

# Neural Activation in the NAcc and Amygdala in Females Exposed to Low and High Levels of Early Life Stress

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204B final project

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# ELS STUDY DESIGN

Adolescents came to the lab between the ages of 9-12 years old

## Behavior

- demographic characteristics
- early life stress



## fMRI

- functional MRI
- 3.0 Tesla FE MRI scanner



# TRAUMATIC EVENTS SCREENING INVENTORY FOR CHILDREN

## Example

Have you ever been in a really bad accident, like a car accident, a fall or a fire? Did you feel as scared as you'd ever been, like this was one of the scariest things that EVER happened to you? Did you feel confused or mixed up (or helpless)? Did you feel sick or disgusted (or horrified)?

**Response:** Dichotomous item ("Yes" or "No")

- Panel rated the objective severity using the UCLA Interview coding system
- 0 = non-event; 4 = severe event
- Sum severity for each stressful event

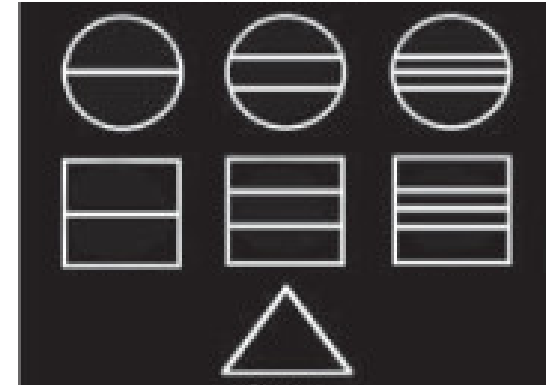
# KIDMID

## Parameters

- slice thickness = 3
- number of slices = 43
- Phases = 250
- time of the scan = 8:20
- FOV = 224 x 224
- TR = 2
- voxel size=3.2 x 3.2 x 3.0 mm

