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## Presentation Abstract

Program#/Poster#: 309.24/I6

Presentation Title: Delay differential analysis of EEG during reaching to grasp virtual objects

Location: WCC Hall A-C

Presentation time: Monday, Nov 17, 2014, 8:00 AM -12:00 PM

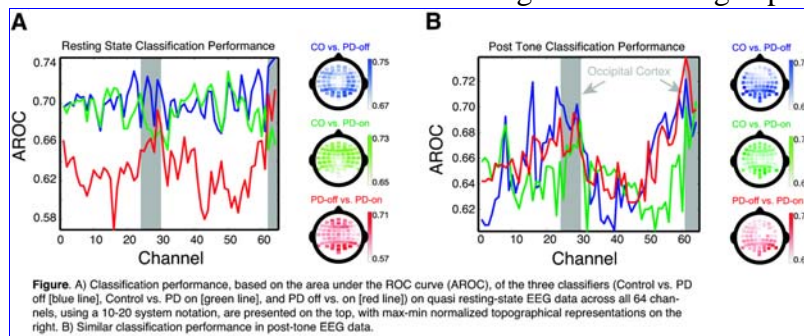
Presenter at  
Poster: Mon, Nov. 17, 2014, 11:00 AM - 12:00 PM

Topic: ++C.03.a. Human studies

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Abstract: Parkinson's disease (PD) is a costly, chronic, neurodegenerative disorder that affects tens of millions of people worldwide, yet no biomarker has been established to date. PD is known to lead to marked alterations in cortical-basal ganglia activity and is characterized by motor impairments such as bradykinesia, muscle rigidity, resting tremor, and postural instability. Using non-linear Delay Differential Analysis (DDA) for time-domain classification of PD patients on and off dopaminergic therapy (PD-on, PD-off, respectively, n=9) from healthy age-matched controls (CO, n=10), we hypothesize that individual trials of EEG data can be used to classify CO from PD-on/off. Surface EEG activity was recorded from 64- channels in all subjects during a reaching task to grasp rectangular virtual objects with haptic feedback provided. A tone was provided to indicate the start of the trial, and two data sets, one full second prior to the tone (resting state) and half a second after the tone were used for classification (post-tone). The virtual object was unexpectedly rotated 90 degrees in the frontal plane

on a subset (33%) of trials and two additional data sets of behavioral and EEG data, time-locked to the onset of the object perturbation are considered. Resting state EEG provided a relatively uniform classification performance for CO vs. all PD patients and poorer performance within PD patients. In contrast to resting state, post-tone EEG was shown to provide increased classification performance towards occipital areas, consistent with a PD patient's increased reliance on visual feedback processes during complex motor tasks. Task-related changes in EEG after the onset of the perturbation were also identified that merit further exploration with behavioral changes due to PD. Thus, non-linear features in EEG data may provide a potential biomarker for Parkinson's disease based on single 1 s or 1/2 s trials of EEG data that are sensitive to changes in a virtual grasping



movement.

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Keyword (s): PARKINSON'S DISEASE

EEG

MOTOR CONTROL

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