ABSTRACT

One of the regions hindered by schizophrenia is the dorsolateral prefrontal cortex (DLPFC) which has been associated to the ability of task switching (TS). Nevertheless, literature suggests that people affected by schizophrenia (SCHZ) do not perform worse than a neuro-typical control population (CTRL). Apparently, SCHZ are simply slower in TS, but reach the same tasks’ performances of CTRL. The literature assumes that this latter fact is possibly due to some unknown compensation mechanism in the SCHZ’s brain.

The **objective** of our project was an exploration of the differences in brain activity between SCHZ and CTRL during TS. To this end we consider the results of the 175 participants subjected to the following test.

While under fMRI, each subject was presented with a series of one of four possible geometric shapes and asked to respond to either the color or the shape of the image based on the task cue presented prior to, and above, the image. On 25% of trials the instructions switched, such that participants were instructed to switch from responding from shape to color, or vice versa.

An **ANOVA** of the subjects’ test scores shows that both groups apply similar speed/accuracy tradeoffs. SCHZ performances are poorer than the CTRL ones. However, while the CTRL scores decrease when the subjects are requested to switch, SCHZ subjects’ performances are not affected by the switching.

A **PCA** on the functional connectivity maps of the subjects yielded two results. First, SCHZ are more homogeneous in brain activity. Second, the distinction between SCHZ and CRTL is not given by a single region of the brain but by the interaction of multiple systems.

Unfortunately, we cannot affirm that the PCA results are conclusive due to the high noise afflicting the data. However, the intuition suggested by the PCA results were confirmed by other researchers of the MOX Department that used more advanced non-parametric and functional statistical analysis techniques.

**ABSTRACT da usare come REFERENCE SHEET**

**The study-case**: One of the regions of the brain by schizophrenia is the dorsolateral prefrontal cortex (DLPFC) which has been associated to the ability of task switching (TS). Nevertheless, literature suggests that people affected by schizophrenia (SCHZ**) do not perform worse** than neuro-typical ones in a task switching test: SCHZ are simply slower in TS, but reach the same performances of CTRL. This may suggest the existence of some unknown underlying compensation mechanism in the SCHZ’s brain.

The **objective** of our project: we wanted to the **differences in brain activity** between SCHZ and CTRL during TS, considering the results of the 175 participants subjected to the following test.

**The experiment**: While their brain was scanned, each subject was presented with a series of geometric shapes and asked to identify either the color or the shape of the image shown. On 25% of trials the instructions switched, such that participants were instructed to switch from responding from shape to color, or vice versa.

An **ANOVA** of the subjects’ reaction times shows that both groups apply similar speed/accuracy tradeoffs. SCHZ performances are poorer than the CTRL ones, however, while the CTRL scores decrease when the subjects are requested to switch, SCHZ subjects’ performances are not affected by the switching.

A **PCA** on the functional connectivity maps of the subjects yielded two results:

1. SCHZ are more homogeneous in brain activity
2. the distinction between SCHZ and CRTL is not given by a single region of the brain but by the interaction of multiple systems.

Unfortunately, we cannot affirm that the PCA results are conclusive due to the high noise afflicting the data.