

## Background

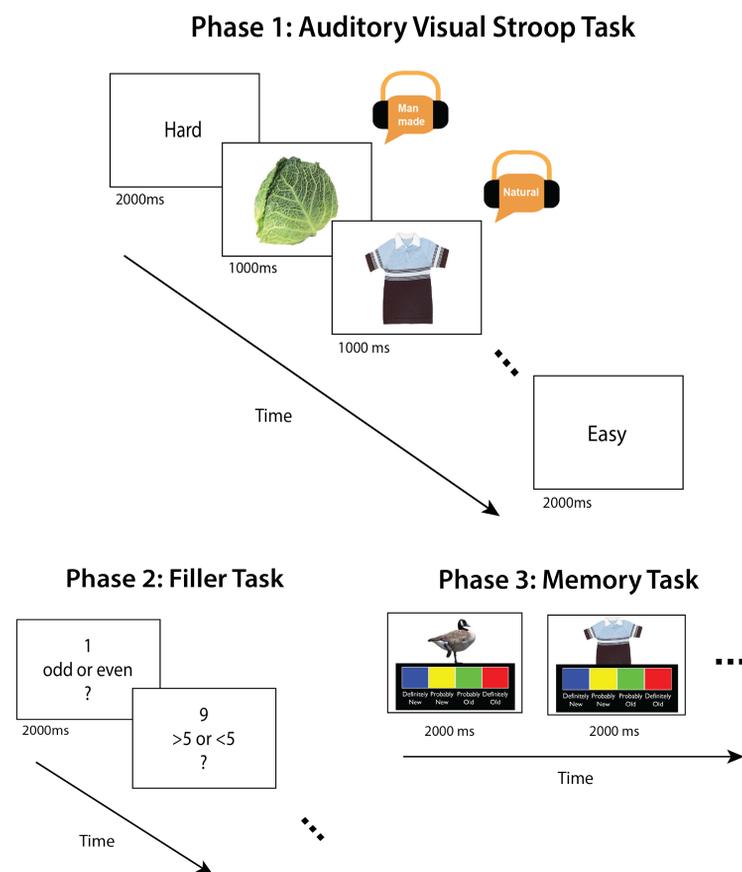
### Research Question

- People respond to items that were paired with high vs. low control demand faster in later encounter. However, whether the control state is reinstated when these items are encountered again was not investigated.
- The current study aims to find the biological evidence of control reinstatement, which is indirectly reflected by reduced auditory processing in the auditory cortex.

## Methods

### Design

- Visual-auditory Stroop task --> 160 trials x 4 runs
  - Hard block --> 80% incongruent trials
  - Easy block --> 20% incongruent trials
- Filler task
- Memory recognition task (old vs. new): 120 trials x 2 runs
  - New --> 1/3 trials
  - Old --> 2/3 trials

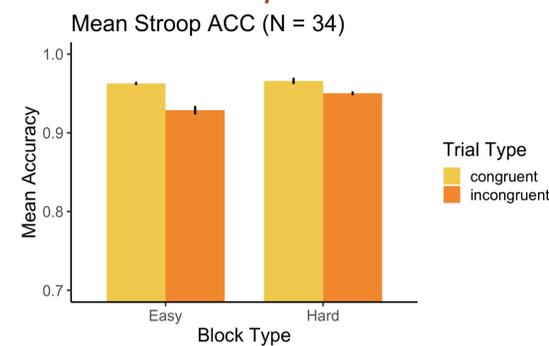


## Hypotheses & Results

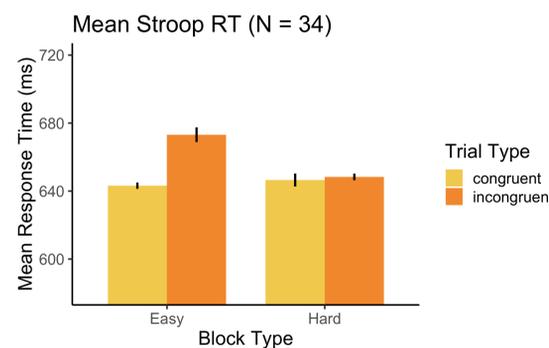
### Behavioral Hypotheses

- Shorter RT in hard blocks and in incongruent trials
- Smaller stroop effect in hard blocks
- Better at recalling images that were the trial image in hard blocks or in incongruent trials<sup>2</sup>

