**BBSRC MIBTP Studentship Project**

**September 2023**

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| **Project Title** | Changing cognition in older adults: How does executive function change as we age? |
| **Project Summary** | |
| Background  Cognitive changes happen to everyone as we age; most obviously in dementia, where we start to see problems in how people attend to and process information, encode and retrieve from memory, and use and understand language. However, these changes also take place to a degree in “healthy” ageing, and this is a key area to explore as an ever-increasing proportion of the population comprises older adults.  While we have a reasonable grasp of how memory changes with age, an important and little-explored area is “executive function”. This is a set of high-level cognitive skills, including a person’s ability to plan, problem-solve, flexibly shift attention, and hold and manipulate information. These skills are key for working, running a household, maintaining relationships and many other aspects of life, so it is important to identify how they are affected in ageing. The proposed project will examine such changes using computer-based tasks in which we monitor participants’ responses, including their eye movements. This will provide crucial information about how cognitive skills change over time, and help identify possible interventions.  Aims and objectives:  The aim is to evaluate changes in executive function between young and older adults using tasks that assess key cognitive skills, including the ability to shift attention flexibly, retain information in working memory, and disengage from one strategy to use another. Variation in such skills have been shown to account for 54% of functional abilities (activities of daily living) and to predict later cognitive decline. The research will have implications for 1) how we understand cognitive difficulties that are common in ageing, and 2) and how we might make use of technology and social changes to improve the wellbeing of older people.  Methods:  Our proposal is to use a combination of online experiments, which enable us to obtain data from many participants quickly and effectively, and more focused laboratory-based experiments that measure eye movement and EEG recordings of brain activity to inform our understanding of how executive function changes during typical (i.e., “healthy”) ageing.  This research will involve the recruitment of human participants, comprising young adults (aged 18-30 years), typically recruited from the University, and older adults (aged 65+ years) recruited from the local community.  Techniques that will be undertaken during the project   * Programming of online, eye tracking and EEG experiments * Eye movement and EEG recordings during experimental tasks * Complex statistical analysis using R   BBSRC Strategic Research Priority: Understanding the Rules of Life - Neuroscience and behaviour  Integrated Understanding of Health - Ageing | |
| **References** | |
| Verssimo, J., Verhaeghen, P., Goldman, N., Weinstein, M., and Ullman, M. T. (2021). Evidence that ageing yields improvements as well as declines across attention and executive functions. Nature Human Behavior, 6, 97–110. doi: 10.1038/s41562-021-01169-7 | |