) to neurobiology that provides an algorithm to estimate the transmission time of an auditory stimulus from cochlea until the auditory cortex (approx. 50–60 msec).