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Presentation Abstract

Program#/Poster#: 522.02/V13

Presentation Title: Local field potentials in the motor cortex of people with tetraplegia: comparison using unsupervised methods

Location: Hall A

Presentation time: Tuesday, Oct 20, 2015, 8:00 AM -12:00 PM

Presenter at Poster: Tue, Oct. 20, 2015, 9:00 AM - 10:00 AM

Topic: ++D.18.c. Neuroprosthetics: Control of real and artificial arm, hand, other grasping devices

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Abstract:

Dimensionality reduction techniques, applied to neural spike trains, have revealed structure in the motor cortex of non-human primates (NHPs, e.g. Yu et al, 2008, Sadtler et al, 2014, Vargas-Irwin et al, 2015). Local field potential oscillations have been shown to contain information about attempted or imagined movements in NHPs (e.g. Murthy and Fetz, 1992, Sanes and Donoghue, 1993) and people with tetraplegia (e.g. Perge et al, 2014). We propose a method to identify frequency bands of interest in local field potential activity recorded intracortically with a multielectrode array placed in motor cortex. First, we compute LFP power across time using multi-taper spectral analysis. We then apply factor analysis and k-means clustering to these power spectra and compute the distance between clusters in the frequency domain. We apply this method to data collected from nine people with tetraplegia during a 2D point-and-click cursor control task. These include two people with tetraplegia resulting from spinal cord injury (S1 and T8), two people with tetraplegia and anarthria resulting from brainstem stroke (S3 and T2), and five people diagnosed with amyotrophic lateral sclerosis (T1, A1, T6, T7, and T9). The analysis recovers the prominence of the beta band (10-40 Hz) and suggests differences in beta activity between participants. The results point towards new ways to interpret local field potentials in motor cortex, including in comparisons across task contexts and between etiologies of paralysis.

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