

# The Effects of Choice and Goals on Brain Activation: A fMRI Study

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## INTRODUCTION

### Objectives

- To understand neural mechanism of choice
- To find the differential neural correlates of individual characteristic based on Achievement Goal Orientation

## METHODS

### Participants

24(12 males and 12 females) healthy right-handed volunteers

### Experimental design

Event-related design  
2 x 2 factorial design (choice x reward)

### Task

Verbal frequency Judgment Task  
Post scan : Achievement Goal Orientation Scale  
(Mastery & Performance goal orientation)

### <Instruction for each condition>

#### Choice condition

“In these trials, you should choose one word that has higher frequency.”

#### No-choice condition

“In these trials, you have to choose the word that the computer system indicates.”

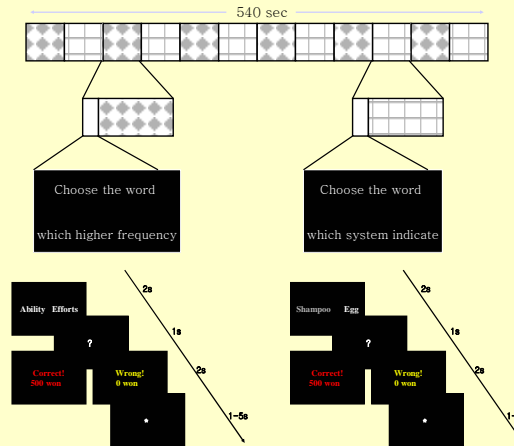
### Data Acquisition

22 slices with 5mm thick no gap 3.0T(ISOL)  
TR = 2000ms, TE = 35ms  
flip angle = 60°, FOV = 64 x 64 matrix]  
K line = 7<sup>th</sup>, oblique = ascending

### SPM 5 Analysis

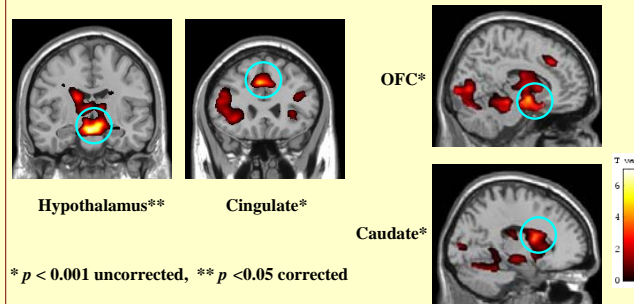
Implemented in Matlab 7  
A second level analysis is performed using random effect model  
Regression analysis  
Statistical threshold  
One sample Results ( $p < .001$  uncorrected,  $K = 10$ )  
Two sample results ( $p < .005$  uncorrected,  $K = 10$ )

### Sequence and material example



## RESULTS

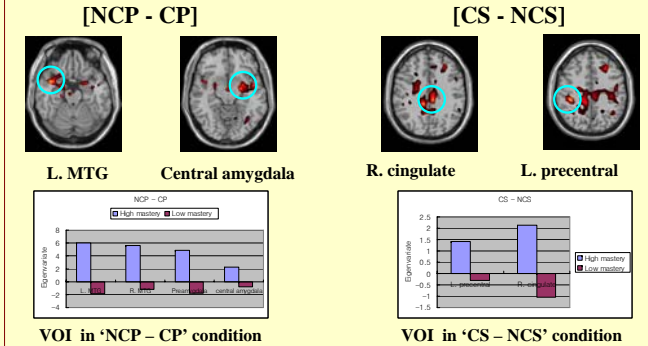
### CS – NCS (One sample t-test)



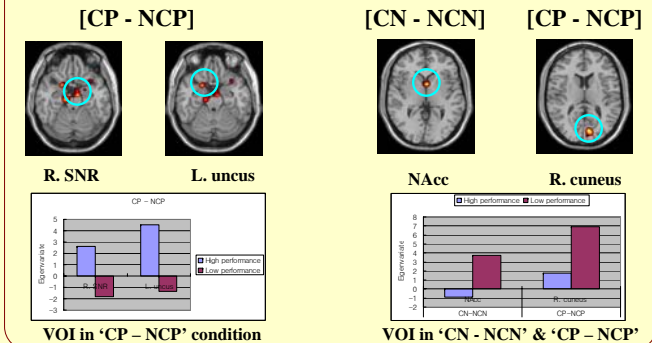
### Conditions

- CS: choice condition stimuli
- NCS: no choice condition stimuli
- CP: choice positive feedback
- NCP: no choice positive feedback
- CN: choice negative feedback
- NCN: no choice negative feedback

### High mastery – Low mastery (Two sample t-test)



### High performance – Low performance (Two sample)



## CONCLUSIONS

- Choice makes participants perceive the task self-relevantly regardless of feedback or not. Especially, in the case of high possibility for success, choice takes an important role in inducing learners' motivation.
- Depending on the achievement goal orientations, the choice should be offered differently.
  - Mastery – offer many choice situations regardless of task difficulty
  - Performance – offer choice with easy level and high success probability

