**University of Leicester**

**BBSRC MIBTP Studentship Project 2025-6 entry.**

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**Section 2 – *Project Information***

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| **Project Title** | Effects of Cognitive Aging on Language Use and Comprehension: Gaining Insights from Eye-Tracking and EEG |
| **Project Summary**  |
| This project is concerned with how healthy aging affects visual and cognitive capabilities, particularly in the context of reading. As people age, they can experience a decline in these skills, which are crucial for everyday tasks like reading, navigation, and locating objects. While previous behavioural studies have shed light on how these capabilities change across the adult lifespan, there is much to learn about the neural basis of these changes. Understanding the neural mechanisms is key to gaining a deeper insight into how normal aging influences brain function. The primary focus of the research will be to explore how aging impacts reading. The project will employ novel methods for simultaneously recording eye movements and EEG to study both the behavioural and neural aspects of aging effects on reading. By synchronising these two methods in real-time, the project aims to provide new insights into the cognitive changes that naturally accompany aging. The research will be conducted at the School of Psychology & Vision Sciences at the University of Leicester, which is equipped with state-of-the-art EEG systems and eye-tracking technology. Our research group is at the forefront of using these techniques to investigate how aging affects reading. The PhD student will have the opportunity to focus on one of the following research areas: * Aging and Language Processing: Exploring how aging influences aspects of language processing, including word recognition, sentence comprehension, and meaning interpretation during reading.
* Cognitive Benefits of Second Language Learning: Investigating whether learning a second language can help delay cognitive decline and enhance cognitive resilience.
* Working Memory and Vocabulary Acquisition: Analysing the role of working memory in vocabulary learning among older adults.

The student will receive thorough training in experimental design, eye-tracking, and EEG techniques, including methods for combining these technologies. They will also learn advanced statistical analysis techniques, including linear mixed-effects modelling and Bayesian analysis techniques, using the R programming language. The supervisory team has a strong track record of international collaborations and publications. The student will be supported in presenting their research at national and international conferences, collaborating with other research labs, and publishing in top cognitive neuroscience journals. Techniques that will be undertaken during the projectHigh-precision eye movement recording Electro-encephalography Co-registration of eye movements and EEG Linear mixed-effect modelling in the R programming environment   |
| **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.  |