THE INFLUENCE OF REWARD EXPECTATION ON THE REWARD PROCESSING SYSTEM

Outline of the project
Reward and Punishment

- Uncertainty, prediction and behavior adaptation
- Positive and negative feedbacks
  - Guide behavior and mediate learning
- The brain circuits
  - Orbitofrontal cortex, amygdala, ventral striatum, NAcc, Prefrontal cortex, and ACC
- Specific roles of each part
 Reward and error prediction

The projection of dopaminergic neurons

Medial Frontal Negativity

Expectations

Do dopamine neurons report an error in the prediction of rewards? (Schultz et al, 97)

ERP for gains (thick lines) and losses (dotted lines) in a gambling task (Marco Pallares et al, 07)
Objectives

- Study the influence of expectations of the result in the reward and punishment processing mechanism
  - Part 1
    - Modulation of the response in cortical areas
    - Frequency band differences in the response in different conditions
  - Part 2
    - Identification of specific areas activated in response to gains and losses
    - Identification of specific areas activated in response to errors
Hypothesis

- Gains and losses are processed differently
- Expectations also modify the response
  - Probability
    - In the conditions that are better or worse than expected, there will be a modification in the observed activation
  - Magnitude
    - In maximum losses and gains there will be a modification in the response compared to minimum gains and losses
Material and methods

- 20 subjects, without history of addiction or diseases that may influence the reward processing system
- Subjects will make a task in which they play for real money
- What they win/lose will be added/subtracted from the money that they are paid for their participation
- Neuroimaging technique:
  - Part 1: EEG
  - Part 2: fMRI
Design

- A cue with the information on magnitude and probability
- Choose the card
- Receive the feedback
- Next trial
- Times should be enough to see the result of processing
1 sec

1~1.2 sec

Reaction Time

1.5 sec

10 10 10

10 10 10

2
Problems

- Motivation
- Do they keep the expectations to the end?
- If we want to study the same process with two techniques, the experiment should be adaptable for both in a way that activate the same mechanisms.
Thank You!