

```
In [1]: import mne
        %gui qt
        import matplotlib

        %matplotlib qt
        import numpy as np
        from matplotlib import pyplot as plt
        from stormdb.access import Query
        from pickle import load
        from scipy import stats
        from mne.datasets import sample
        from mne.stats import spatio_temporal_cluster_1samp_test
        import os
        import pickle
        from copy import deepcopy
        import warnings
        warnings.filterwarnings("ignore", category=DeprecationWarning)
        # os.environ['ETS_TOOLKIT'] = 'qt4'
        # os.environ['QT_API'] = 'pyqt5'
        # %gui qt
        #mne.viz.set_3d_backend("notebook")
```

```
In [2]: proj_name = 'MINDLAB2020_MEG-AuditoryPatternRecognition'
        wdir = '/projects/' + proj_name + '/scratch/working_memory/'
        stats_dir = wdir + 'results/stats/'
        data_dir = wdir + 'averages/data/'

        subs_dir = '/projects/' + proj_name + '/scratch/fs_subjects_dir/'
        sample_path = sample.data_path()
        sample_subjects_dir = sample_path + '/subjects'
        src_sample = mne.read_source_spaces(sample_subjects_dir +
                                           '/fsaverage/bem/fsaverage-vol-5-src.fif'
                                           ')

```

Reading a source space...

[done]

1 source spaces read

```
In [3]: # Read stats
periods = {'encoding': [0,2], 'delay': [2,4], 'retrieval': [4,6.25]}
stats = {}

for p in periods:
    csfname = '{}ERF_source_stats_{}.p'.format(stats_dir, p)
    cfile = open(csfname, 'rb')
    stats[p] = pickle.load(cfile)
