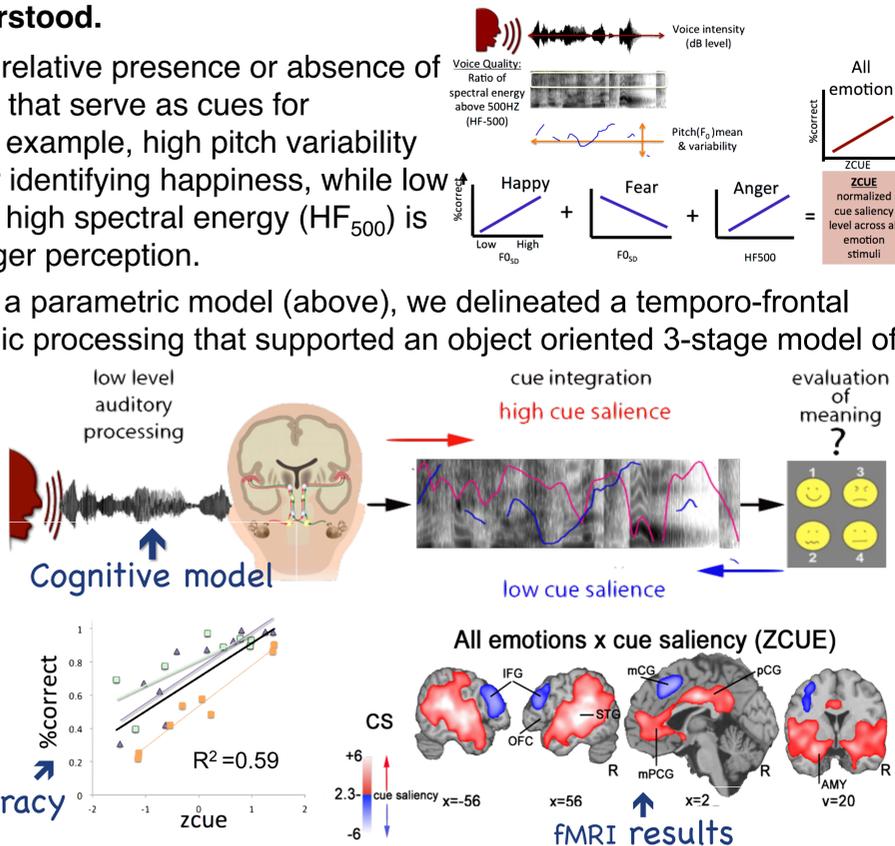


## BACKGROUND & RATIONALE

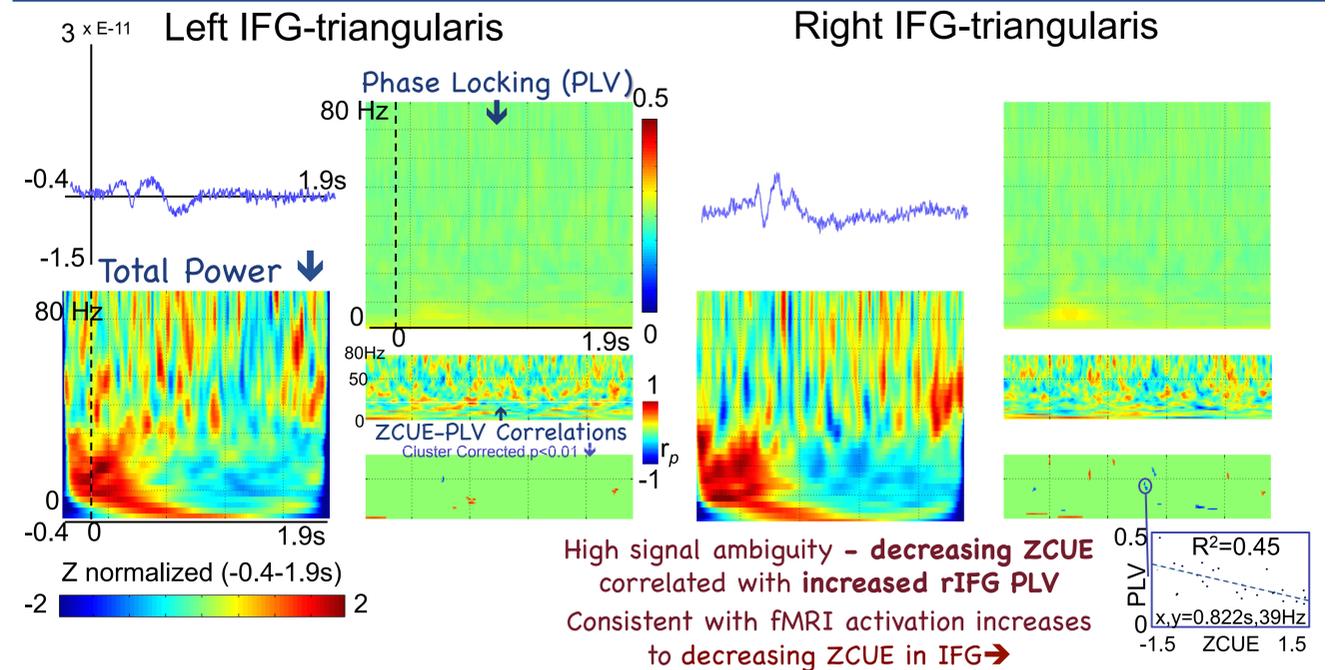
- Dysprosodia** - impairment in perceiving social intent via vocal intonation, features prominently in a number of neurological/psychiatric disorders (e.g. Depression, Parkinson's Disease, Autism Spectrum Disorder, and Schizophrenia). **The neural mechanisms of prosody are poorly understood.**
- Cue saliency** refers to the relative presence or absence of particular acoustic features that serve as cues for differentiating emotion. For example, high pitch variability ( $F0_{SD}$ ) is a powerful cue for identifying happiness, while low  $F0_{SD}$  signals fear. Similarly, high spectral energy (HF<sub>500</sub>) is strongly correlated with anger perception.
