Control/Tracking Number: 2011-S-13863-SfN
Activity: Scientific Abstract
Current Date/Time: 5/16/2011 1:06:51 PM

Temporal stability of visually selective responses in intracranial field potentials from the human occipital and temporal lobes

AUTHOR BLOCK: *A. K. BANSAL[1], J. M. SINGER[1], J. R. MADSEN[1], G. KREIMAN[1,2];
[1]Neurol., Children's Hosp. of Boston, Boston, MA; [2]Swartz Ctr. for Theoretical Neurosci., Harvard Univ., Cambridge, MA

Abstract: Intracranial field potentials (IFPs) measured using electrocorticography (ECoG) from electrodes in occipital and temporal regions in human epilepsy patients have been shown to contain significant information about visual object categories and exemplars. Evaluating the degree of stationarity, or similarity over time, of the visually selective IFP responses is important for studying plasticity of neural responses, and for potential use of ECoG in brain-machine interfaces (BMIs). Here, we quantitatively assessed the stationarity of IFPs while 19 subjects were presented with brief flashes of grayscale images belonging to one of five different categories, across two or more sessions separated by hours or days.
We considered electrodes that showed robust visual selectivity as assessed by the probability of reliably discriminating across different categories from the IFP responses. These electrodes were typically located in the inferior occipital gyrus, the inferior temporal cortex and the fusiform gyrus. We found that IFP responses were generally stationary within and across sessions. To quantify the degree of stationarity, we evaluated the accuracy for decoding the presented image category, or the Pearson correlation of the values of IFP waveform features such as amplitude and max/min time across sessions. Significant decoding accuracy could be achieved by training classifiers using IFP data from one session and then testing using data from another session, further indicative of the general stationarity of the IFP response. Nevertheless, the correlation of decoding accuracy was stronger when using data from within a session for training and testing, as compared to using data across sessions. Finally, the preferred exemplars for any selective IFP channel, when multiple exemplars per category were presented, were significantly more similar across sessions than those predicted by chance.
These results establish a baseline in the stationarity of the IFP response selectivity within and across sessions, which can facilitate the application of IFPs for studying cortical plasticity and also for BMIs.
:

Presentation Preference (Complete): No Preference
Linking Group (Complete): None selected
Nanosymposium Information (Complete):
Theme and Topic (Complete): D.04.m. Extrastriate cortex and subcortical structures: Neural coding ; D.04.s. Representation of objects
Keyword (Complete): VISUAL CORTEX ; NEURAL CODING ; CORTICAL PLASTICITY

Support (Complete):
Support: Yes
Grant/Other Support: : NIH R21EY019710
Grant/Other Support: : NIH DP2OD005393
Grant/Other Support: : NIH R21NS070250-01A1
Grant/Other Support: : NSF 0954570
Grant/Other Support: : NSF 1010109

Special Requests (Complete):
Is the first (presenting) author of this abstract a high school or undergraduate student?: None

Religious Conflict?: No Religious Conflict
Additional Conflict?: No

Status: Finalized