Each block was 6 seconds

Cue types  
250 ms



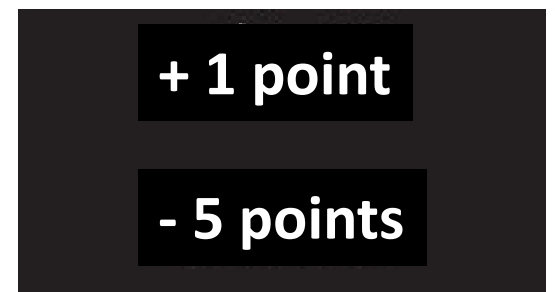
Fixation  
2-2.5 seconds



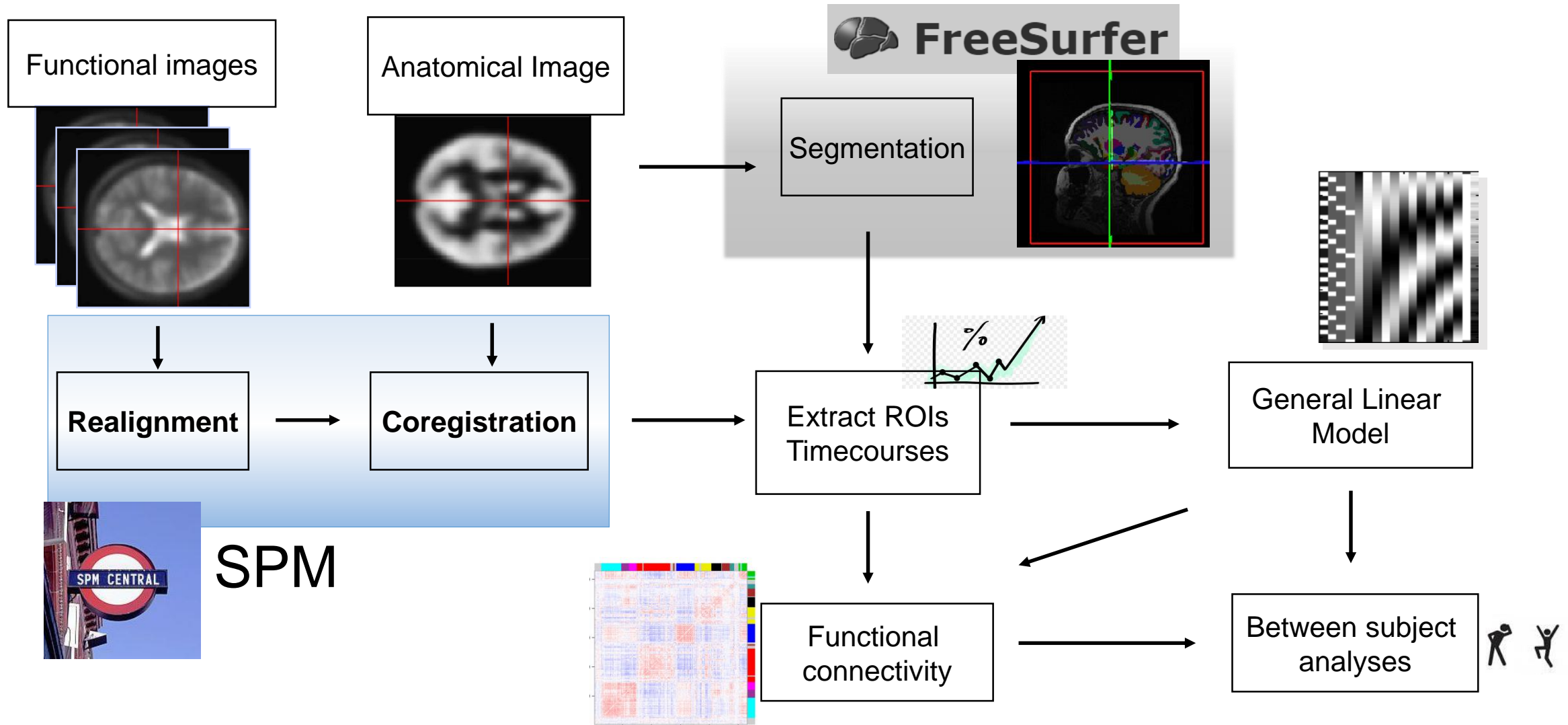
Target  
250-350 ms



Feedback  
1.65 seconds

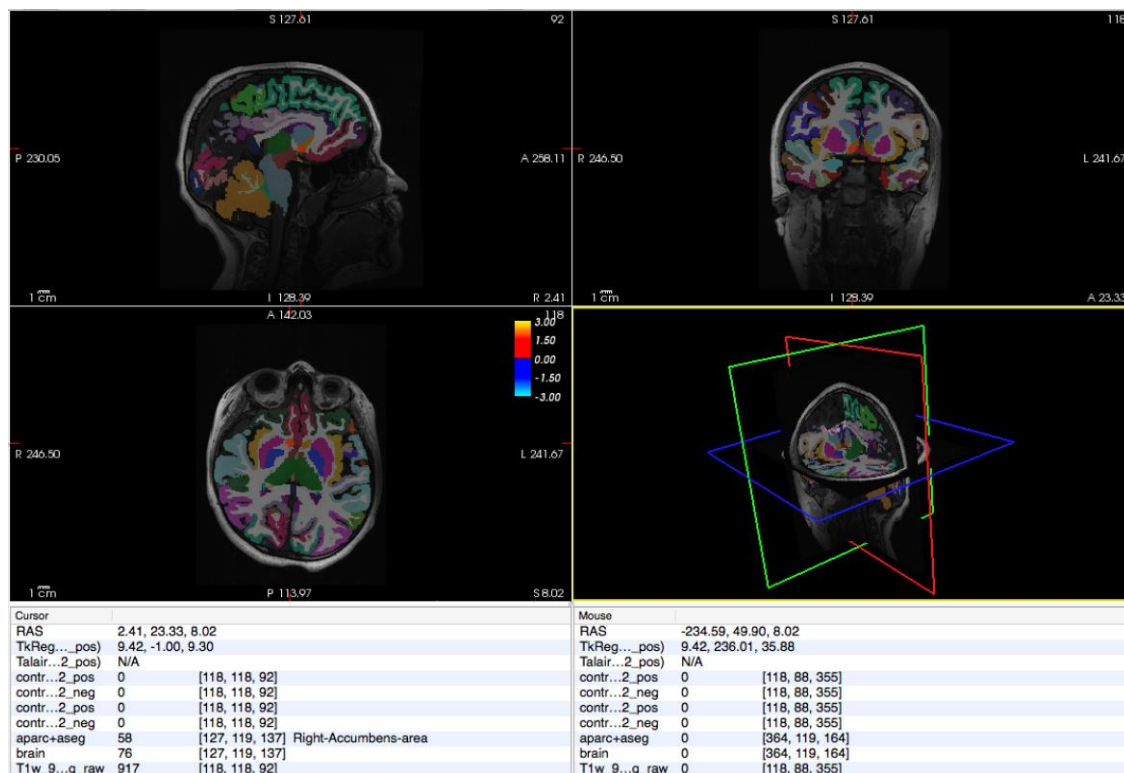


# ANALYSIS PIPELINE



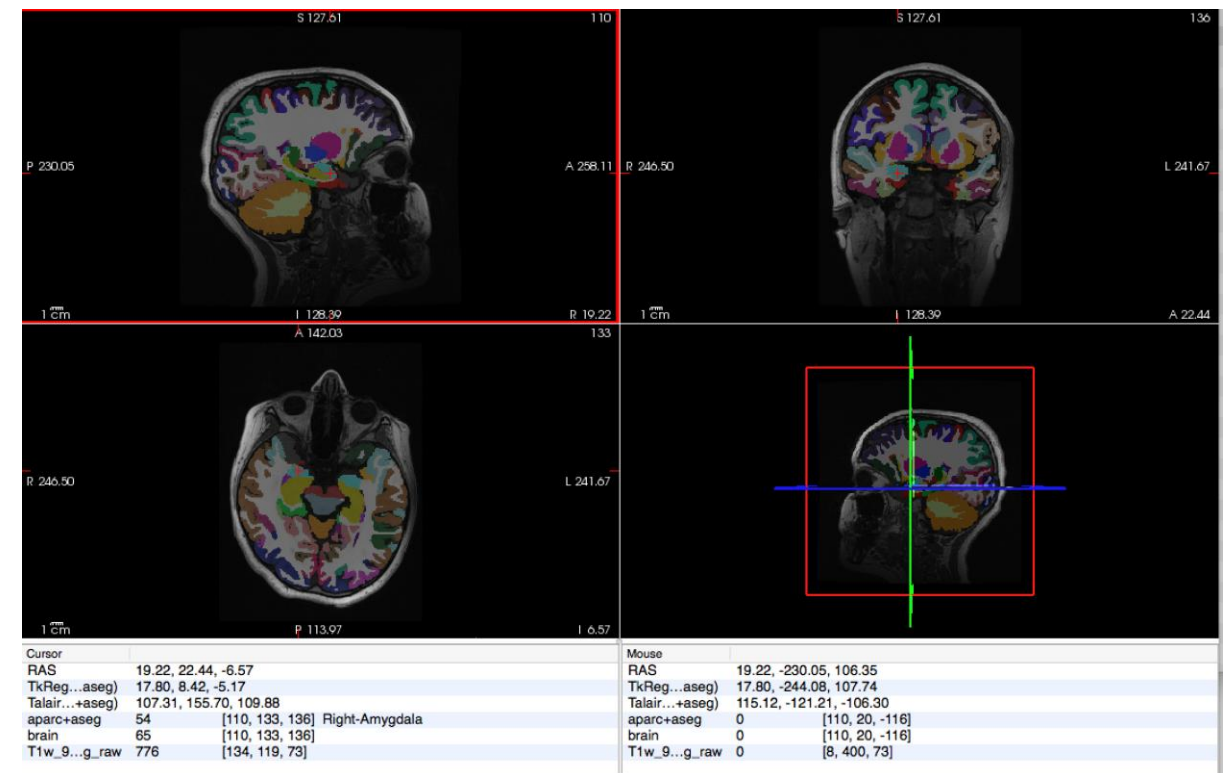
# FREESURFER

NAcc: length 10.5, width = 14.5, height = 7  
(Neto et al., 2008)



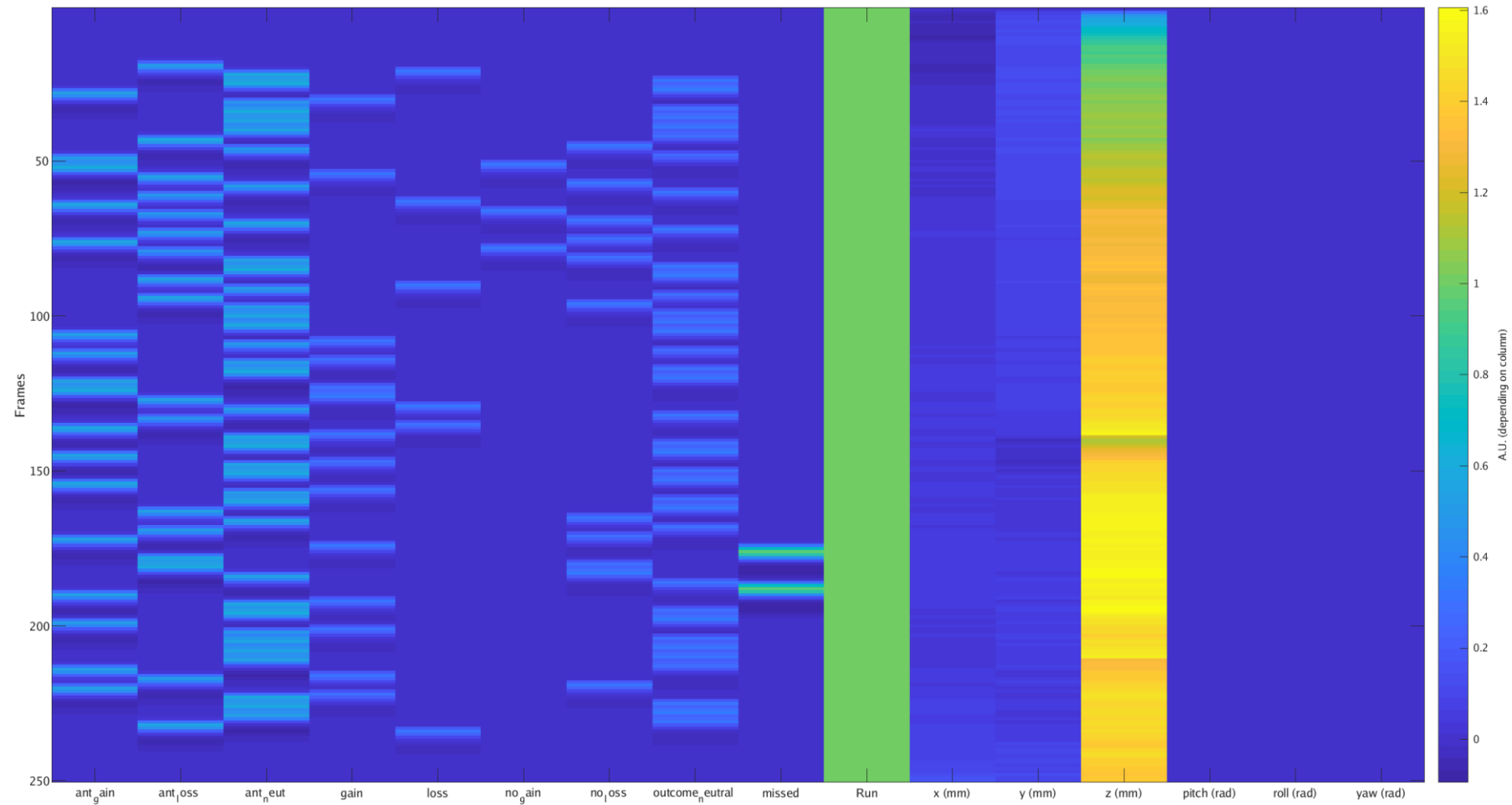
~740 mm<sup>3</sup>

Average size of amygdala = 1.24 cm<sup>3</sup> (SD=0.14)  
(Brabec et al., 2010)

