

# NENS stipend training stay report

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Host Lab: Department of Psychiatry, University of Cambridge, UK.

Work stay: July 1<sup>st</sup> 2016 – September 30<sup>th</sup> 2016.

**Background:** It was a great pleasure and honor to be able to go for a 3 months training stay with Dr. Graham Murray at the University of Cambridge, Department of Psychiatry, Behavioural and Clinical Neuroscience Institute.

Studying young adults in the subclinical phase of psychotic disorder could provide information on the development of psychosis and contribute to early interventions. Previous research in patients with psychotic disorder shows alterations in the brain's reward system (ventral medial prefrontal cortex (VMPFC), ventral striatum (VS), nucleus accumbens, caudate, putamen, ventral tegmental area (VTA)) using the monetary incentive delay task (MIDt). Reward anticipation is the expectation of reward and therefore a positive reinforcement of an action.

**Material & methods:** A sample (n=25) of young adults aged 16-26 years in the PE-group (CAPE positive distress subscale  $\geq 2$ ) and healthy control (HC) group (n=42) were analyzed. Reward anticipation was determined based on

reaction times on seven different cues in the MIDt and fMRI was measured during this phase. Cues related to win, loss or neutral conditions with three gain or loss levels (small; €0.10, medium; €0.60 and large €3.00). During the anticipation phase functional brain activation was recorded. FMRI analysis were performed using FSL with a focus on the reward versus neutral contrasts. In FSL a GLM was applied to the data with regressors for each condition. Next to whole brain analysis a region of interest (ROI) analysis on the VMPFC, VS and VTA was conducted. Furthermore an exploratory analysis on Experienced Sampling Method (ESM) has been conducted to investigate reward anticipation in daily life using the question that rates how much a person looks forward to the next upcoming event.

**Results:** Mean age, gender and educational level did not differ between groups. On average participants were 22 years old, with slightly more females in the HC-group compared to the PE-group. Trend significance for slower reaction times towards the loss cue in the PE-group was found. No significant differences in cue reaction times, non responses and money gain were found comparing both groups. In the fMRI analysis main effects of large win (€3.00) > neutral were found in both groups showing widespread brain activation.

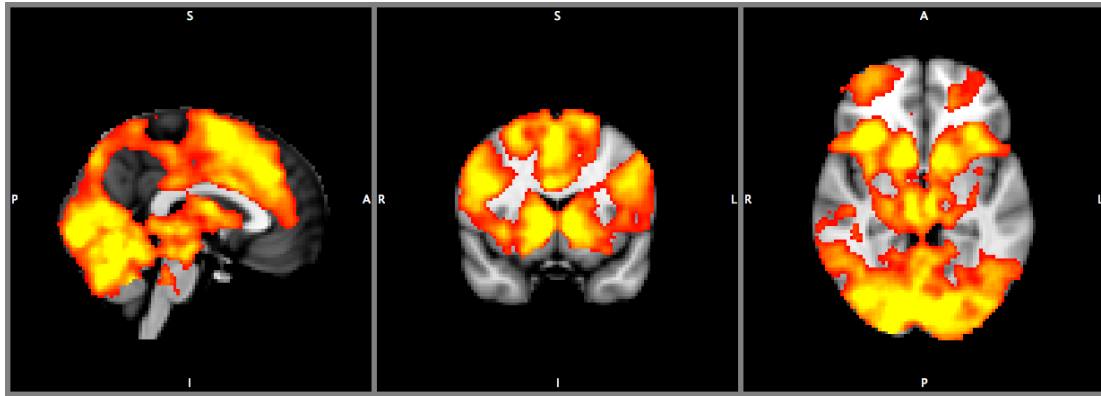


Fig1; brain activation in healthy control group in the large win > neutral condition.

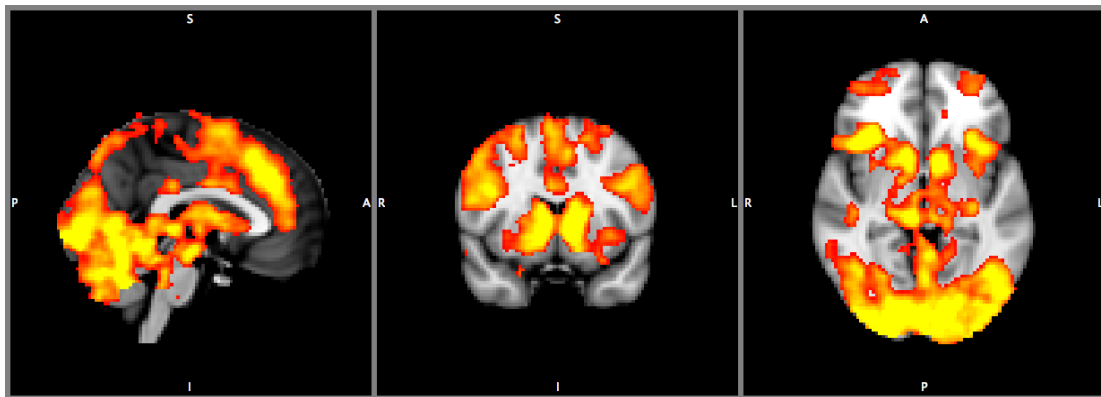


Fig2; brain activation in psychotic experiences group in the large win > neutral condition.

When comparing PE > HC group on the large win outcome > neutral increased activation was found in the left temporal pole. This finding was confirmed on the contrast combining the three win levels > neutral. ROI analysis did not find significant differences between groups.

**Discussion and conclusion:** The difference in reaction time towards the square cue could indicate a difference in loss-avoidance in the PE group. Therefore, partly altered reward anticipation in individuals with subclinical psychosis may indicate that underlying dopamine dysregulation may be more subtle in this phase, thereby not (yet) influencing this behavioral mechanism.

Interestingly, increased activation was found in the PE-group compared to the HC-group in the reward anticipation contrast. This might point to a compensatory mechanism in the prodromal phase. Preliminary ESM results indicate that when participants were looking forward to what was going to happen in the near future the more positive emotions they experienced one moment later.

**Implementation and future:** The newly acquired skills on fMRI analysis are important for ongoing research within the School for Mental Health. This knowledge will be shared via presentations and practical workshops among colleagues. The training stay also made close collaboration between the University of Cambridge and the Maastricht University possible. This will lead to further collaboration combining fMRI analysis with ESM.

**Personal development:** The financial support from the Network of European Neurosciences Schools made this training stay possible and accelerated my understanding of novel development in the fMRI methodology. Especially the hands-on guidance made thorough understanding possible and provided in depth information on the nuts and bolts of complicated fMRI analysis. Furthermore, I also met several experts in the field of neuroimaging whom I will collaborate with in the career ahead.