



Economic
and Social
Research Council



Exploring the Relationship between Exteroception and Interoception in Neurotypical and Neurodivergent Populations

ESRC DTP Joint Studentship

University of Nottingham and Loughborough University

The Midlands Graduate School is an accredited Economic and Social Research Council (ESRC) Doctoral Training Partnership (DTP). One of 14 such partnerships in the UK, the Midlands Graduate School is a collaboration between the University of Warwick, Aston University, University of Birmingham, University of Leicester, Loughborough University and the University of Nottingham.

We are now inviting applications for an ESRC Doctoral Joint Studentship between **University of Nottingham** (where the student will be registered) and the **Loughborough University** to commence in October 2023.

This research project presents an ideal opportunity to develop a novel approach, using augmented reality, to allow the investigation of the relationship between internal and external sensory systems in autistic and non-autistic populations, to inform theoretical models of sensory integration.

Sensory processing is fundamental to how we experience and learn about ourselves and the world we live in. However, around 16.5% of the general population have difficulties with processing sensory information and these reports are even more common in neurodivergent conditions such as autism or attention deficit hyperactivity disorder (ADHD). As disrupted sensory processing can significantly impact upon social and emotional wellbeing in these groups, it is crucial for us to understand more about why and how these sensory differences occur.

The majority of sensory research in neurodivergent conditions has generally focussed on primary senses (e.g. vision, touch, audition) and largely neglected interoceptive signals such as heart rate, hunger, muscle tension, temperature, and pain. However, a recent review (Chen et al. 2021) has suggested that these two sensory systems may interact in important ways that help an individual to regulate one's sensory experience.

This project will use a wide range of methods to investigate Chen et al's (2021) argument for the bi-directionality of exteroceptive (primary) and interoceptive sensory systems. In particular, the research will explore how body illusions can be used to systematically manipulate the inter-relationship between external sensory information and interoceptive processes; for example, using augmented reality to induce the feeling of tingling, itching or coldness in the hands. The project will also further develop novel illusions that will manipulate the perception of inner

sensations such as proprioception, muscle tension and heart rate. Please see link for demonstration of the virtual reality system with body illusions used in previous projects [[MIRAGE virtual reality](#)].

Application Process

To be considered for this PhD, please complete the Joint Studentship application form [available online here](#). Please upload an anonymised CV and cover letter as part of the online application process. Shortlisted applicants will also be required to provide transcripts and two references.

Application deadline: Tuesday 28th February (23:59). Estimated interview date: Friday 15th March 2023.

Midlands Graduate School ESRC DTP

Our ESRC studentships cover fees at the home rate, a maintenance stipend, and extensive support for research training, as well as research activity support grants. Support is available to both home and international applicants. For further details, visit: www.mgsdtp.ac.uk/studentships/eligibility/.

Informal enquiries about the research or School of Psychology (Nottingham) prior to application can be directed to Professor Danielle Ropar [Danielle.Ropar@nottingham.ac.uk].