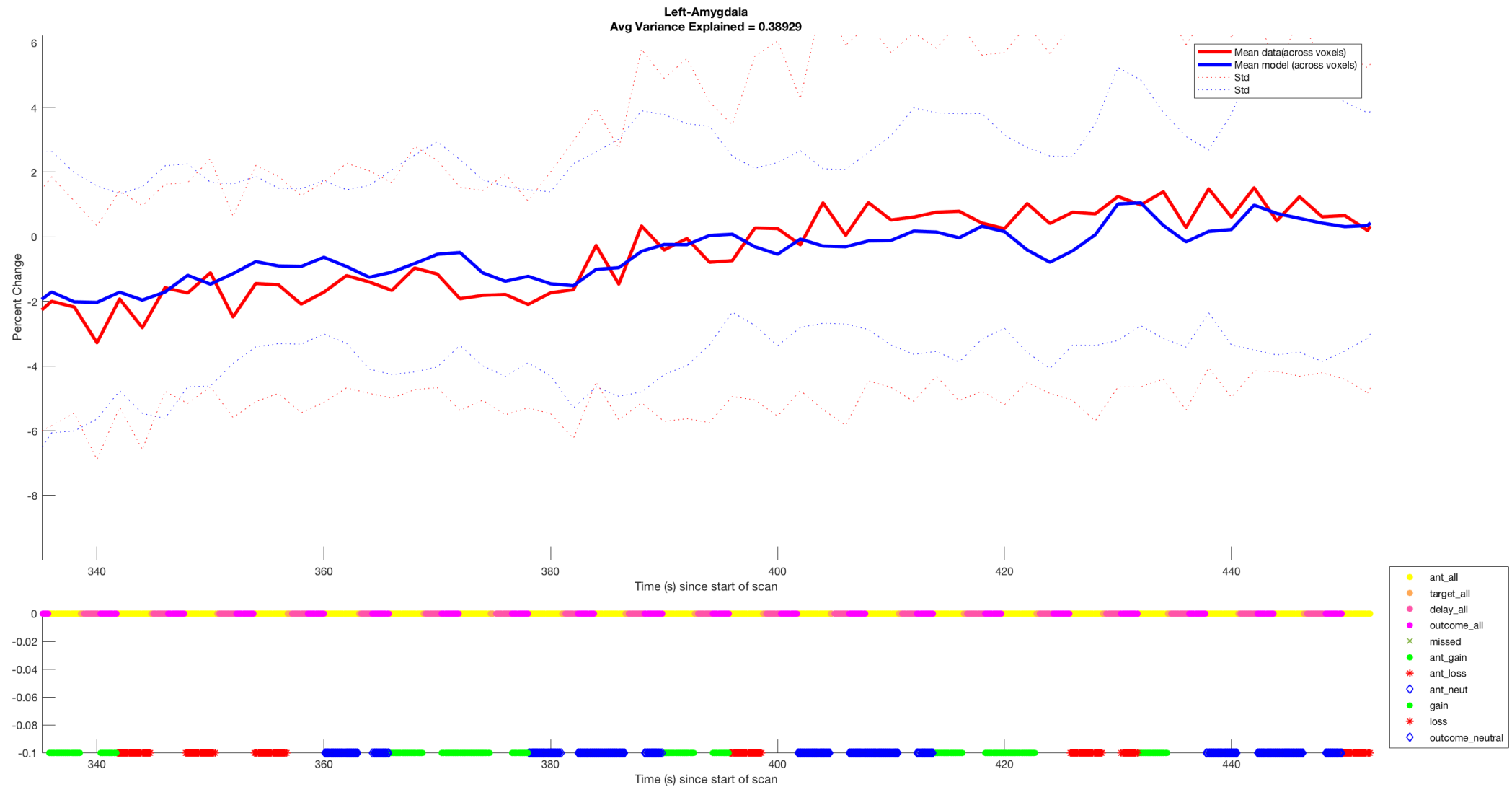


~1660 mm<sup>3</sup>

# GENERAL LINEAR MODEL

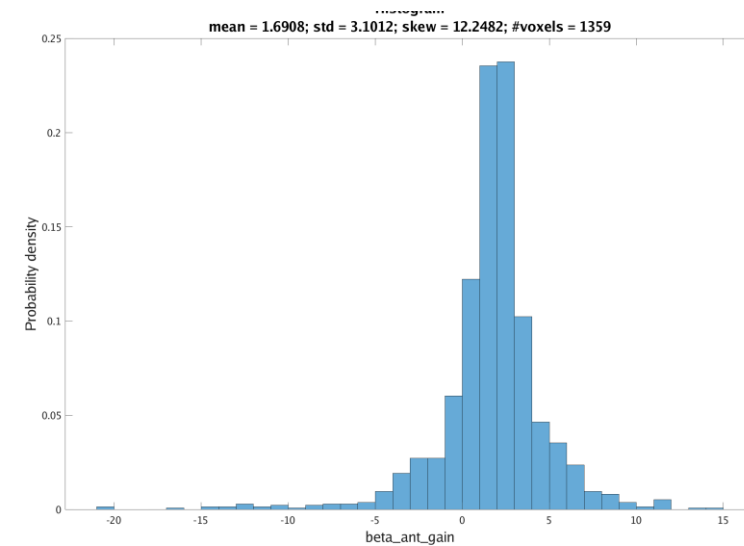
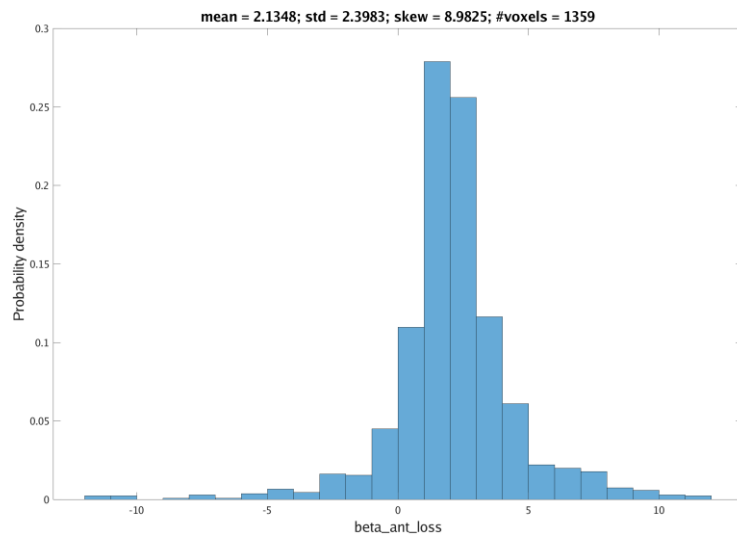
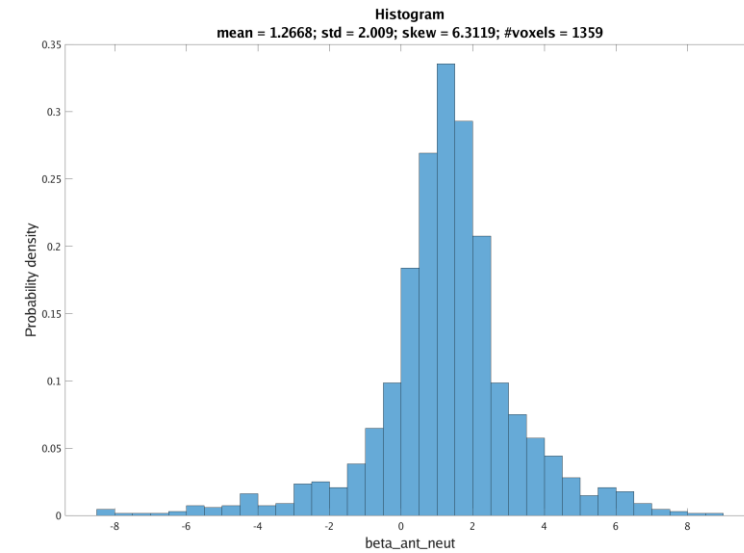
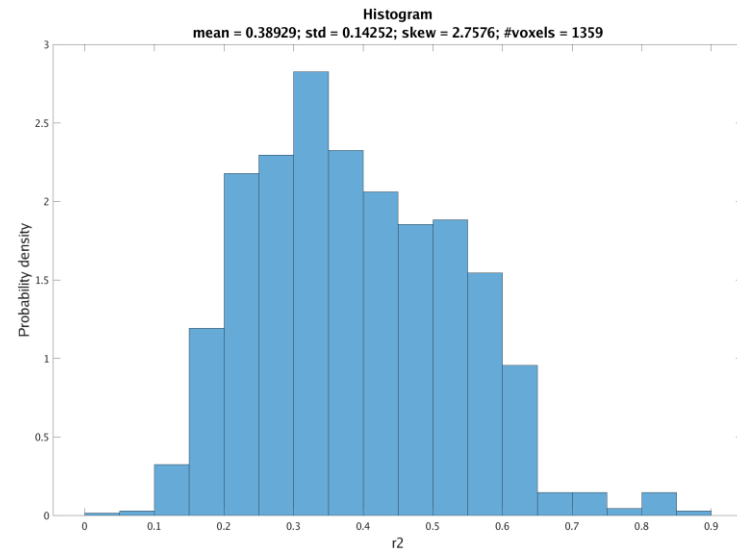