- Previously, using fMRI and a parametric model (above), we delineated a temporo-frontal reciprocal circuit for prosodic processing that supported an object oriented 3-stage model of prosodic processing.
- We observed that cue saliency (ZCUE) increases were correlated with increased activation in superior temporal /middle gyrus and amygdala, while decreases in ZCUE correlated with increased frontal activity within IFG.



## RESULTS

**Hypothesis:** ZCUE time-frequency related changes will be in part reflected by inter-trial Gamma (30-80Hz) phase synchrony as estimated by Phase Locking Value (PLV).

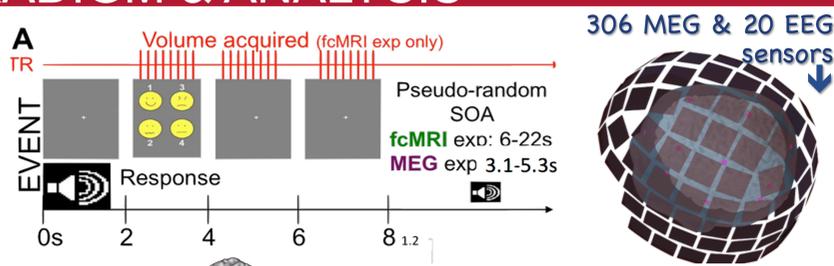
**Rationale:** 1) Computational models suggesting that gamma frequency reflects excitatory inhibitory balances that allow for local cortical pyramidal columns to act in unison. 2) prior studies linking fMRI-BOLD activation to Gamma synchrony