### • Smaller Stroop Effect in Hard Blocks

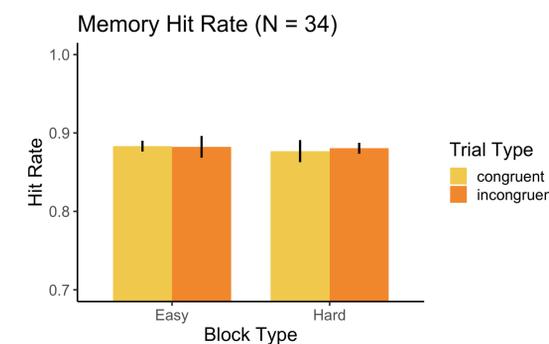


Block Type x Trial Type:  $F(1,33) = 2.697, p = 0.11, \eta p^2 = 0.08$



Block Type x Trial Type:  $F(1,33) = 20.95, p < 0.001, \eta p^2 = 0.39$

### • No Apparent Difference in Memory Performance

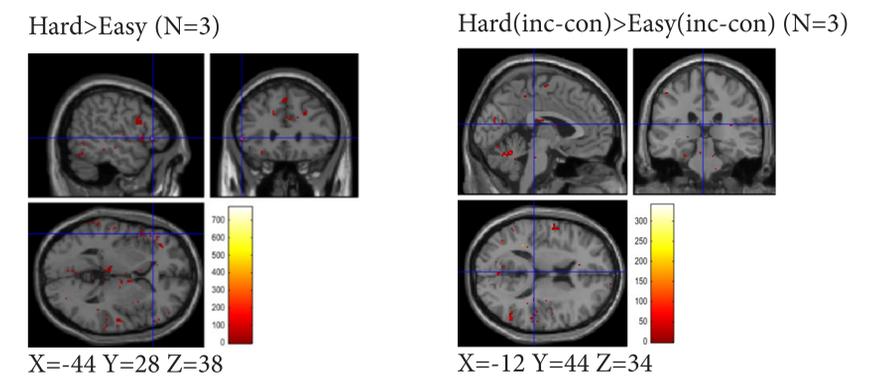


Block Type x Trial Type:  $F(1,33) = 0.06, p = 0.808, \eta p^2 < 0.001$

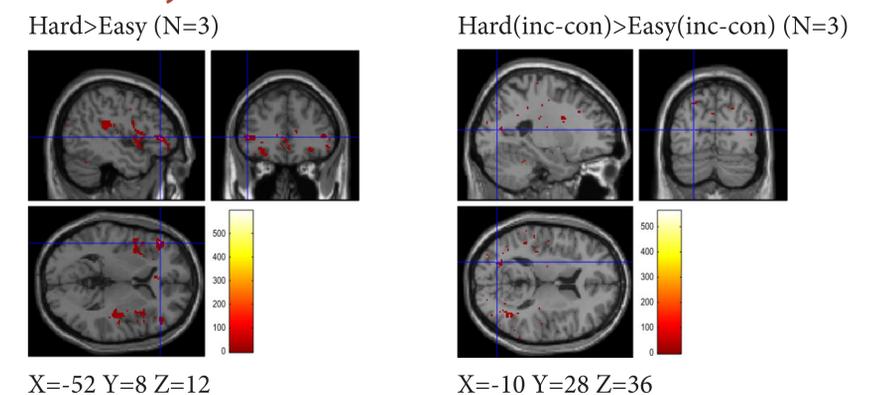
### fMRI Hypotheses

- Increased activation in the dlPFC following incongruent trials and in hard blocks<sup>3</sup>
- Increased activation in the dACC on incongruent trials when they follow a congruent trial than when they follow an incongruent trial
- In the memory phase, reduced auditory processing in images that appeared in a hard block or an incongruent trial
- Larger difference between incongruent and congruent trials in auditory inhibition in hard blocks

### • Activation in the dlPFC, anterior cingulate in Stroop Task



### • Activation in the dACC, inferior frontal cortex in Memory Task



## Conclusions

- Greater list-wide interference induced a high control demand and a smaller Stroop effect
- In line with previous studies, the dlPFC, dACC, anterior cingulate and the inferior cortex showed increased activation in a hard vs. easy block

## Future Steps

- Analyze all 34 subjects and look for more evidence for our hypotheses
- Organize data into a more reproducible, BID format and conduct the preprocessing steps using fMRIPrep
- Conduct higher level analysis to look for more direct evidence of control reinstatement