    cfile.close()
print(stats)
```

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```

In [4]: # Load and morph a source time course
dfname = data_dir + '0021_LZW_evoked_sources.p'
dfile = open(dfname, 'rb')
all_stc = pickle.load(dfile)
dfile.close()
stc = deepcopy(all_stc['main']['same'])
del all_stc

# load source morph
morph = mne.read_source_morph(subs_dir + '0021_LZW/bem/0021_LZW_vol-mor
ph.h5')
stc = morph.apply(stc)
print(stc)

```

```

<VolSourceEstimate | 14629 vertices, subject : fsaverage, tmin : -150
0.0 (ms), tmax : 6500.0 (ms), tstep : 10.0 (ms), data shape : (14629,
801), ~89.5 MB>

```

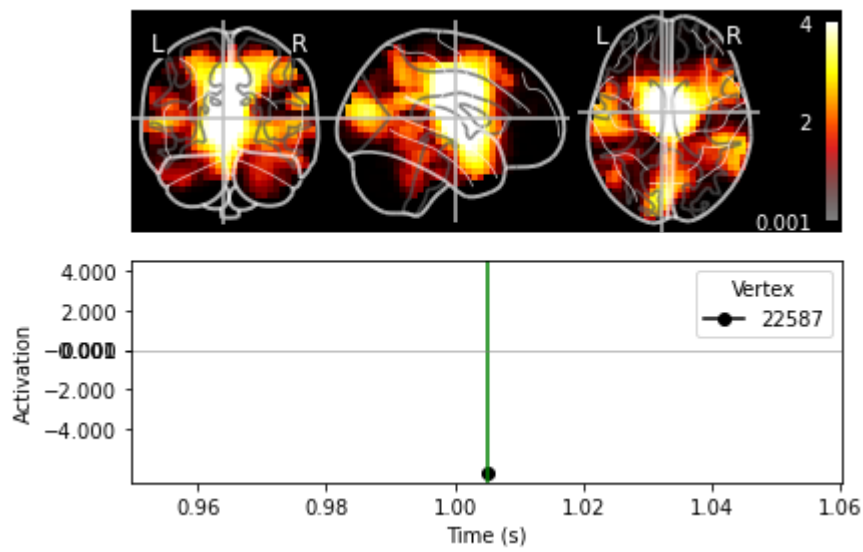
```
In [8]: # Plot 1 stc

p = 'delay'
c = 'maintenance'

for p in stats:
    for c in stats[p]:
        mask = stats[p][c]['qvals'] <= 0.025
        stc.data = stats[p][c]['tvals']*mask#*stats[p][c]['mask']
        stc.tmin = periods[p][0]
        #     plot_times = np.arange(0,2,0.1)
        #     for pt in plot_times:
            print('{} {} {}'.format(p,c,stc.tmin+pt))
            brain = stc.mean().plot(subjects_dir=subs_dir,clim={'kind': 'value', 'lims': [0.001,2,4]},#time_viewer=True,
                                   subject='fsaverage', mode = 'glass_brain',
                                   src=src_sample)#,initial_time = stc.tmin+pt)
```

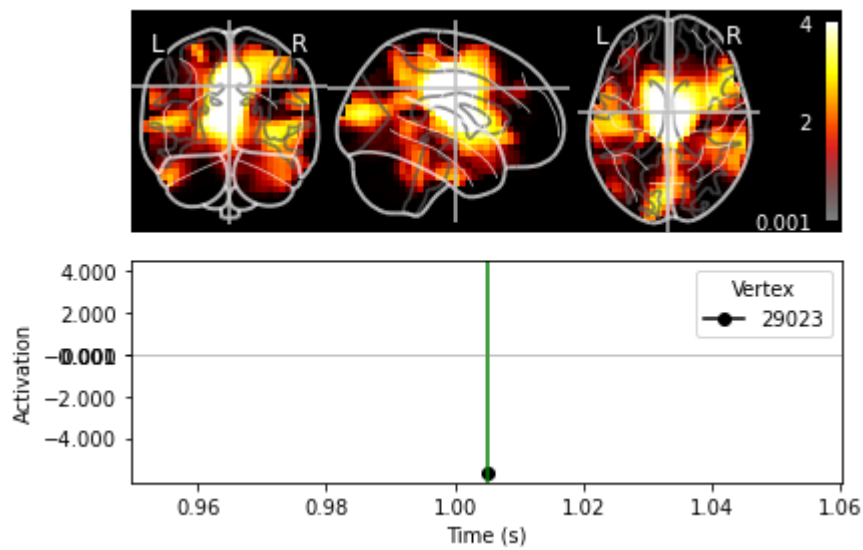
encoding maintenance 1.9000000000000001

Showing: $t = 1.005$ s, $(-5.0, -10.0, 10.0)$ mm, $[15, 21, 17]$ vox, 22587 vertex



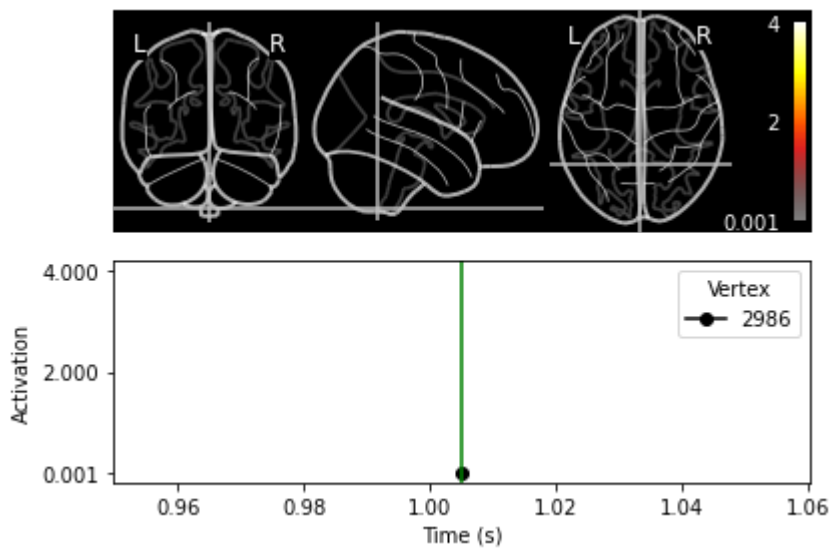
encoding manipulation 1.9000000000000001