# TIMECOURSE

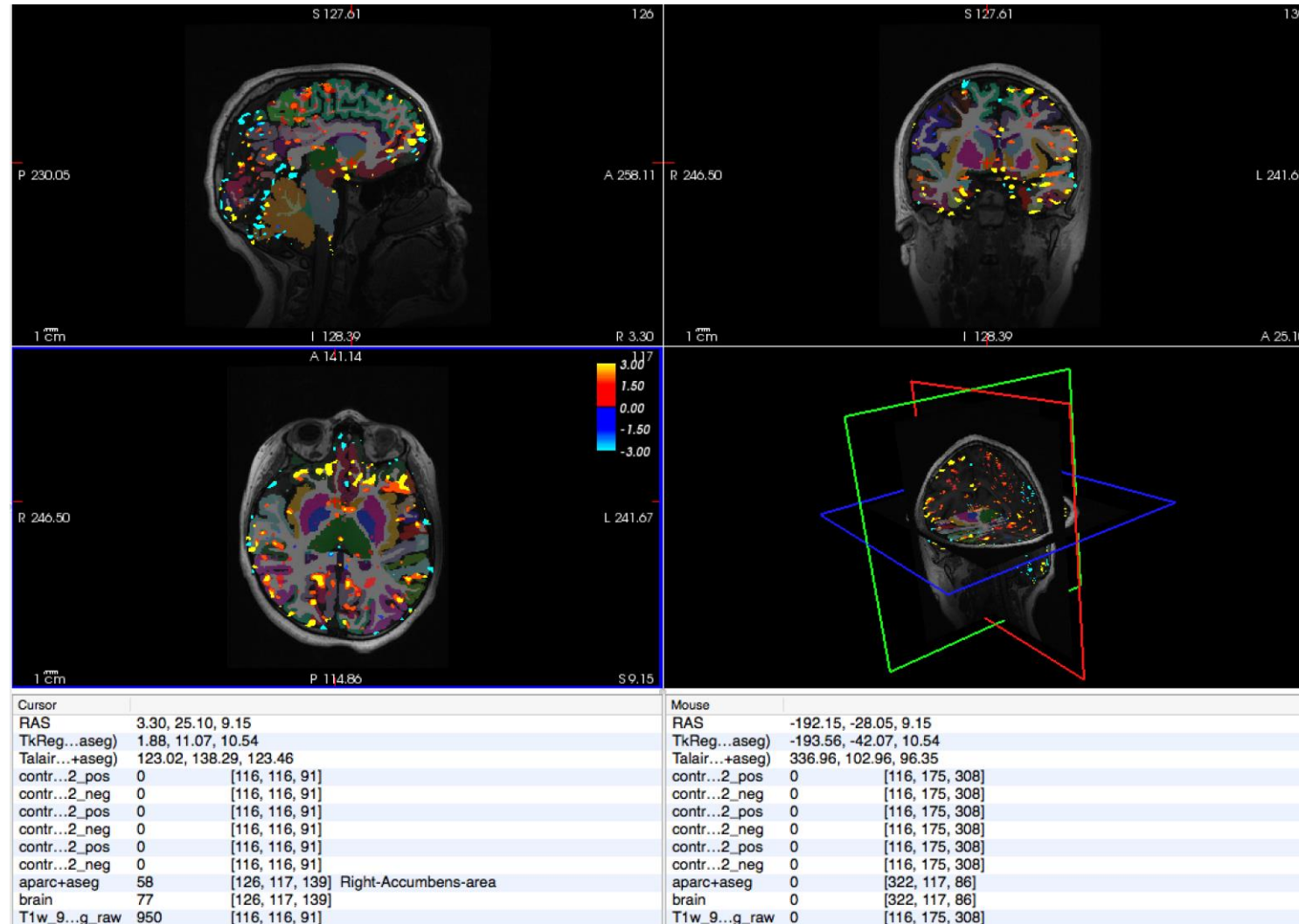




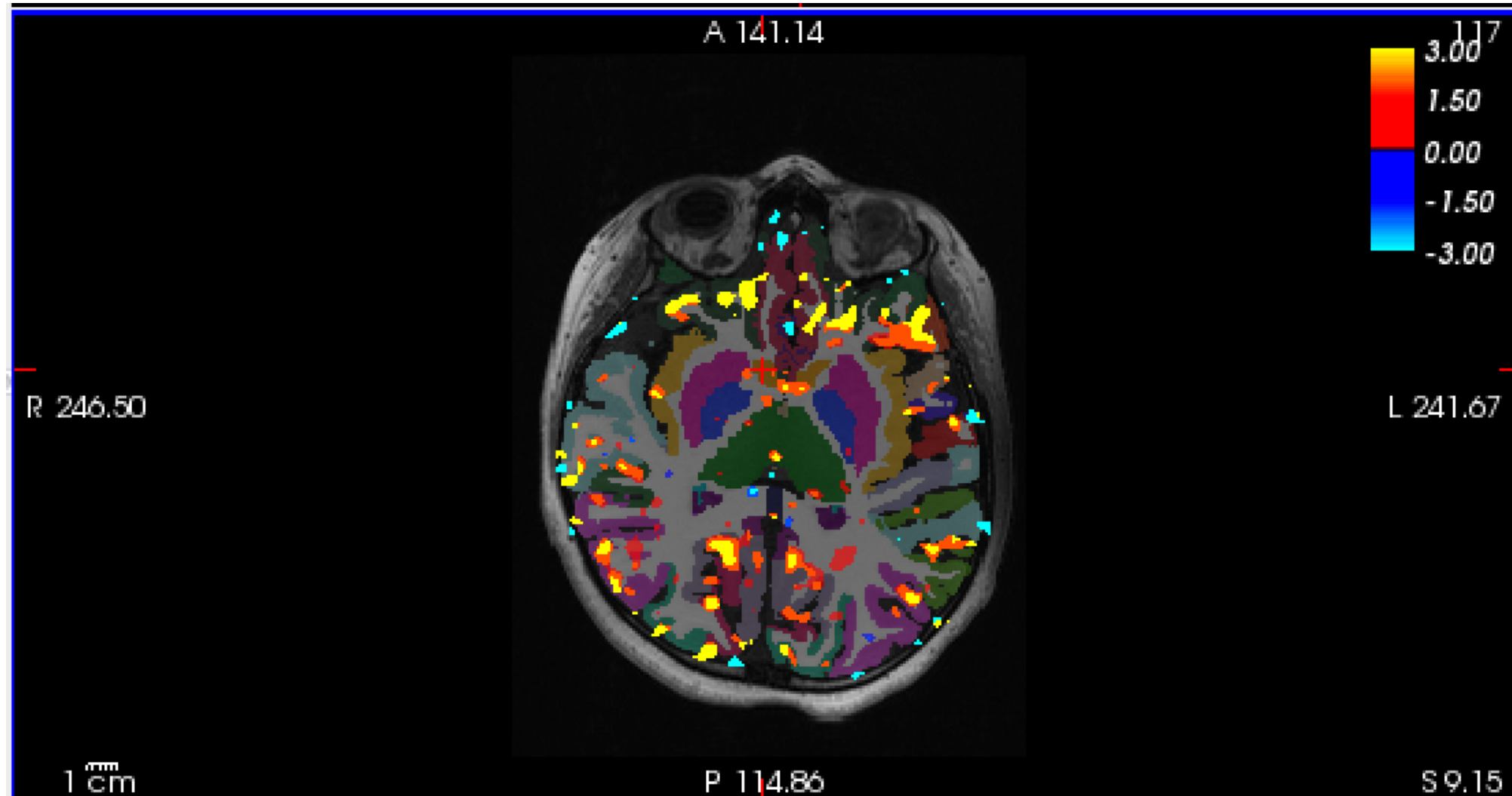
# HISTOGRAMS OF BETA WEIGHTS



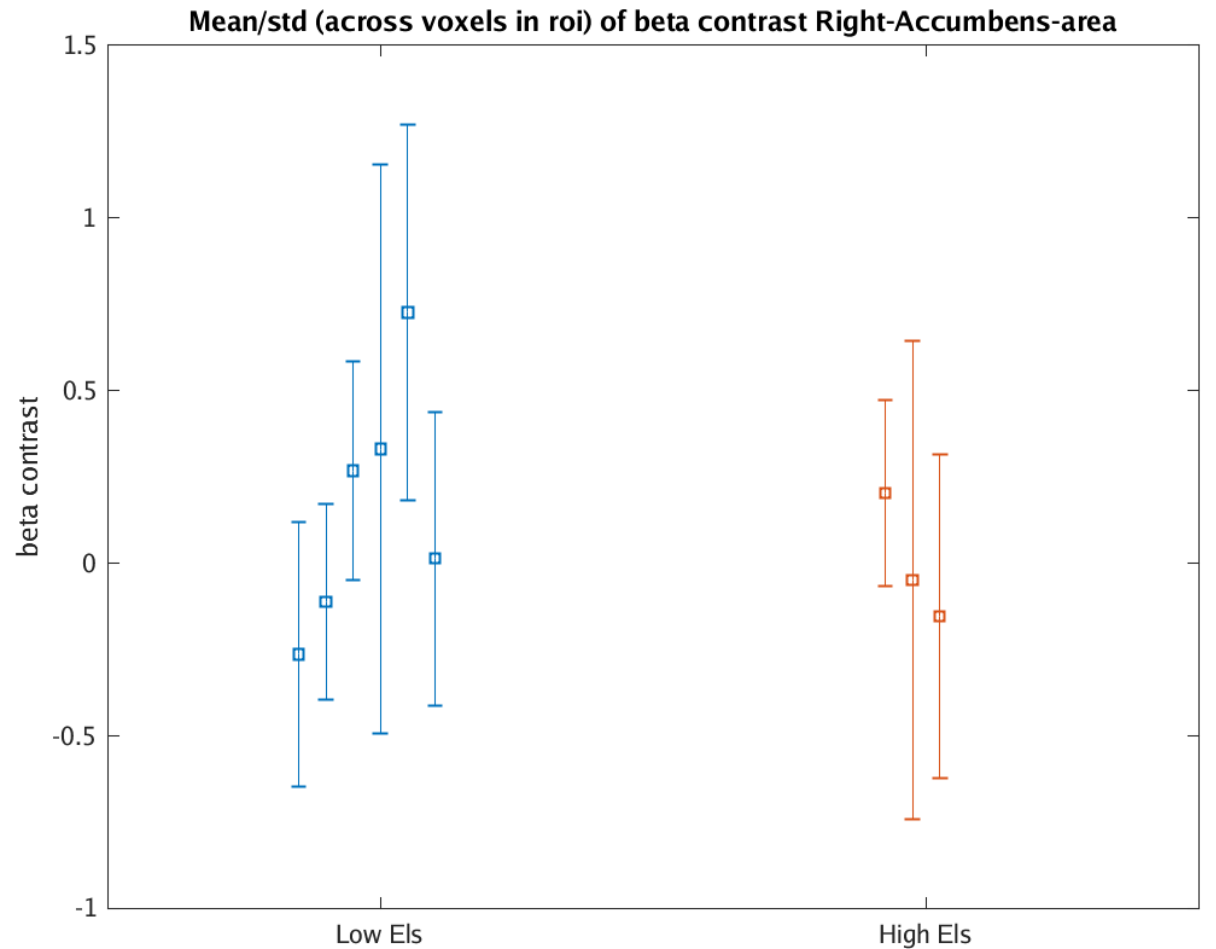
