# HW2 Report — Daehyun Cho



## [1] Preprocessing and GLM

### (a) Preprocess and GLM

Here is my `afni_proc.py` command and I've automated them into one tcsh file since it takes too long time...

```
#!/bin/tcsh

foreach subj (s*)
        foreach task (ad_evt lh_evt rh_evt vs_evt)

                set prefix = $subj$task
                afni_proc.py \
                        -subj_id $prefix \
                        -dsets ./$subj/$task+orig.HEAD \
                        -copy_anat ./$subj/anat/anat_orig/anat_$subj.nii.gz \
                        -blocks despike tshift align tlrc volreg blur mask scale
 regress \
                        -tlrc_base /home/jj/abin/MNI152_T1_2009c+tlrc.BRIK.gz \
                        -volreg_align_to MIN_OUTLIER \
                        -volreg_align_e2a \
                        -volreg_warp_dxyz 3 \
                        -mask_epi_anat yes \
                        -blur_size 8 \
                        -regress_reml_exec \
                        -regress_apply_mask \
                        -html_review_style pythonic \
                        -execute
        end
end
```

Required preprocessing steps and their corresponding commands are below —

1. ***despiking*** `-blocks despike`
2. ***slice timing correctiong*** `-blocks tshift`
3. ***motion correction*** `-blocks align`
4. ***spatial normalization to the MNI space*** `-blocks tlrc volreg`
   with ***3mm isotropic voxel size*** `-volreg_warp_dxyz 3`
   - so this needed an extra option `-tlrc_base /home/jj/abin/MNI152_T1_2009c+tlrc.BRIK.gz` because I thought the default was Talairach space. But later found out that the default space was MNI. What a waste of time...
   - `-volreg_align_to MIN_OUTLIER` It's to specify the base position for volume reg but normally we use third. Since I didn't know when MP data was taken, I chose `MIN_OUTLIER`
   - `-volreg_align_e2a` Aligned EPI to anatomy at volreg step.
5. ***Spatial smoothing*** `-blocks -blur`
   using ***8mm isotropic FWMH Gaussian kernel*** `-blur_size 8`
6. ***Scaling*** of the voxel intensity to an average of 100 `-blocks scale`
   - default average was 100, no extra options needed.
   - `-blocks mask` and `-mask_epi_anat` options were added since default scaling processes were set to extended mask, which is not our desirable results.
7. ***temporal detrending***
   - ss
8. ***General Linear Model*** `-blocks regress`
   -

### (b) Review overall results with afni_proc.py QC with a html format.

This was done with `-html_review_style pythonic`

Those results

## [2] Statistical Anaylsis

The first thing to do was to resample all the `stats.` files after GLM since they had number of voxels and stuffs. I referenced the link below. Beforehand, I've put all the `stats.` from the same task into same folder(i.e. to have auditory tasks GLM results were all in the `ad` folder)

> Re: T-Test Error: "Does match first one in size"
> I'm currently in the process of adding more data to my current sample. The new data was collected during a different session. I am having issues with the t-test (one and two sample) and keep getting this error (see below, "does match first one in size") for ONLY the newly added data.
> https://afni.nimh.nih.gov/afni/community/board/read.php?1,107517,148717#msg-148717

With `tcsh` script below, I've gone through all the resampling process.

```
#!/bin/tcsh

foreach file (./*.gz)

        echo $file
        3dresample -master ../ad/stats.s02ad_evt_REMLvar+orig.BRIK.gz   \
                   -prefix res$file \
                   -input $file

end
```

### (a) One-sample t-test

Command — `3dttest++ -setA STATS*` ← file that starts with stats, results from GLM

### (b) Paired t-test for all pairs of tasks

Command — `3dttest++ -setA STATSforTask1 -setB STATSforTask2` ← two file

### (c) One-way repeated ANOVA

## [3] Discuss Overall results obtained from [1] and [2]

***Gap between theory and practice***

Even though I get to know what's going on in theory, I can't directly match them to practice right away. There are too many exceptions, extra options for

minor edge cases which is good, but documentations are not intuitive to newly-users, which is sad...

tcsh
I used bash more than 5 years ago and it was good to automate some works with tcsh script file.