## PARADIGM & ANALYSIS

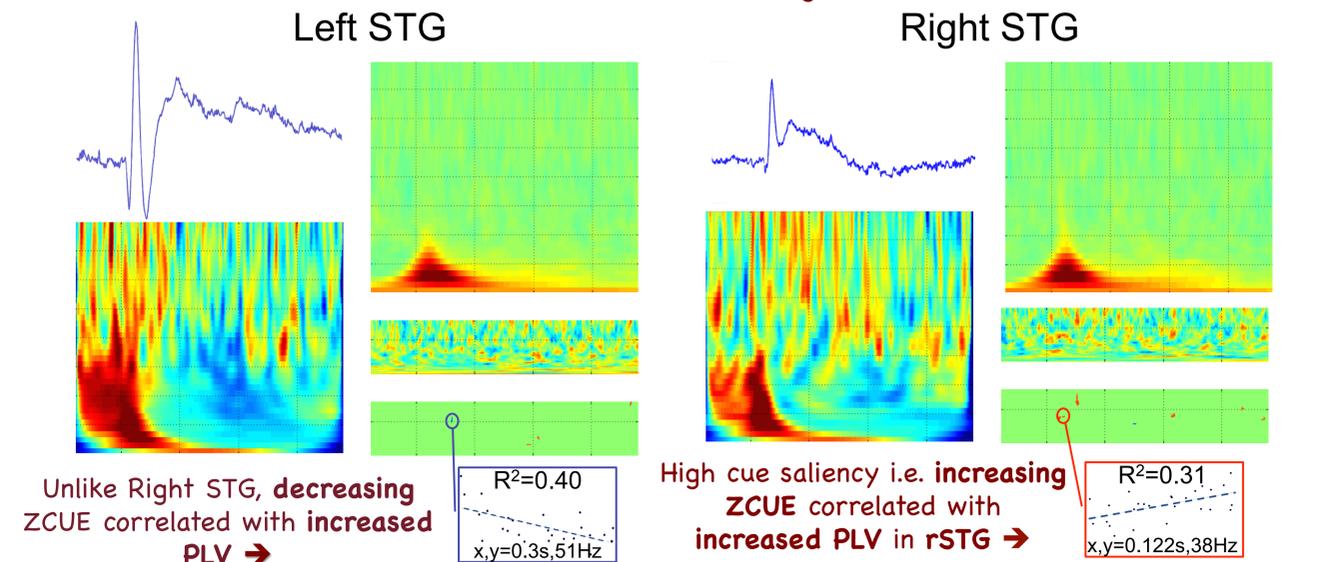
### Subjects:

18 healthy controls (13 males)  
24.86±7.31 years of age;  
Education: 14.86±1.81 years)



### Analysis pipeline

- 1) Raw 1000fs subjected to ELECTA TSSS filter then 2)
- 2) Filtered and downsampled: 500fs 0.42-100Hz
- 3) SSP correction for EOG&ECG artifacts
- 4) Cortical surface reconstruction via *Freesurfer* augmented with the merging of subcortical Amygdala and Hippocampal surfaces
- 5) EOG&ECG artifact correction via Signal Source Projection (SSP)
- 6) Data averaged across all stimuli and subjected to **L2 minimum-norm model using MNE**
- 7) Source activity for each trial is extracted from 4mm spheres centered on the vertex reflecting individualized source "center of mass of source activity" for each anatomic ROI
- 8) ROIs subjected to time and time-frequency analysis, correlating these measures with parametric variation in **Cue saliency (ZCUE)**



## REMARKS

Preliminarily, we found cue-saliency weighted temporo-spectral modulations in gamma band in both right IFG and STG consistent with our temporo-frontal reciprocal circuit model

- To do's:**
- 1) Extend this analysis to construct a cue-saliency-weighted temporo-spectral map for each node in our temporo-frontal reciprocal circuit
  - 2) Examine reciprocal activation and connectivity across network nodes
  - 3) Use diffusion imaging to examine structural functional relationships