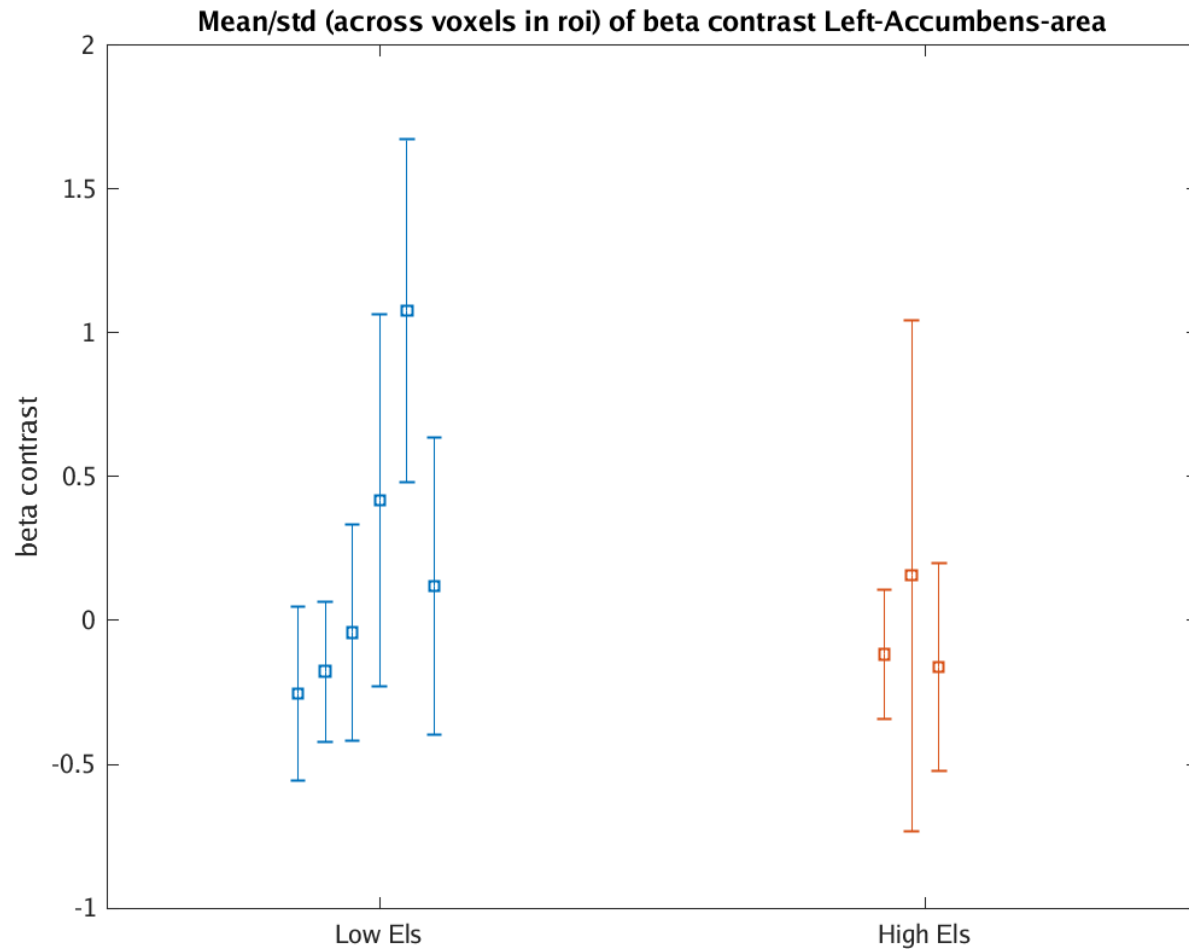
# ANTICIPATION OF GAIN contrast to neutral – high vs. low ELS



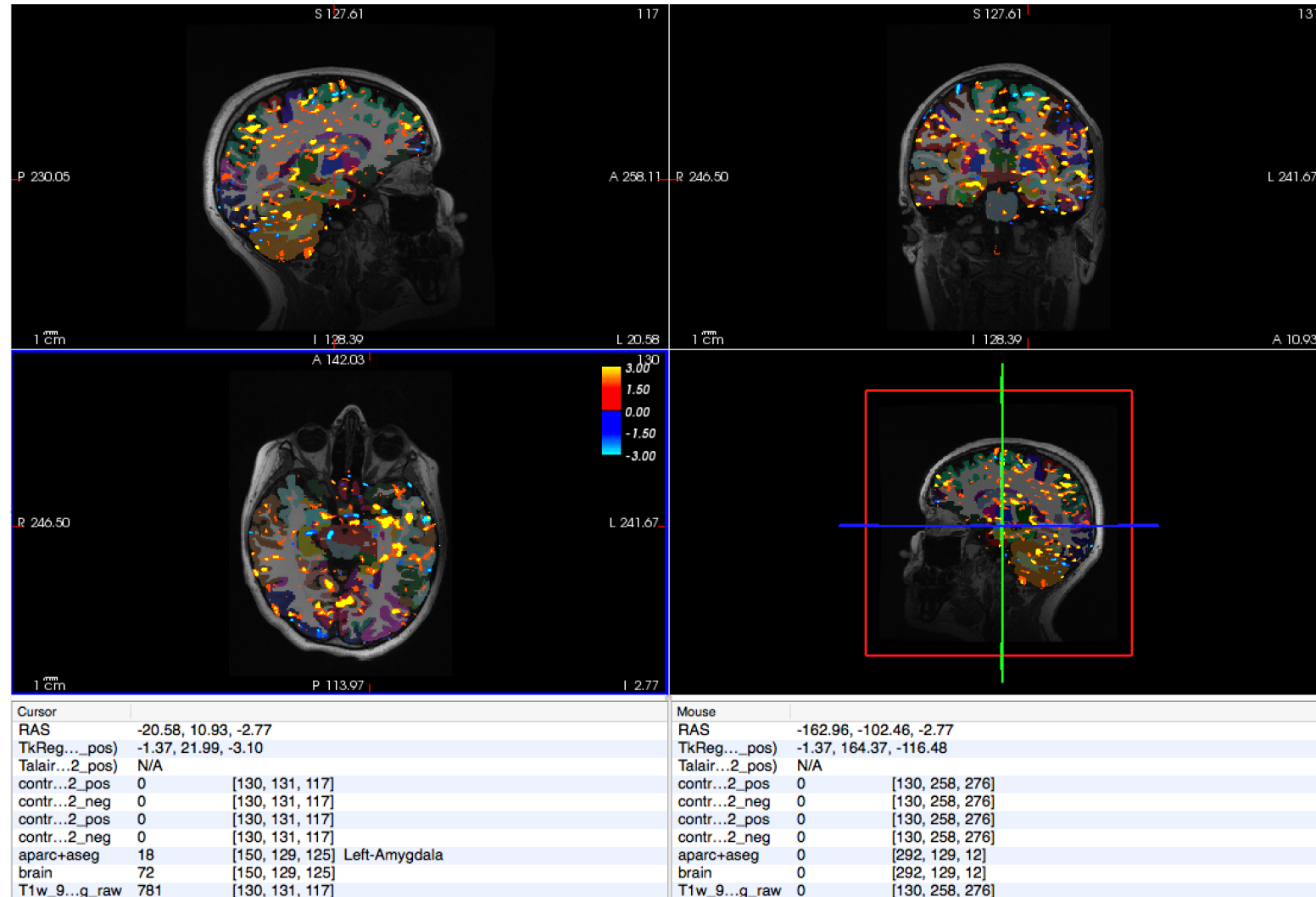
# ANTICIPATION OF GAIN contrast to neutral – high vs. low ELS