Showing: $t = 1.005$ s, $(0.0, -10.0, 35.0)$ mm, $[16, 21, 22]$ vox, 29023 vertex



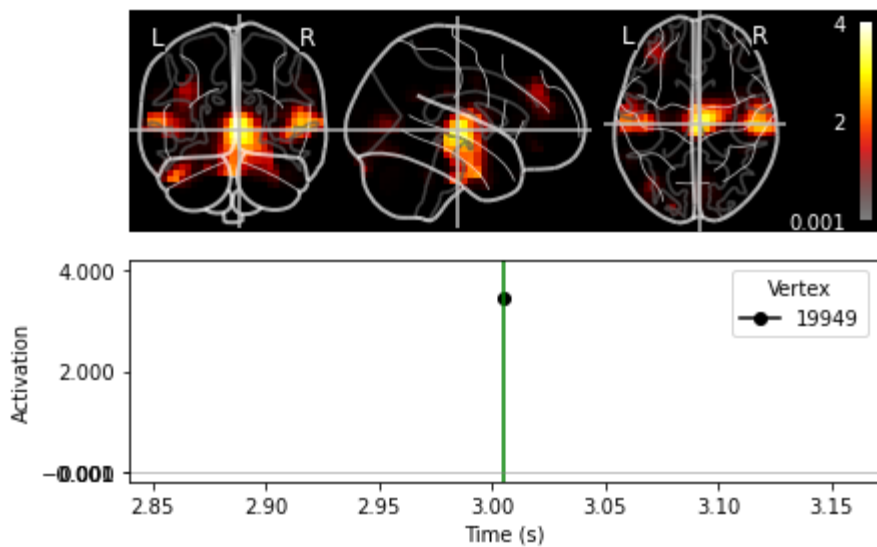
encoding difference 1.9000000000000001

Showing: $t = 1.005$ s, $(0.0, -55.0, -65.0)$ mm, $[16, 12, 2]$ vox, 2986 vertex



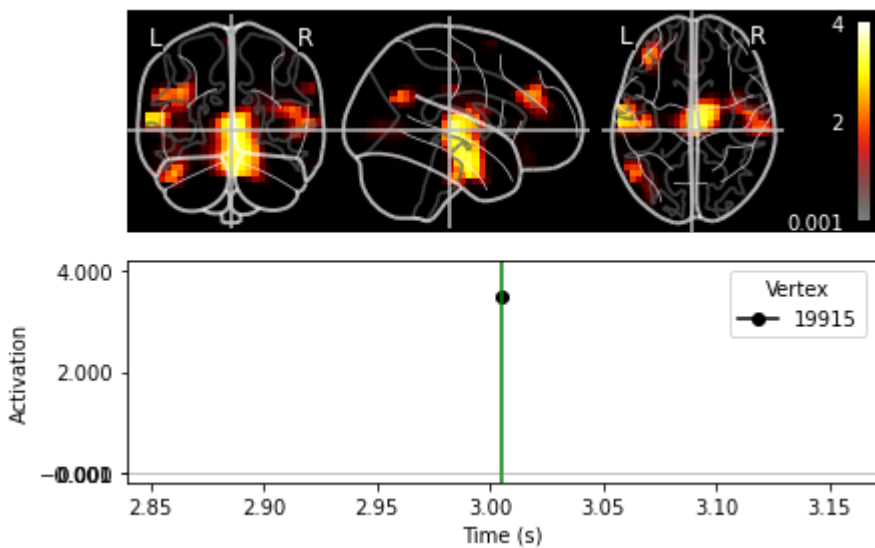
delay maintenance 3.9000000000000004

Showing: $t = 3.005$ s, (5.0, -20.0, -0.0) mm, [17, 19, 15] vox, 19949 vertex



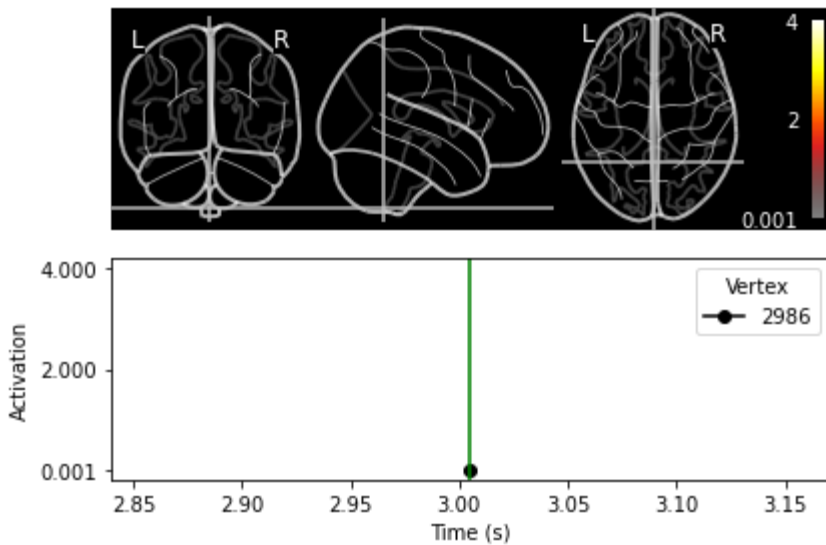
delay manipulation 3.9000000000000004

Showing: $t = 3.005$ s, (0.0, -25.0, -0.0) mm, [16, 18, 15] vox, 19915 vertex



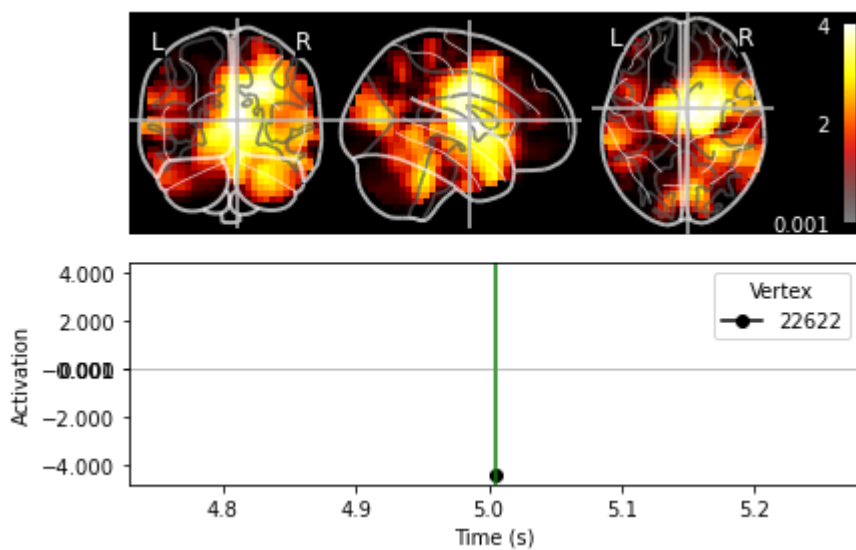
delay difference 3.9000000000000004

Showing: $t = 3.005$ s, (0.0, -55.0, -65.0) mm, [16, 12, 2] vox, 2986 v
ertex



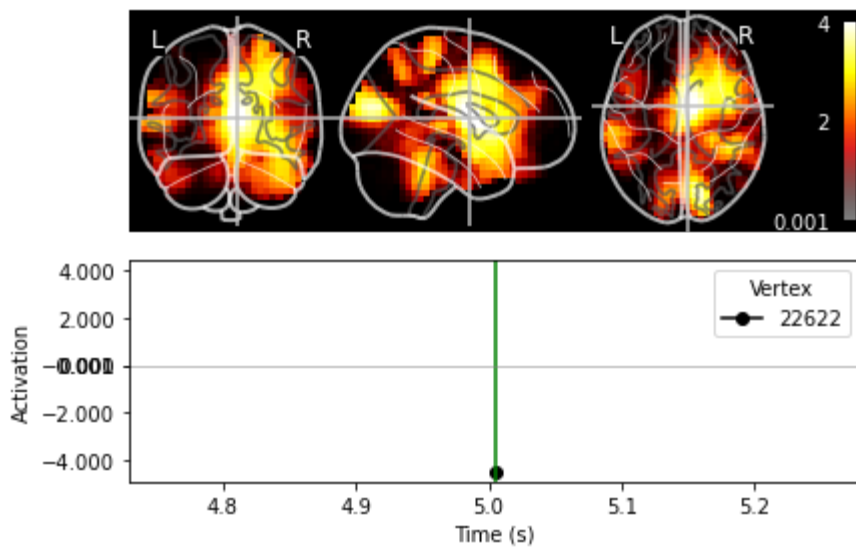
retrieval maintenance 5.9

