Dear Fellow ECoG Researcher,

These are some of the cue-based hand & tongue movement and imagery data described in the Proceedings of the National Academy (PNAS) 2010 Manuscript titled: “**Cortical activity during motor execution, motor imagery, and imagery-based online feedback**”. The patients only partially overlap with the patients from that study.

Miller, Kai J., Gerwin Schalk, Eberhard E. Fetz, Marcel Den Nijs, Jeffrey G. Ojemann, and Rajesh PN Rao. "Cortical activity during motor execution, motor imagery, and imagery-based online feedback." Proceedings of the National Academy of Sciences (2010): 200913697.

Please keep in mind that these anonymized data are from real patients who donated time in a difficult period of their lives to advance our understanding of the brain. Any publication involving these data **MUST** include the following in the methods section of the manuscript, without modification:

**Ethics statement:** All patients participated in a purely voluntary manner, after providing informed written consent, under experimental protocols approved by the Institutional Review Board of the University of Washington (#12193). Portions of these data originally appeared in the manuscript *“Cortical activity during motor execution, motor imagery, and imagery-based online feedback”* published in PNAS in 2010 [Reference]. Portions of these patient data was anonymized according to IRB protocol, in accordance with HIPAA mandate. It was made available through the library described in “A Library of Human Electrocorticographic Data and Analyses” by Kai Miller [Reference], freely available at

<https://searchworks.stanford.edu/view/zk881ps0522>

**“Cue-based movement task”** *The basic datafiles (in MATLAB format) are named “##\_mot\_t\_h.mat” in the folder data/##, where ## denotes the 2 letter patient code. This code is not the patient’s initials****:*** Patients performed simple, repetitive, motor tasks of hand (synchronous flexion and extension of all fingers, i.e., clenching and releasing a fist at a self-paced rate of ~1-2 Hz) or tongue (opening of mouth with protrusion and retraction of the tongue, i.e., sticking the tongue in and out, also at ~1-2 Hz). These movements were performed in an interval-based manner, alternating between movement and rest, and the side of move- ment was always contralateral to the side of cortical grid placement.

There were between 30 and 75 cue presentations for each movement modality. Cues for motor movement were delivered visually in a 10 x 10 cm presentation window at a distance of 75–100 cm from patient. Visual cues were presented using the BCI 2000 program with a written word indicating the specific body part to be moved (typically, multiple movement types were interleaved in each experimental run). Stimuli were presented for 2 s or 3 s cue blocks, followed by rest intervals (indicated by a blank screen) of the same length. The patients were instructed to perform repetitive, self-paced motor movement, alternating with rest intervals of the same length (indicated by the absence of the cuing target). Repetitive motion, rather than tonic contraction, was intended to accentuate the spectral shift during each interval.

**“Cue-based imagery task”** *The basic datafiles (in MATLAB format) are named “##\_imagery\_t\_h.mat” in the folder data/##, where ## denotes the 2 letter patient code. This code is not the patient’s initials****:*** Following the overt movement experiment, each subject performed an imagery task, imagining making identical movement rather than executing the movement. The imagery was kinesthetic rather than visual (“imagine yourself performing the actions like you just did”; i.e., “don’t imagine what it looked like, but imagine making the motions”).

Each datafile has 2 variables:

* "stim" (time x 1): This is what was stimulus was on the screen at each point in time.

0: blank screen

11: tongue movement or imagery

12: hand movement or imagery

* "data" (time x number of channels): These are the data. I have attempted to remove the contaminated channels. Data were recorded with respect to a scalp reference.
* sampled at 1000Hz
* scale factor: 1 amplifier unit = .0298 microvolts
* built-in band pass 0.15 to 200 Hz,

- but a 1 pole band pass, so there is no sharp corner at 200Hz.

-The amplitude roll-off function is in the file “ns\_1k\_1\_300\_filt.mat”

For all patients, there is a file titled “##\_electrodes.mat” in the subfolder locs/##,

Each file contains a single variable:

* "electrodes" (number of channels x 3): Electrode locations, in Taliarach coordinates, for plotting on the standardized brain. These were obtained using the LOC package, and can be plotted with it as well (code in “loc” folder). From “*Cortical electrode localization from X-rays and simple mapping for electrocorticographic research: The “Location on Cortex” (LOC) package for MATLAB*” in J Neurosci Meth, 2007.

In order to reproduce the analyses from the manuscript, open and examine the file “imagery\_th\_master. m”. Each step of analysis is shown clearly in the functions called from these files.

Note that the folders “loc” and “toolbox” from the root directory (zip files of the ECoG library) must be included in your MATLAB path for the analyses to work properly.

Some things to consider for these data:

- Some of the patients included here described difficulty while trying to perform the imagery task, and were not a part of the original study. I have included them here in any case.

- Note that electrode montages may be different from same task in same patient elsewhere in this library.

- I have not rejected bad/epileptic channels from these data. You may wish to do this.

Best Wishes!

Kai Miller,

Stanford University, 2015 (revised 2018)

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