**BBSRC MIBTP Studentship Project**

**September 2023**

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| **Project Title** | Understanding the neural basis of ageing effects on word recognition during reading  |
| **Project Summary**  |
| Healthy ageing is associated with reductions in visual and cognitive abilities that are required for many activities of daily life (e.g., reading, navigation, object-finding). These losses in visual and cognitive abilities have been widely studied using behavioural tasks, to draw inferences about differences in how people process information across the lifespan. Little is known, however, about the neural correlates of these changes, although such information is essential for understanding how normal ageing impacts on brain processes. This project addresses this issue with a specific focus on ageing effects on reading, using novel methods that synchronise the electroencephalographic (EEG) recording of brain activity with eye movements. This relatively new method allows us to examine the patterns of brain activity that take place on each individual fixation during reading. It therefore provides us with a powerful method for understanding how ageing impacts on brain processes involved in recognising words during natural reading. The research project will be undertaken in the School of Psychology and Vision Sciences laboratories at the University of Leicester, using a state-of-the-art EEG system and eye-tracker for the co-registration of EEG and eye movements in real-time. Our research group is the first to apply these methods to understanding ageing effects on the recognition of words during reading. This project will use this method to conduct novel investigations of ageing effects on word recognition during reading, with the aim of uncovering differences in the patterns of brain activity associated with the recognition of words by older adults (aged 65+ years) as compared with younger adults (aged 18-30 years). The older adult participants for this research would be recruited using a database of older adult volunteers while young adult participants would be recruited from the University student population. The PhD student will be fully trained in the design of human experimental studies and the use of this novel method for co-registering eye movements and EEG. Full training will also be given in the analysis of these data using linear mixed-effect modelling and statistical packages in the R programming environment. The student will be supported in presenting their research at national and international conferences, collaborating with other labs worldwide, and publishing their research in leading cognitive neuroscience journals. Techniques that will be undertaken during the project* High-precision eye movement recording
* Electro-encephalography
* Co-registration of eye movements and EEG
* Linear mixed-effect modelling in the R programming environment

BBSRC Strategic Research Priority: Understanding the Rules of Life - Neuroscience and behaviourIntegrated Understanding of Health - Ageing |
| **References** |
| Degno, F., Loberg, O., Zang, C., Zhang, M., Donnelly, N., & Liversedge, S. P. (2019). Parafoveal previews and lexical frequency in natural reading: evidence from eye movements and fixation-related potentials. Journal of Experimental Psychology: General, 148, 453-474. Henderson, J. M., Luke, S. G., Schmidt, J., & Richards, J. E. (2013). Co-registration of eye movements and event-related potentials in connected-text paragraph reading. Frontiers in Systems Neuroscience, 7, 28.   |