Showing: $t = 5.005$ s, (5.0, -5.0, 10.0) mm, [17, 22, 17] vox, 22622 v
ertex



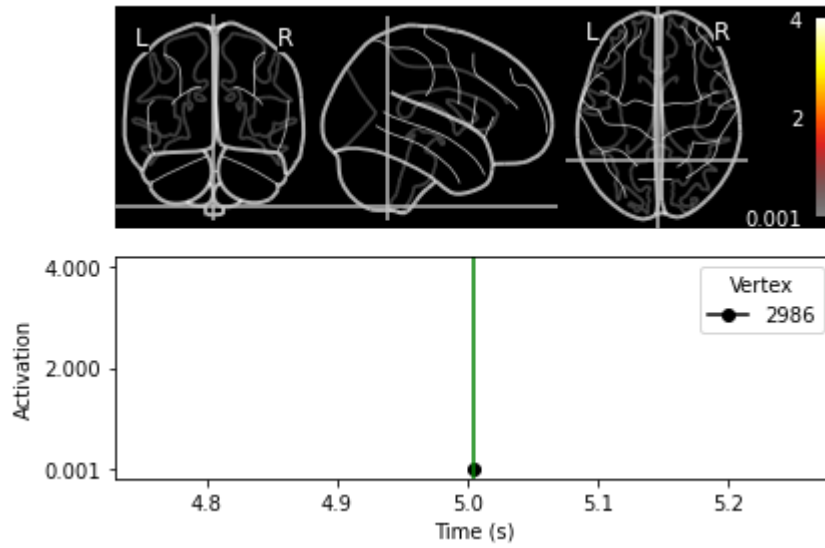
retrieval manipulation 5.9

Showing: $t = 5.005$ s, (5.0, -5.0, 10.0) mm, [17, 22, 17] vox, 22622 vertex



retrieval difference 5.9

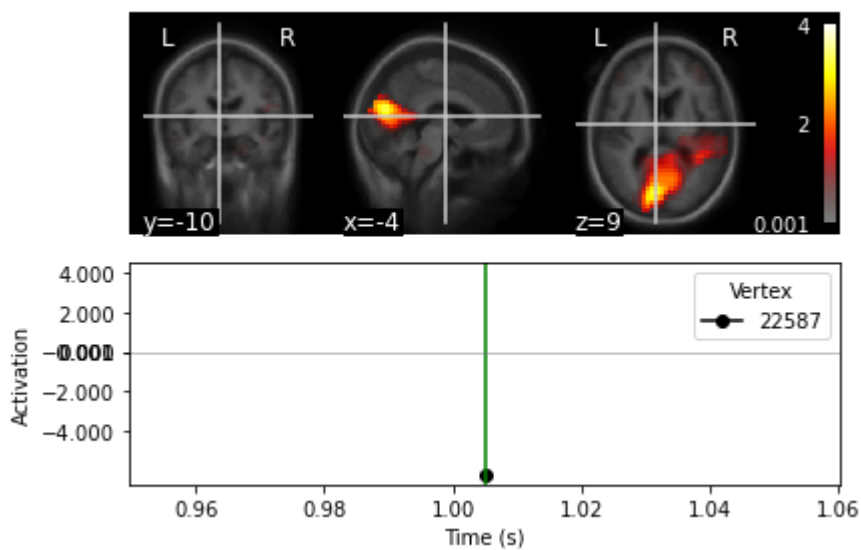
Showing: $t = 5.005$ s, (0.0, -55.0, -65.0) mm, [16, 12, 2] vox, 2986 vertex



```
In [10]: # Plot 1 stc
for p in stats:
    for c in stats[p]:
        mask = stats[p][c]['qvals'] <= 0.025
        stc.data = stats[p][c]['tvals']*mask#*stats[p][c]['mask']
        stc.tmin = periods[p][0]
    #     plot_times = np.arange(0,2,0.1)
    #     for pt in plot_times:
        print('{} {} {}'.format(p,c,stc.tmin+pt))
        brain = stc.mean().plot(subjects_dir=subs_dir,clim={'kind': 'value', 'lims': [0.001,2,4]},#time_viewer=True,
