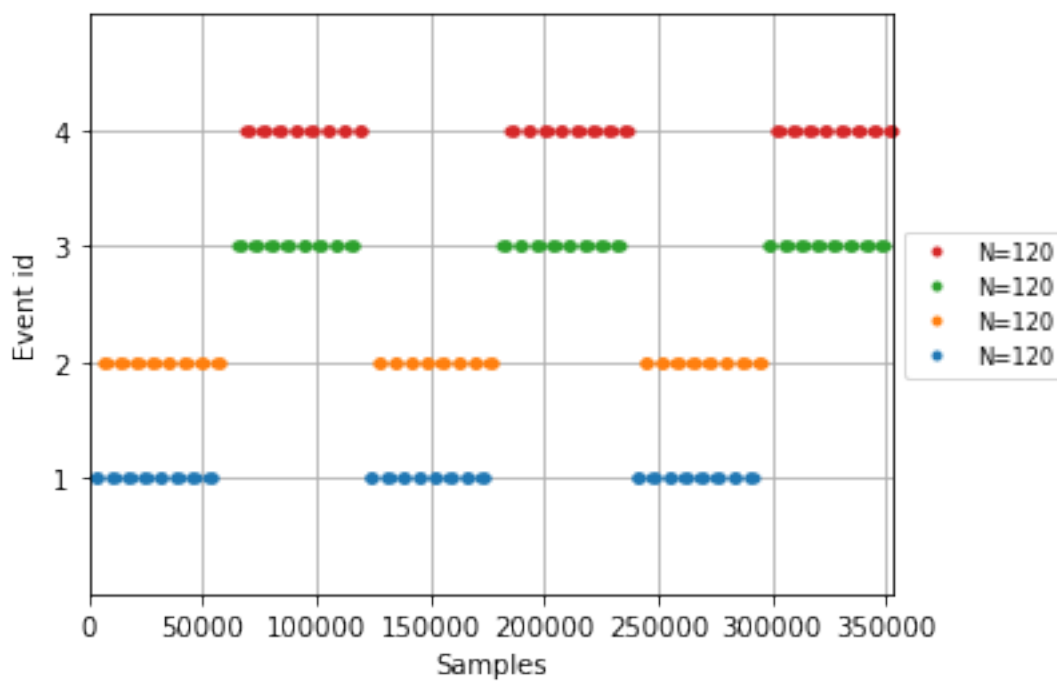# MCP_reports

August 16, 2021

```
Subject ID : JM288
Motor Command Protocol report for JM288 (patient)
```
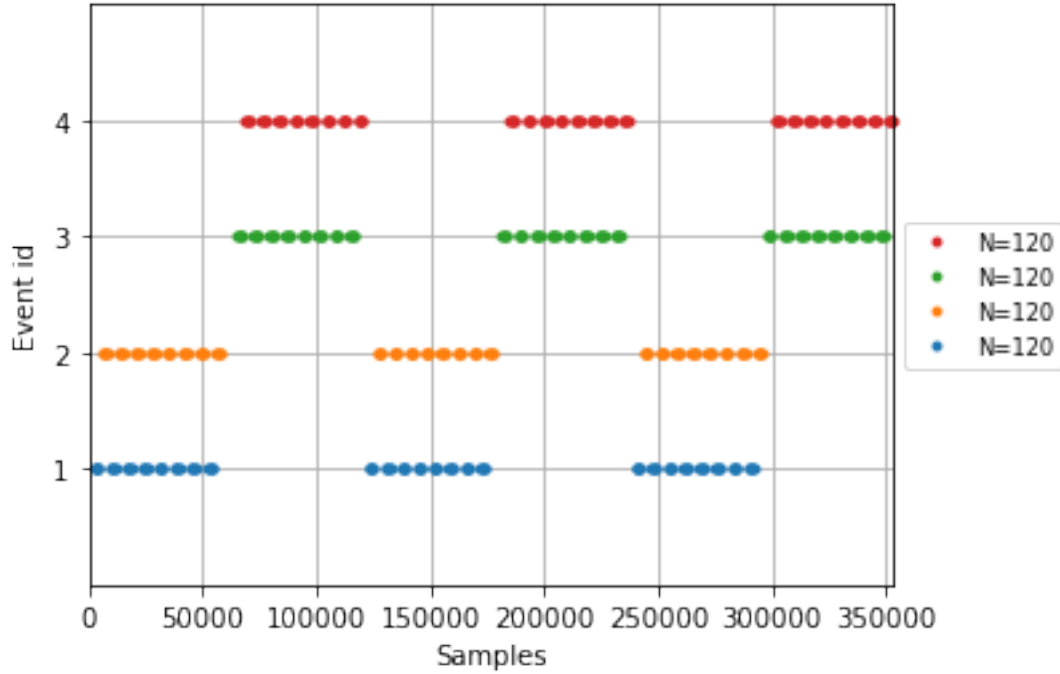
1 Data preprocessing

```