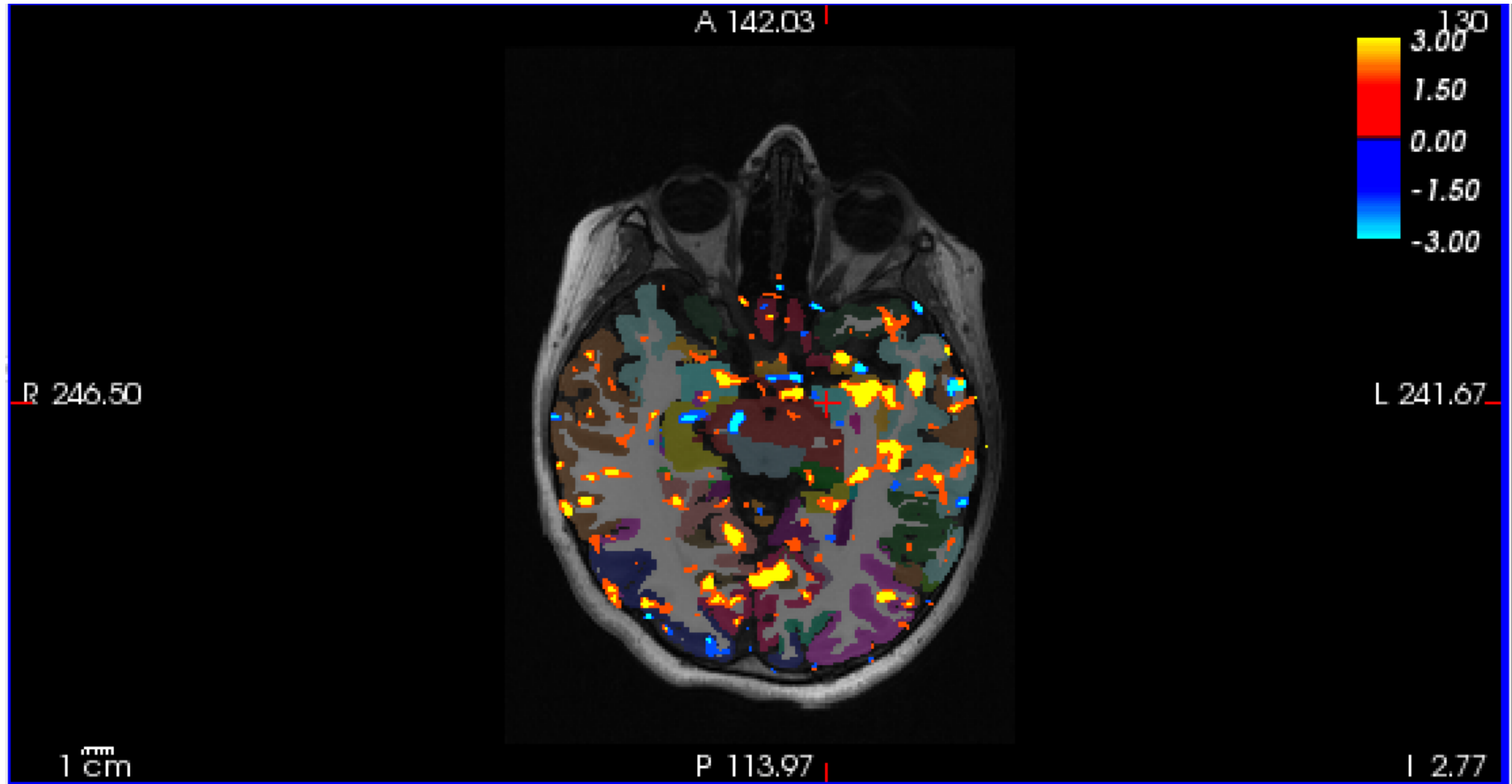
# ANTICIPATION OF GAIN contrast to neutral – high vs. low ELS



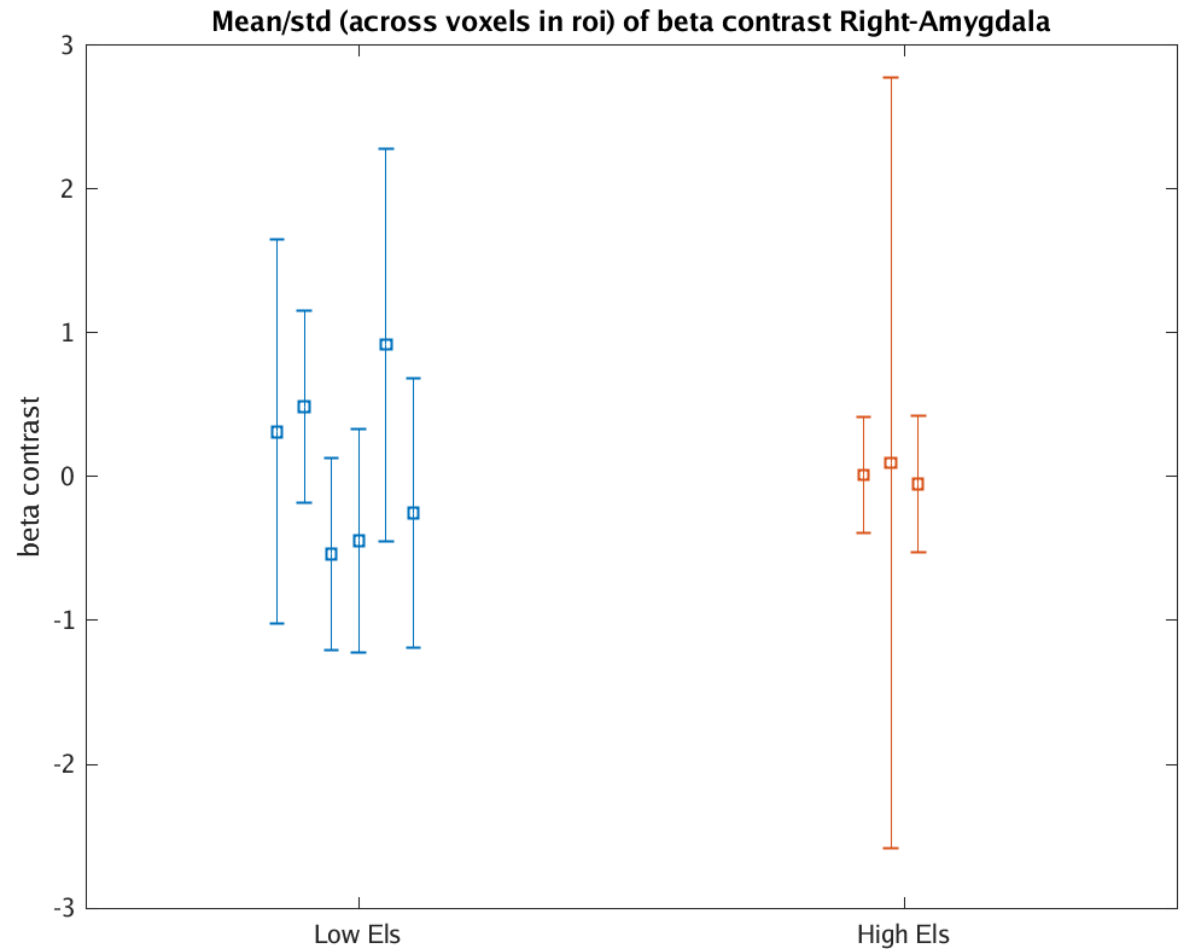
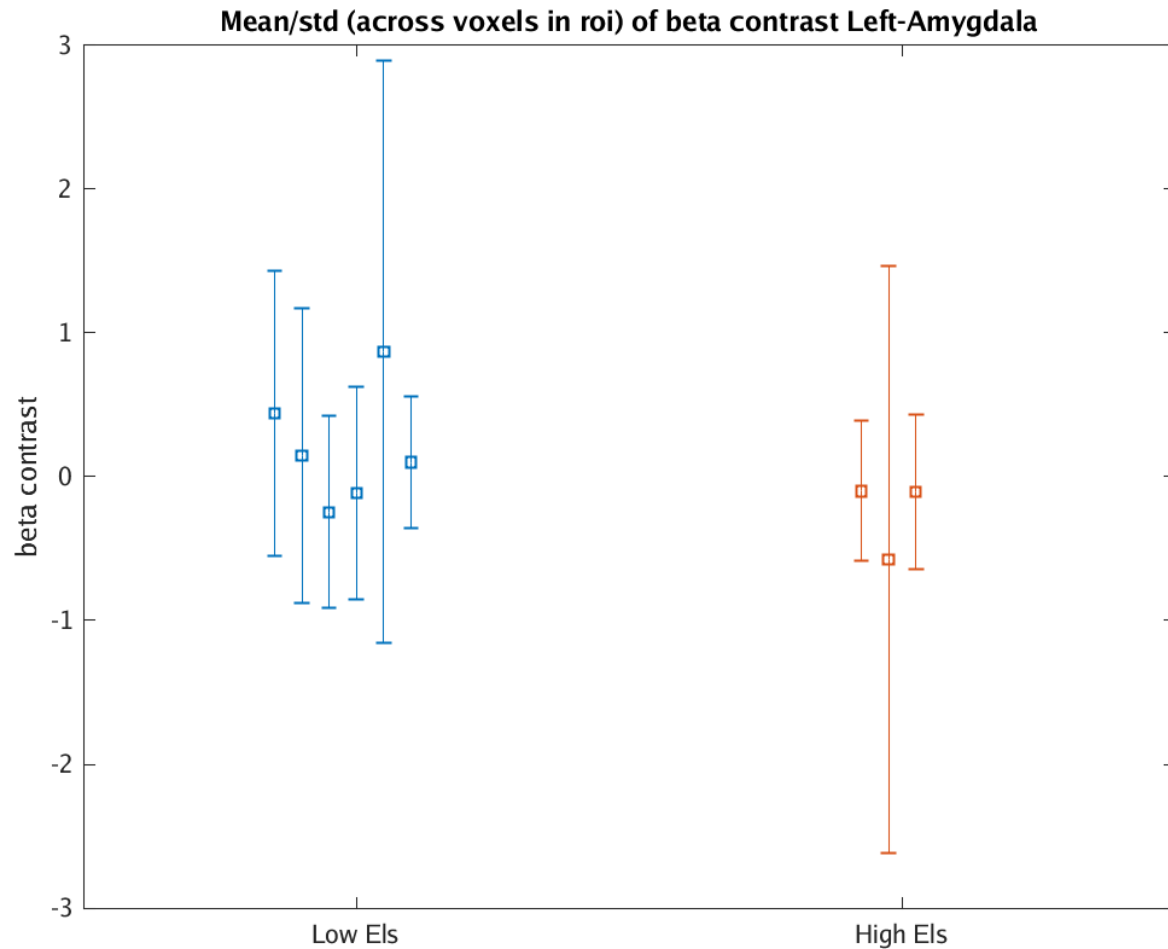
# ANTICIPATION OF LOSS contrast to neutral – high vs. low ELS