                                subject='fsaverage', mode = 'stat_map',src
                                =src_sample)#,initial_time = stc.tmin+pt)
```

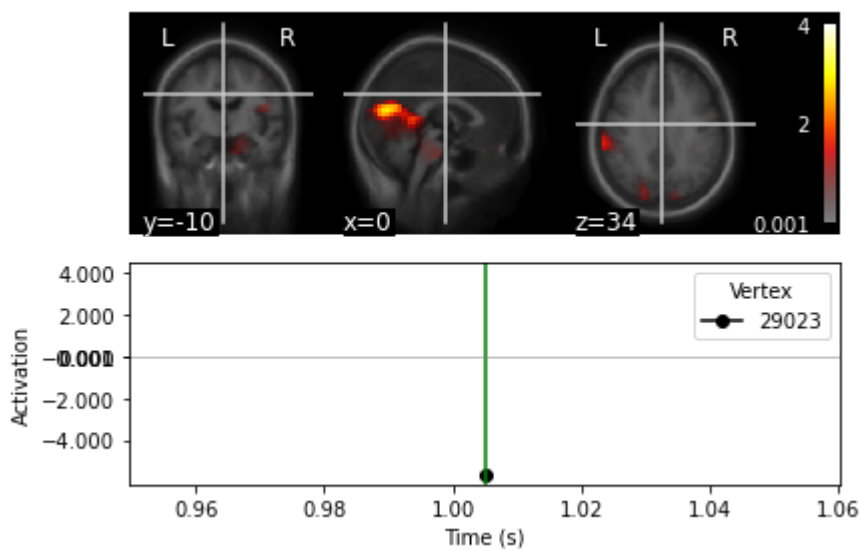

encoding maintenance 1.9000000000000001

Showing: $t = 1.005$ s, $(-5.0, -10.0, 10.0)$ mm, $[15, 21, 17]$ vox, 22587 vertex



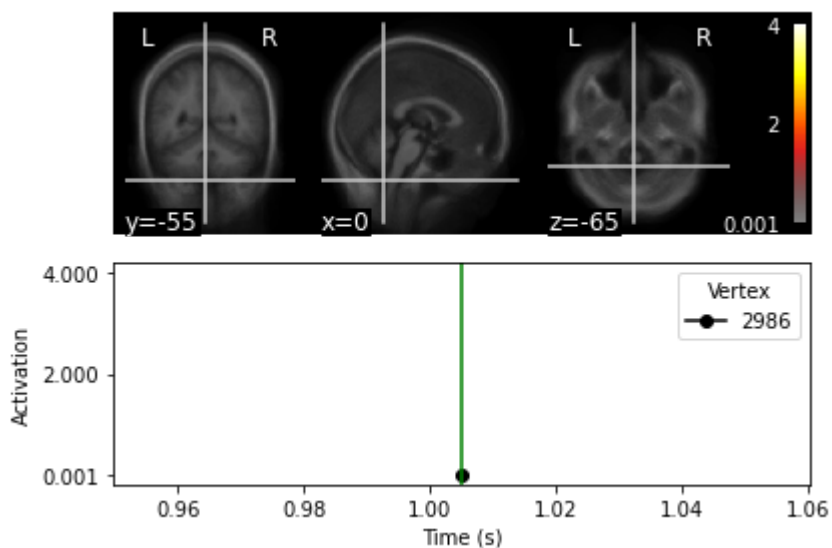
encoding manipulation 1.9000000000000001

Showing: $t = 1.005$ s, $(0.0, -10.0, 35.0)$ mm, $[16, 21, 22]$ vox, 29023 vertex



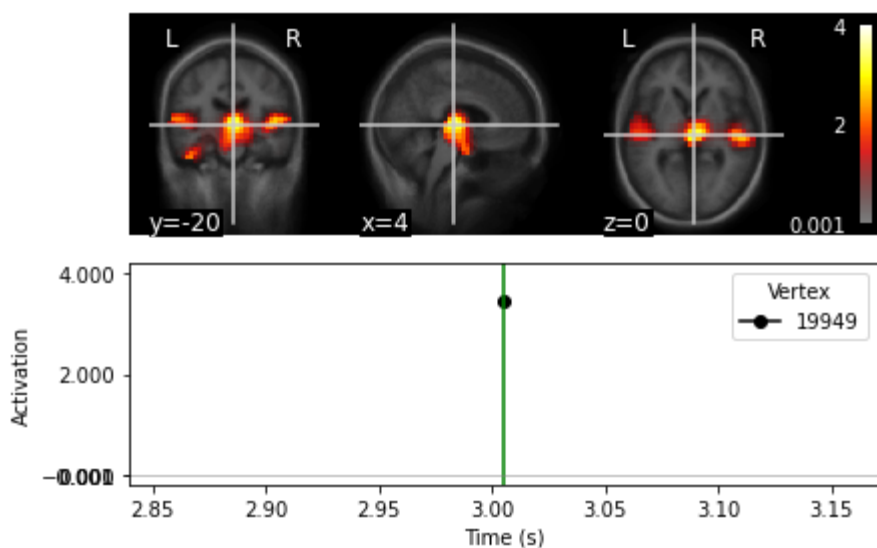
encoding difference 1.9000000000000001

Showing: $t = 1.005$ s, $(0.0, -55.0, -65.0)$ mm, $[16, 12, 2]$ vox, 2986 vertex



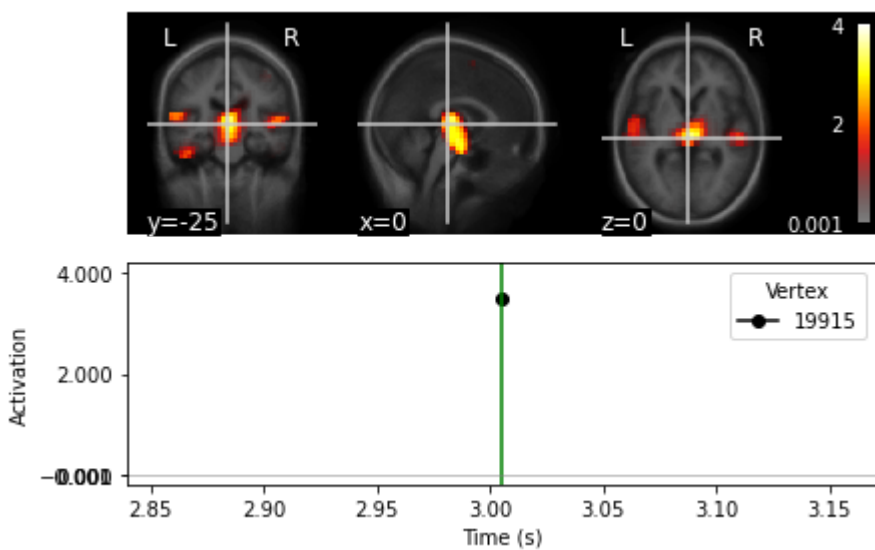
delay maintenance 3.9000000000000004