Applied a 257 --> 19 electrodes mapping
Keeping 19 channels over 257 after preprocessing steps (7.4 %)
```
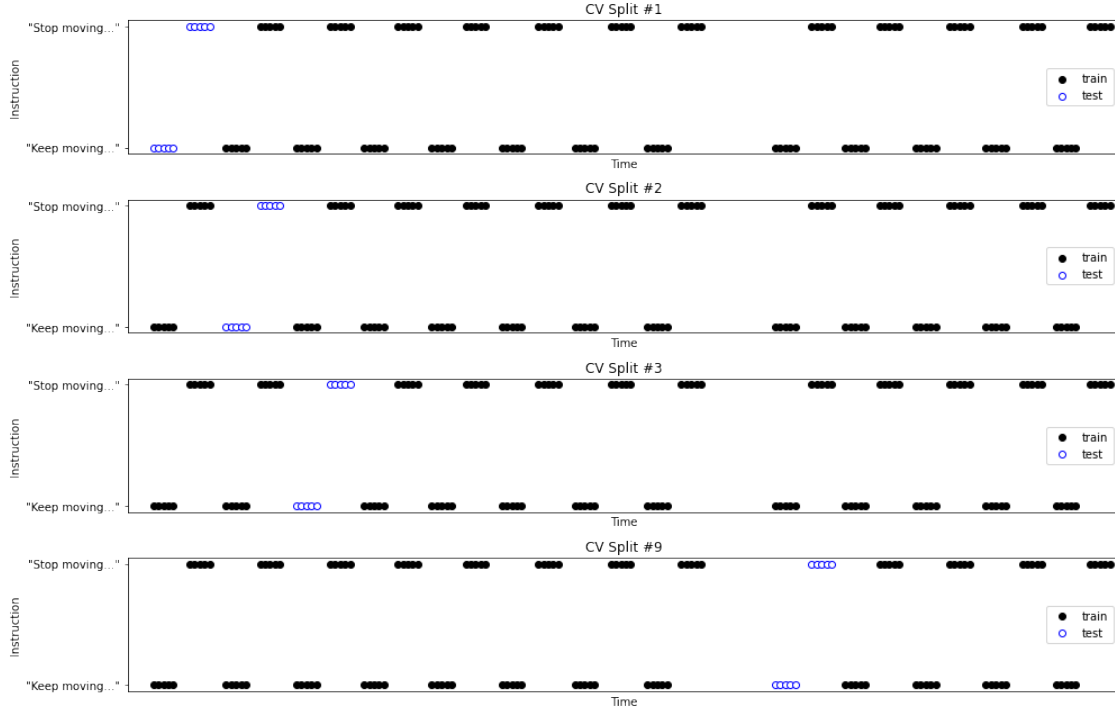
2 Block design

[12]:

Code of events: {'keep/right': 1, 'stop/right': 2, 'keep/left': 3, 'stop/left': 4}