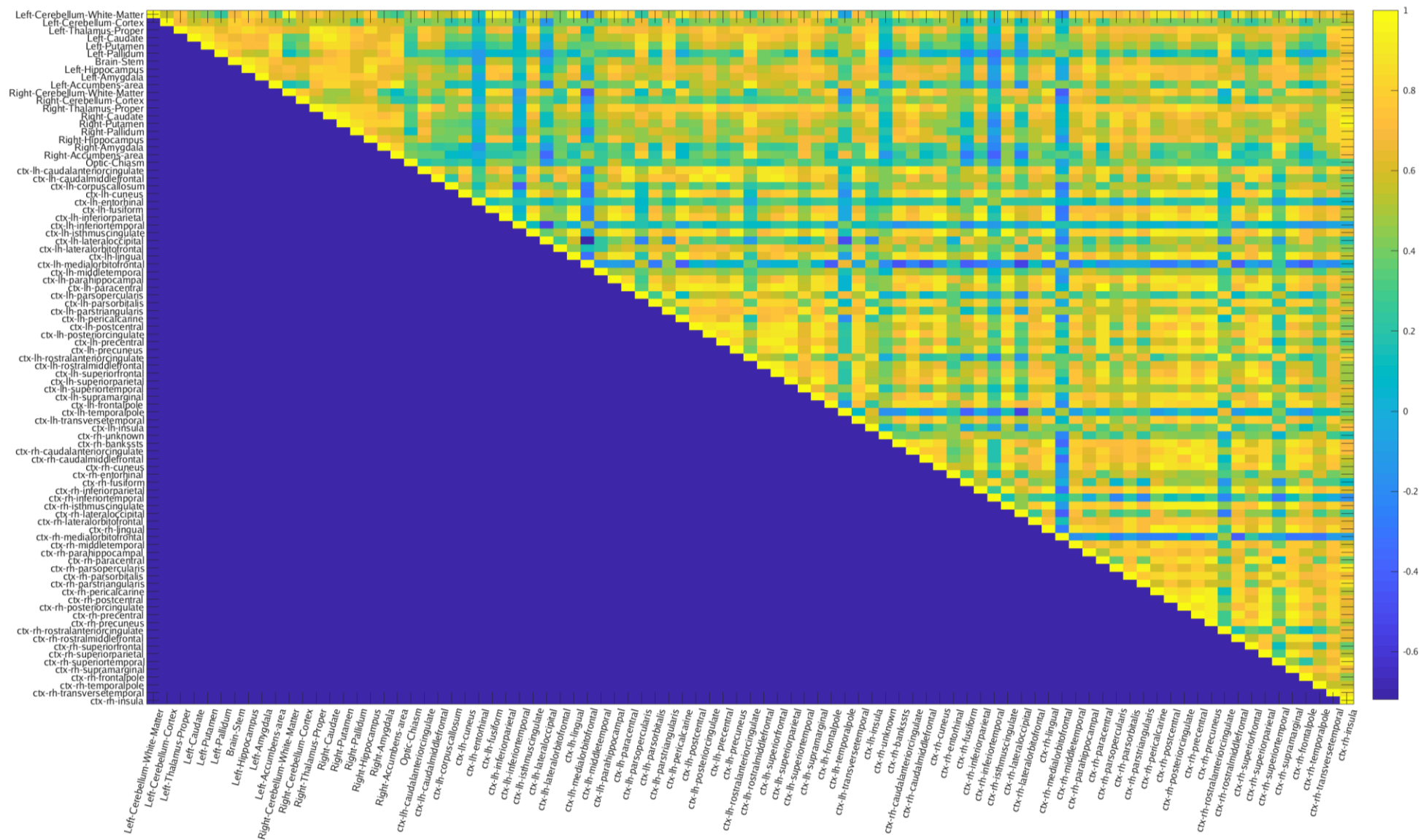
# ANTICIPATION OF LOSS contrast to neutral – high vs. low ELS



