**BBSRC MIBTP Studentship Project**

**September 2023**

|  |  |
| --- | --- |
| **First Supervisor** | Dr Claire Hutchinson |
| **School/Department** | Psychology & Vision Sciences |
| **Email**  | ch190@leicester.ac.uk  |

|  |  |
| --- | --- |
| **Second Supervisor** | Dr Doug Barrett and Professor John Maltby |
| **School/Department** | Psychology & Vision Sciences |
| **Email**  | djkb1@leicester.ac.uk / jm148@leicester.ac.uk  |

|  |  |
| --- | --- |
| **Additional Supervisor** |  |

|  |  |
| --- | --- |
| **Project Title** | A componential approach to visual perceptual decision-making in aging |
| **Project Summary**  |
| **Background**Visual perceptual decision-making encompasses our ability to perceive and make judgements about the visual world. It is a complex multifactorial process that relies on our brain’s ability to process information from our eyes, evaluate potential options, and act upon the world based on our expectations and experience. At the core of this process is the ability of our visual systems to resolve perceptual uncertainty. We know a lot about how our brains encode specific visual and cognitive components of visual perception in isolation. However, we know much less about: (1) the relationships between different visual and cognitive abilities, (2) how they contribute to our ability to resolve perceptual uncertainty and see the world accurately and (3) how this changes as we age.**Project objectives**The objectives of this PhD project are to: (1) provide the first comprehensive assessment of the sensory and cognitive components of visual perception, (2) determine the relationships between them (3) explore the rules and algorithms our brains use to weight different sources of information to make sense of the visual world, (4) determine how this changes throughout the adult lifecourse and into older age.**Methods**This project represents the first large-scale study of human visual sensory and cognitive performance on key visual perceptual tasks across the healthy adult lifespan. Established techniques from human cognitive neuroscience (visual psychophysics and eye-movement analysis) will be used to generate a large, representative dataset of human perceptual performance across adulthood. The behavioural dataset will be subjected to cutting-edge psychometric statistical analyses (informed by established methodologies from the social sciences) to establish the relative contributions of sensory and cognitive components to the overall construct of visual perception. Probabilistic mathematical and computational modeling techniques (Bayesian analysis) will be applied to model how sensory and cognitive coding in the brain changes to accommodate age-related changes in how the visual system is able to deal with perceptual uncertainty. **Supervisory team**The project is underpinned by the complementary expertise of a multidisciplinary supervisory team. Dr Claire Hutchinson is a vision scientist with a track-record in fundamental and translational research in visual perception and cognition. She uses a range of techniques including visual psychophysics and computational modeling to understand the human visual system. Dr Doug Barrett is a cognitive neuroscientist who uses Bayesian analysis, eye movement recording and computational modelling to understand attentional control in the human brain. Professor John Maltby is an individual differences psychologist. He brings to the project a long-standing history and internationally-recognised expertise in applying psychometric analysis to the assessment of human abilities and behaviour.Techniques that will be undertaken during the project:* Visual psychophysics
* Cognitive assessment
* Eye-tracking
* Mathematical modeling
* Psychometric analysis

BBSRC Strategic Research Priority - Integrated Understanding of Health; Ageing |
| **References** |
|  |