

# Meeting 3

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# Objectives

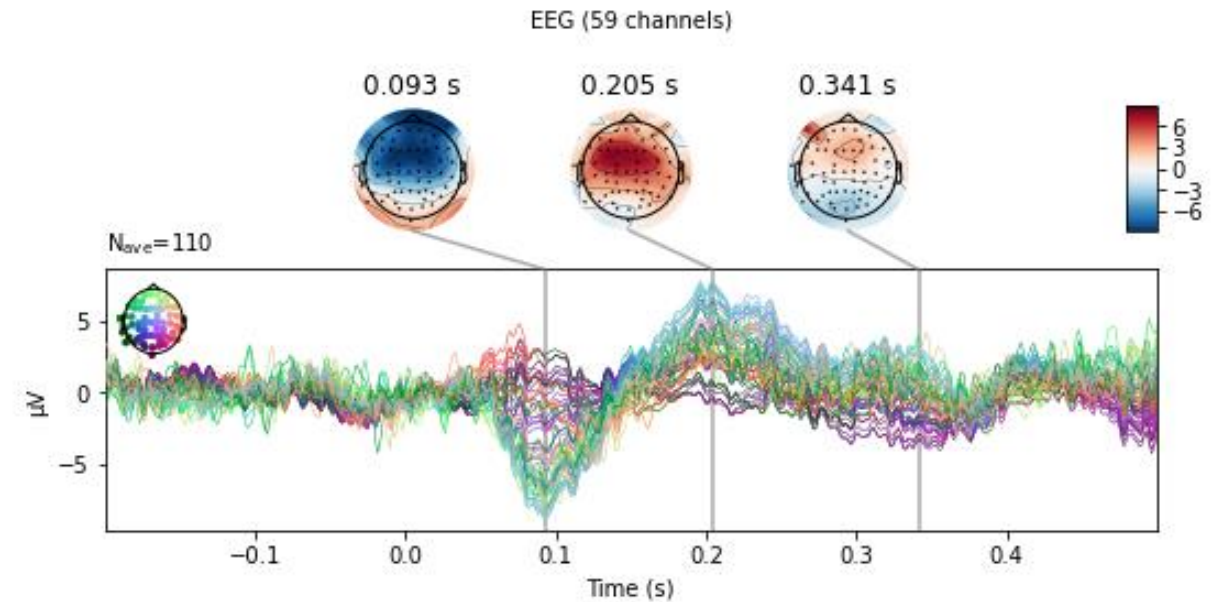
- Research MNE Python Library
- Fourier Transform

# MNE Python Library

- Visualize/Analyze neurophysiological data (EEG)
- Preprocess data
- Gather data and decide what parts to use
- Plot Data

# MNE EEG Visualizations

```
decision_tree_2.py x mne_example.py x Bokeh_Example.py x decision_tree.py x SendData4.py x
10 sample_data_folder = mne.datasets.sample.data_path()
11 sample_data_raw_file = os.path.join(sample_data_folder, 'MEG', 'sample',
12                                     'sample_audvis_raw.fif')
13 raw = mne.io.read_raw_fif(sample_data_raw_file)
14
15 print(raw)
16 print(raw.info)
17
18 #raw.plot_psd(fmax=50)
19 #raw.plot(duration=5, n_channels=30)
20
21 # set up and fit the ICA
22 ica = mne.preprocessing.ICA(n_components=20, random_state=97, max_iter=800)
23 ica.fit(raw)
24 ica.exclude = [1, 2] # details on how we picked these are omitted here
25 ica.plot_properties(raw, picks=ica.exclude)
26
27 events = mne.find_events(raw, stim_channel='STI 014')
28 print(events[:5]) # show the first 5
29
30 event_dict = {'auditory/left': 1, 'auditory/right': 2, 'visual/left': 3,
31              'visual/right': 4, 'smiley': 5, 'buttonpress': 32}
32
33 #fig = mne.viz.plot_events(events, event_id=event_dict, sfreq=raw.info['sfreq'],
34                           #first_samp=raw.first_samp)
35
36 reject_criteria = dict(mag=4000e-15, # 4000 fT
37                        grad=4000e-13, # 4000 fT/cm
38                        eeg=150e-6, # 150 µV
39                        eog=250e-6) # 250 µV
40
41 epochs = mne.Epochs(raw, events, event_id=event_dict, tmin=-0.2, tmax=0.5,
42                     reject=reject_criteria, preload=True)
43
44 conds_we_care_about = ['auditory/left', 'auditory/right',
45                        'visual/left', 'visual/right']
46 epochs.equalize_event_counts(conds_we_care_about) # this operates in-place
47 aud_epochs = epochs['auditory']
48 vis_epochs = epochs['visual']
49 del raw, epochs # free up memory
50
51 aud_evoked = aud_epochs.average()
52 vis_evoked = vis_epochs.average()
53
54 p = aud_evoked.plot_joint(picks='eeg')
55
56 p.savefig("test.png")
57
58 aud_evoked.plot_topomap(times=[0., 0.08, 0.1, 0.12, 0.2], ch_type='eeg')
59 aud_evoked.save("ex-ave.fif")
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61 output_file("Example.html")
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```



# Fourier Transform

- Decomposes signal into frequency components
- Input signal can have noise
- Can extract frequency components from EEG signals to study brain and diagnose brain disorders