# ANTICIPATION OF LOSS contrast to neutral – high vs. low ELS

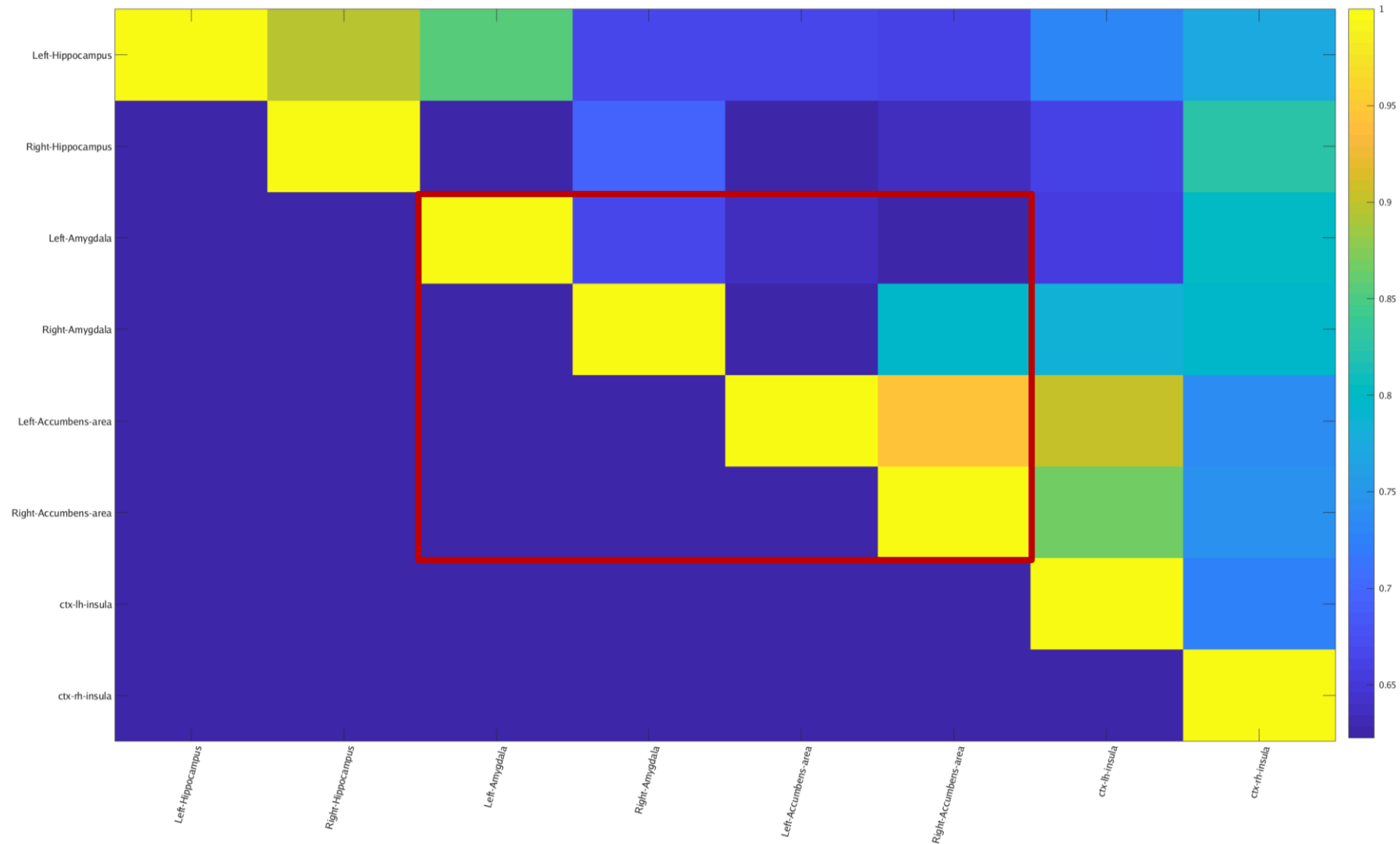


# FUNCTIONAL CONNECTIVITY

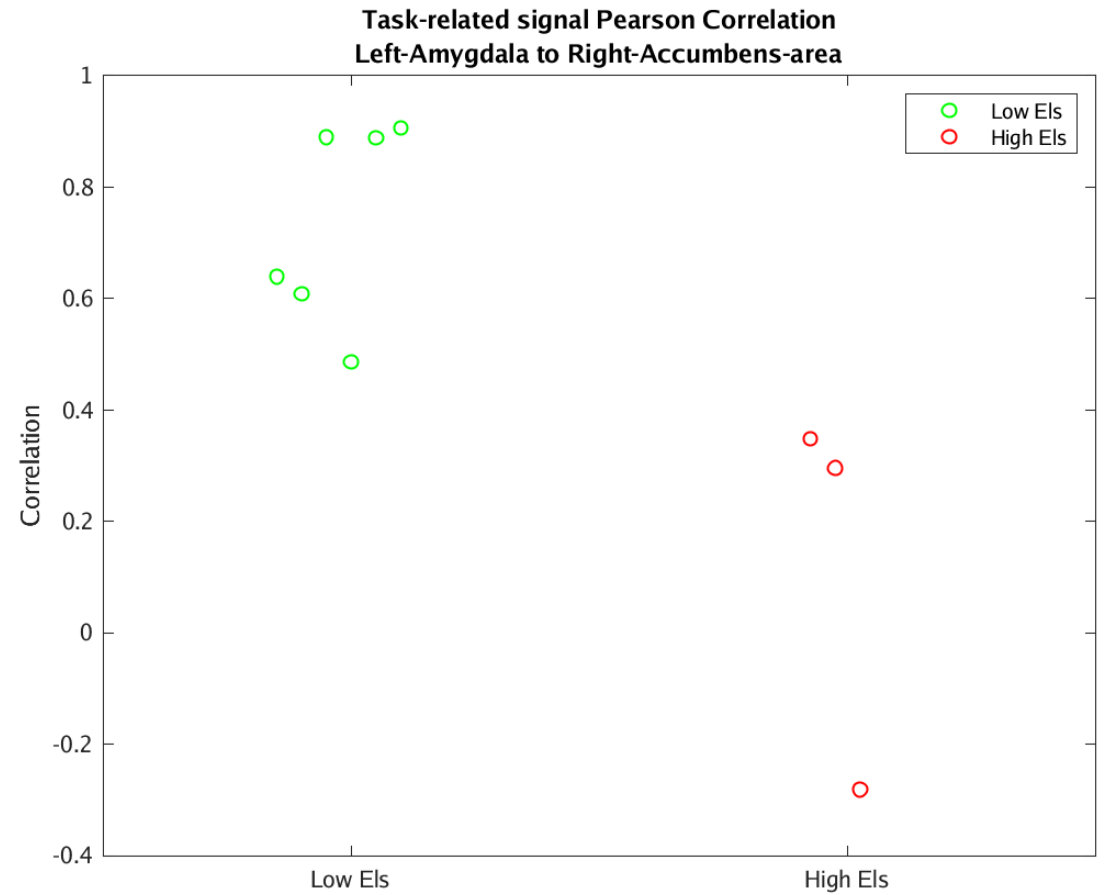
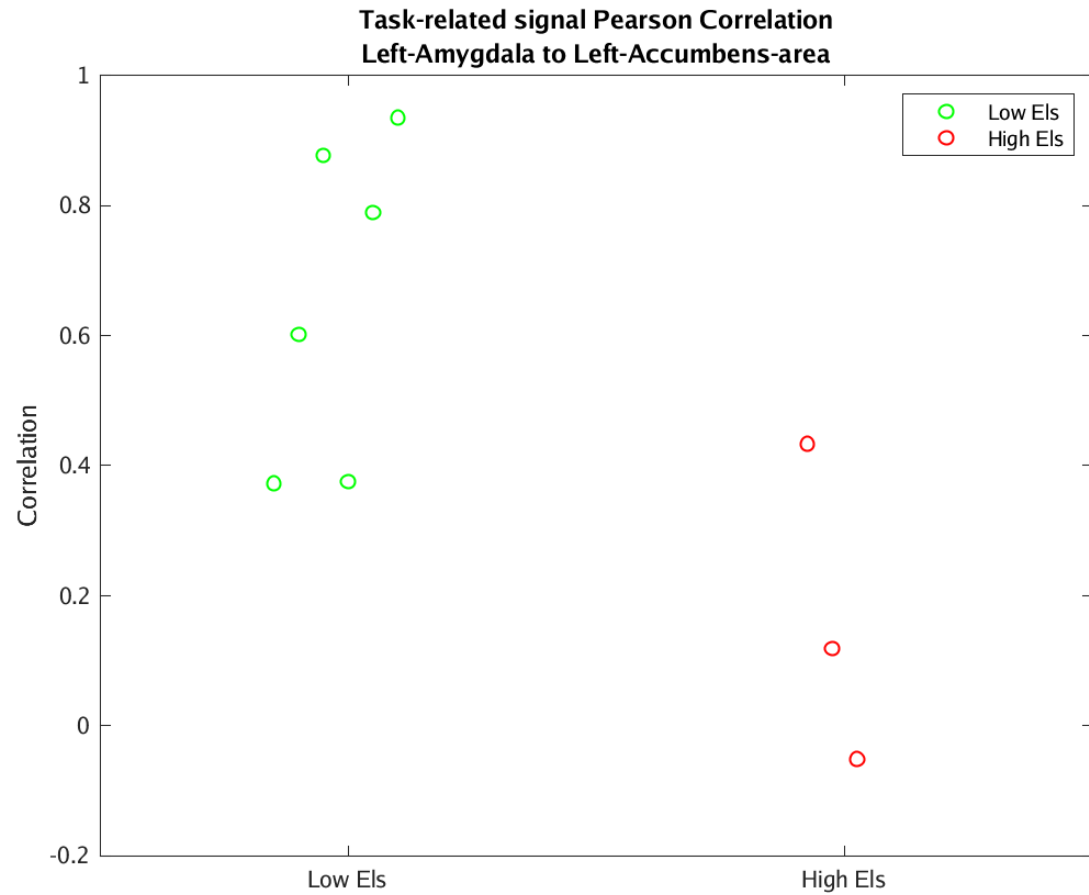




# FUNCTIONAL CONNECTIVITY



# FUNCTIONAL CONNECTIVITY



# SUMMARY

- No significant changes in hemodynamic response in NAcc during anticipation of reward
- No significant changes in hemodynamic response in amygdala during anticipation of loss
- Participants exposed to low ELS showed more coactivation between ROIs than participants exposed to high ELS

# LIMITATIONS

- Small sample size!
- Segmentation can be improved!
  - Improve tracking parameters for FreeSurfer;
  - Manual segmentation
  - Use different parcellations
  - Functionally defined ROIs (ICA, PCA)
- GLM considerations
  - Ill-conditioned regressions => ridged regression
  - Modeling temporal autocorrelations

# QUESTIONS



# T1-weighted SPGR

T1-weighted image in the sagittal view (SPGR)

- slice thickness=0.9
- frequency Rx direction=S/I sagittal
- length of scan=5:15
- FOV=230x230
- TR= 0.00624
- voxel size =0.90 x 0.90 x 0.90 mm

# FUNCTIONAL CONNECTIVITY