Showing: $t = 3.005$ s, (5.0, -20.0, -0.0) mm, [17, 19, 15] vox, 19949 vertex



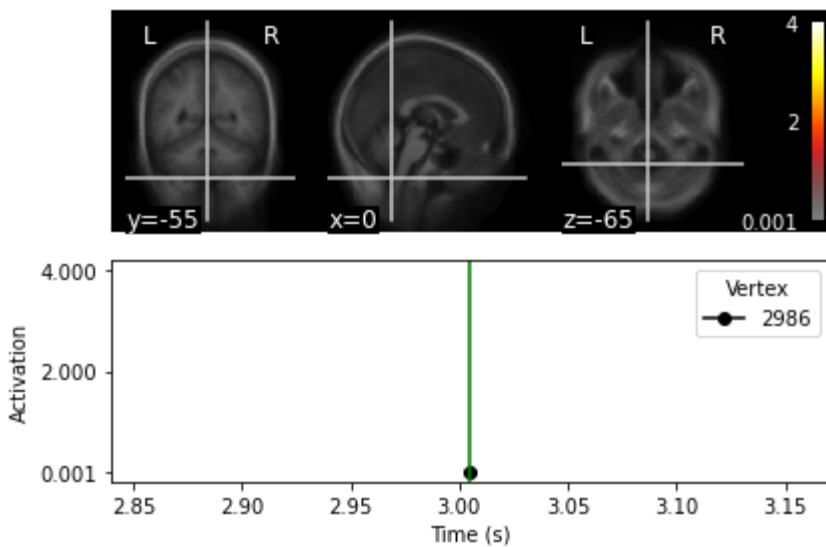
delay manipulation 3.9000000000000004

Showing: $t = 3.005$ s, (0.0, -25.0, -0.0) mm, [16, 18, 15] vox, 19915 vertex



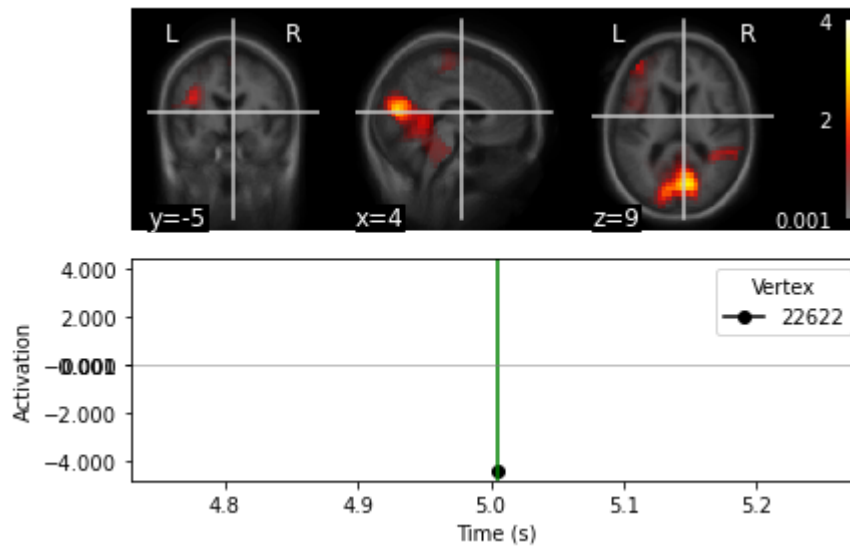
delay difference 3.9000000000000004

Showing: $t = 3.005$ s, (0.0, -55.0, -65.0) mm, [16, 12, 2] vox, 2986 v
ertex



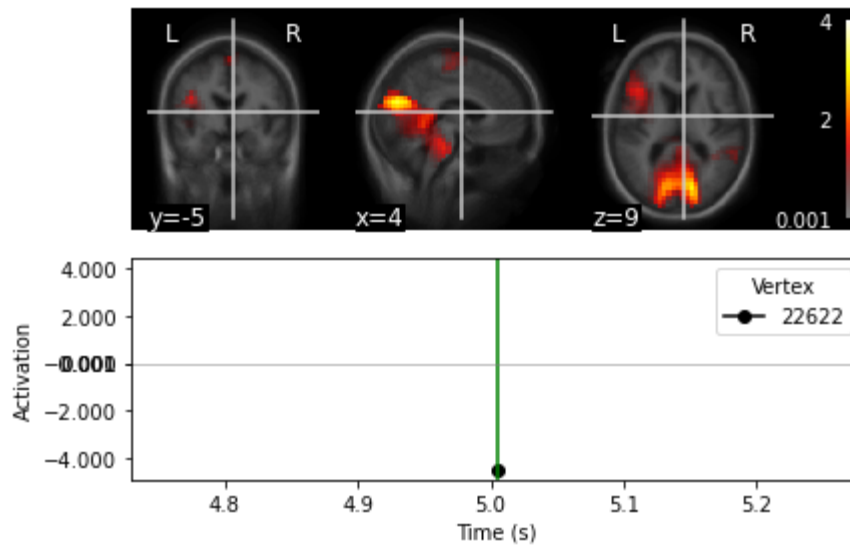
retrieval maintenance 5.9

Showing: $t = 5.005$ s, (5.0, -5.0, 10.0) mm, [17, 22, 17] vox, 22622 v
ertex



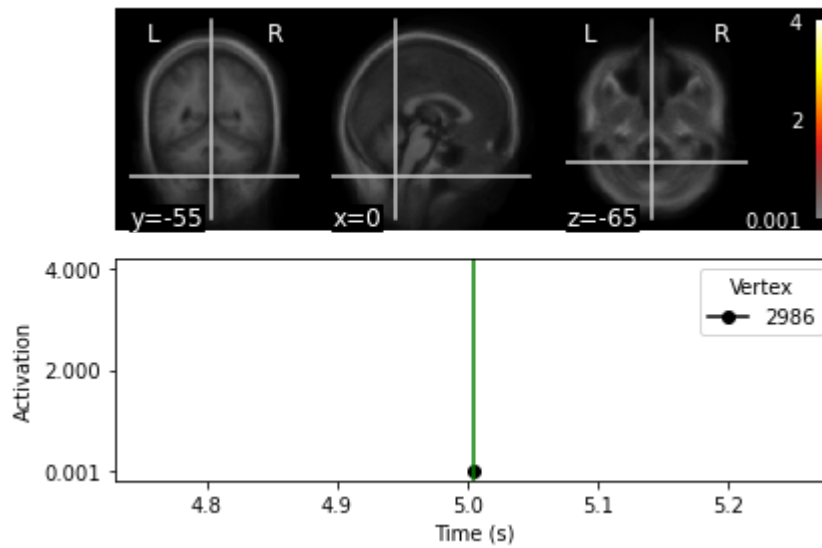
retrieval manipulation 5.9

Showing: $t = 5.005$ s, (5.0, -5.0, 10.0) mm, [17, 22, 17] vox, 22622 vertex



retrieval difference 5.9

Showing: $t = 5.005$ s, (0.0, -55.0, -65.0) mm, [16, 12, 2] vox, 2986 vertex



In []: