Plan Overview

A Data Management Plan created using DMPonline

Title: NeuroFlux: Understanding the impact of brain fluctuations on decision making

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Template: ERC DMP

Project abstract:

Our societies are built on the premise that humans are rational agents who make decisions that are in line with their held beliefs. A central principle is that of choice consistency, i.e. that humans will make identical choices when facing the same problem. However, experimental work overwhelmingly demonstrates that humans are consistently inconsistent and that an exaggerated behavioural variability is a key feature of impulsive psychiatric disorders. The causes for these inconsistencies are unknown and economic theories and computational models fail to explain this omnipresent human characteristic. I propose that intrinsic fluctuations of brain activity are causing us to behave seemingly inconsistent, and the overarching aim of NeuroFlux is to examine how endogenous brain activity changes how we act and make decisions. NeuroFlux will use a novel neuroimaging framework that I have recently developed and that allows to quantify whether and how strongly endogenous fluctuations in a specific brain area contribute to behaviour. I will use this cutting-edge technology to answer the following questions: (i) How do endogenous fluctuations in the dopaminergic midbrain influence decision making and learning? (ii) How do endogenous fluctuations in the noradrenergic midbrain influence decision making? (iii) Is impulsivity driven by an exaggerated brain-behaviour coupling? To address these questions, I will combine real-time functional MRI with pharmacological manipulations and transdiagnostic studies across three intertwined work packages. NeuroFlux will reveal how the brain’s idle states drive and alter our behaviours. This project will provide a new computational understanding that no longer treats behavioural inconsistency as irrelevant noise but as a meaningful window into the brain’s inner workings. NeuroFlux thus has the potential to revolutionise how we understand human behaviour per se and may reveal the mechanisms underlying impulsive psychiatric disorders.

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NeuroFlux: Understanding the impact of brain fluctuations on decision making

Summary

Project Acronym

NeuroFlux

Project Number

946055

Provide a dataset summary

This DMP covers the data that will be acquired during the NeuroFlux project. NeuroFlux aims to uncover how intrinsic fluctuations affect decision making and actions. Ongoing neural fluctuations will be recorded in real time and used to trigger behavioural experiments. For each study within NeuroFlux, a new dataset will be generate. This primarily consists of behavioural responses that can be used for behavioural analyses and computational modelling. In addition the timecourses of each region-of-interest will be shared for reference. This will allow to replicate all reported findings.

FAIR data and resources

1. Making data findable

We intend to provide metadata for all projects. We hope to follow DataCite metadata scheme http://schema.datacite.org/ or https://fairsharing.org/which provides flexibility in our interdisciplinary research field. Task and analysis code will be provided via open-access public github repositories and linked to the data and metadata. We intend to provide data via the official UCL data repository.

2. Making data openly accessible

We intend to make as much data as possible openly accessible. This will primarily entail behavioural responses and ROI time courses. We plan to deposit the data on UCL repositories and provide all task and analysis code openly using GitHub repositories. These are openly accessible repositories and well established in the field.

3. Making data interoperable

We will share data using.csv format, a widely used data format compliant with open-access softwares. Metadata vocabularies will be specified to ensure the interoperability.

4. Increase data reuse

We intend to register our datasets at https://b2share.eudat.eu/ and/or at open science framework. This will increase data re-use and findability.

5. Allocation of resources and data security

The targeted repositories are currently free of costs for users (e.g. UCL repository is provided by UCL). This may change for long-term storage or in a changing financial situation. These repositories also provide the mechanisms for longterm storage and backup to prevent data loss. Costs will be estimated in case repositories will no longer be free of charge.