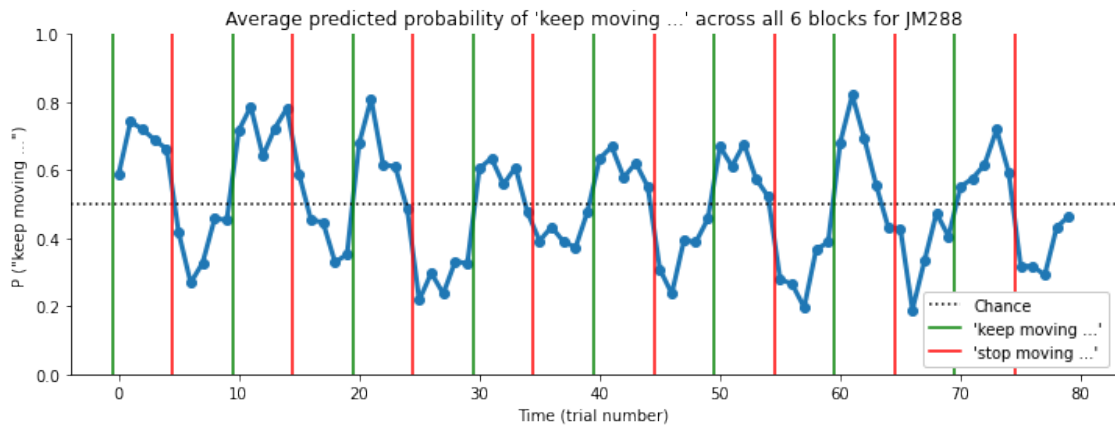# 3 Plot cross-validation for verification purposes

In order to prevent training the classifier on potentially temporally-correlated neighboring epochs, we apply a leave one-trial-out cross-validation (CV). Consequently, the training set consists of 2-second long epochs that are nottemporally adjacent to those used during the test set. We plot it here to verify that it worked correctly.

4 Decoding performance over time

To visualize how the decoding performs over time, we compute the SVM predicted probability of "keep moving..." over time and plot the average probability across all blocks. Useful to compare the classifier performance over time between controls, cognitive motor dissociation (CMD) patients and non CMD patients.

/! This plot is for clarity and descriptive purpose only, as it is not the exact same function that has been used to calculate the AUC score /!
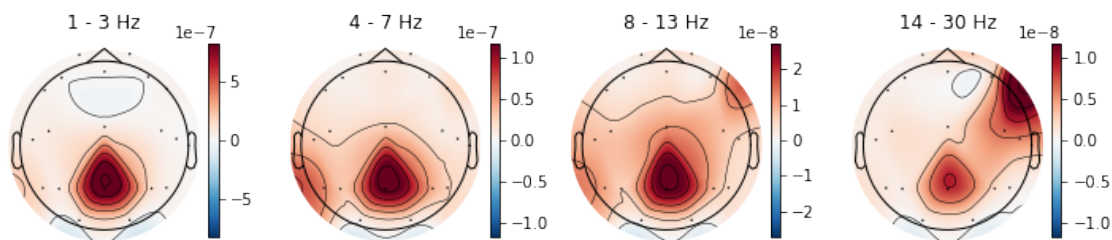
5 Spatial patterns over the 4 frequency bands

- Visualize and compare the spatial distribution of the spectral information used by the SVM classifier

- Features : n electrodes x 4 frequency bands per epoch

```
Spatial patterns over 1 - 3 Hz
Spatial patterns over 4 - 7 Hz
Spatial patterns over 8 - 13 Hz
Spatial patterns over 14 - 30 Hz
```


6 Computing cross-validated AUC scores

```
Mean scores across split: AUC=0.845
```

7 Diagnosis of cognitive motor dissociation (CMD)

7.1 Performing permutation test

To evaluate whether the mean AUC score significantly differs from chance (if AUC > 0.5), we perform a permutation test (Good P. 2006; Noirhomme Q et al. Neuroimage Clin. 2014; Noirhomme et al. Neuroimage. 2017).

This procedure consists of training and evaluating the same classifier several times (n=250 or 500) after randomly shuffling the target labels (i.e. "keep moving …" and "stop moving …").

A recording is considered to reveal command following (i.e., diagnosis of Cognitive Motor Dissociation in clinically unresponsive patients) if less than 5% of the AUCs obtained with scrambled labels are superior or equal to the mean AUC obtained using the real labels.

8 Interpretability of the results

Presence of variation in brain activity in response to alternative verbal motor instructions ("keep moving …" and "stop moving …") :
 AUC=0.85 (p= Not defined, run it to be confident about the result)