

# Pupil Pipeline Design

Clear error messages

Output files for each step

## Inputs

- SMI Begaze output SMI out put : excel sheet with recording time, pupil diameter (4 decimals) and notes for trial onset (there is no value recorded in front of this label)
- Standardizes behavioral data (event timing). **events.mat**. tag.

## Outputs

- Figures
  - Comparing conditions of interest (as specified by user)
    - Diameter (as specified by user)
      - Raw
      - Baseline-corrected
      - Z-score normalized
    - Histogram
  - Raw data plot
- 'Preprocessed' data
  - MATLAB format
  - As with Jessica's, combined across blocks (cSHFB file)

## Pipeline

1. Loading in data
2. Data quality check
  - a. Plot raw data
  - b. Check % of blinks and outliers
  - c. Check linear drift (regress out linear effects if needed)
  - d. Variability (filter impossible).
3. Preprocessing
  - a. Handling blinks and outliers (deletion and/or interpolation)
  - b. Removing linear drift (optional)
  - c. Save whole preprocessed time series to file
4. Epoching
  - a. Align pupil event timing with behavioral data event timing
  - b. Customize epochs around events of interest and cut out trials for each condition (customize the size)
  - c. Interpolation for NaN value du to trial onset

- d. Remove bad trials (including editable threshold for % of blanks needed to reject)
  - e. Baseline correction (customized window; and include option for no baseline correction) baseline made with the average of the 200ms before or after the trial onset, based on fixation cross, good to include different option and no baseline correction
  - f. Save good trials for each condition to file
- 5. Analysis
  - a. Average across trials within condition and plot (use samples don't block)
  - b. Standard error calculation
  - c. Identify dilations and constrictions based on slope changes (Joshi et al. 2016 Neuron) (BONUS)
  - d. Identify blink events (BONUS)
  - e. Determine timing pupil dilation
  - f. Average plots across individuals (average across individual first vs. just concat)
- 6. Combining pupil and iEEG analysis
  - a. Align pupil event timing with iEEG event timing
  - b. Downsample iEEG data?
  - c. Correlate trial-by-trial iEEG response with pupil responses in selected window
  - d. Comparison timing?