

# Inference and prediction in perception and oculomotor planning

- **Supervisors:** [Dr Emma Stewart](#)
- **Studentship Funding:**
  - **Name:** SBBS Studentship
  - **Funder:** School of Biological and Behavioural Sciences (SBBS) at QMUL
- **Application Deadline:** 18<sup>th</sup> April 2024
- **Expected Start Date:** Sept 2024

## Project Overview

Applications are open for a 3-year funded PhD Studentship in the [School of Biological and Behavioural Sciences](#) (SBBS) at Queen Mary University of London.

This project will investigate human visual perception, and how the inferences we make about the physical properties of objects in the world influence eye movements, decisions and plan actions.

Humans can make complex and sophisticated inferences about objects based on the constrained information that hits the retina (Fleming, 2017; Stewart, Hartmann, et al., 2022). Object properties such as shape or geometry can lead to inferences such as where a novel object might move (Sigurdardottir et al., 2014), or where the front or side of a semantically meaningless object is (Stewart et al., 2023). Additionally, due to the anatomy of the retina, a large portion of our visual field is processed by our low-resolution peripheral vision (Stewart et al., 2020). Humans therefore make 2-3 eye movements every second to bring objects and areas of interest into high-resolution central vision. Many factors, including inferences about an object, can influence where we look or can drive predictive oculomotor behaviour (Kowler et al., 2019; Stewart, Ludwig, et al., 2022; Stewart & Fleming, 2023).

This project aims to answer the following questions:

- 1) How do the inferences we draw from objects affect eye movement planning and oculomotor behaviour?
- 2) How do inferences lead to predictions, both oculomotor and behavioural?
- 3) What is the role of both peripheral and central vision in forming inferences and shaping our perception of the world?

[Find out more about the School of Biological and Behavioural Sciences on our website.](#)

## Keywords:

Eye movements; Perception; Vision; Cognition; Behaviour

## Research Environment

The School of Biological and Behavioural Sciences at Queen Mary University of London is one of the UK's elite research centres, according to the 2021 Research Excellence Framework (REF). We offer a multi-disciplinary research environment with approximately 180 PhD students working on projects in the biological and psychological sciences. Our students have access to a variety of research facilities supported by experienced staff, as well as a range of student support services.

The Stewart Lab studies how humans perceive the world, make eye movements, and use visual information from across the visual field to inform our decisions and choices. Research in the lab uses behavioural and psychophysical experiments coupled with eye and hand movements, computational modelling, computer graphics, and statistical modelling. We have international links and active collaborations all over the world (USA, Germany, Australia). You can find out more at [www.emmaemstewart.com](http://www.emmaemstewart.com)

The successful applicant will learn a diverse set of skills including behavioural and eye movement data analysis, computational cognitive modelling, computer graphics, statistical modelling, coding (Matlab, R,

Python), and academic writing and presentation. Additionally, PhD students become part of the Queen Mary Doctoral College, which provides further training and development opportunities.

[Find out more about the School of Biological and Behavioural Sciences on our website.](#)

## Entry Requirements & Criteria

We are looking for candidates who have or are expecting to receive a first or upper-second class honours degree and a Master's degree in an area relevant to the project such as Psychology or Neuroscience. Candidates with a degree in Biology, Mathematics, Computer Sciences or Engineering will also be considered. Candidates must have experience conducting behavioural research in a laboratory environment.

Knowledge of programming (i.e. Matlab, R, Python), psychophysics, eyetracking, computer graphics (i.e. mesh manipulation in Blender), or running online experiments (for example using JsPsych) would be highly advantageous.

[Find out more about our entry requirements here.](#)

Applicants from outside of the UK are required to provide evidence of their English language ability. [Details can be found on our English Language requirements page.](#)

## Funding

The studentship is funded by the School of Biological and Behavioural Sciences (SBBS) at Queen Mary University of London (QMUL). It will cover home tuition fees, and provide an annual tax-free maintenance allowance for 3 years at the UKRI rate (£20,622 in 2023/24).

To classify for Home Fees, this typically means the candidate will have unrestricted access on how long they can remain in the UK (i.e. are a British National, have settled, or pre-settled status, have indefinite leave to remain etc.)

International students will need to cover the difference in fees between the home and overseas basic rate from external sources. [Further details can be found on our PhD Tuition Fees page.](#)

Funding and eligibility queries can be sent to the [sbbs-pgadmissions@qmul.ac.uk](mailto:sbbs-pgadmissions@qmul.ac.uk)

## How to Apply

Formal applications must be submitted [through our online form](#) by the **stated deadline** for consideration.

Applicants are required to submit the following documents:

- Your CV
- Personal Statement
- References
- Copies of academic transcripts and degree certificates

[Find out more about our application process on our SBBS website.](#)

Informal enquiries about the project can be sent to Emma Stewart at [emma.stewart@qmul.ac.uk](mailto:emma.stewart@qmul.ac.uk)

Admissions-related queries can be sent to [sbbs-pgadmissions@qmul.ac.uk](mailto:sbbs-pgadmissions@qmul.ac.uk).

## [Apply Online](#)

The School of Biological and Behavioural Sciences is committed to promoting diversity in science; we have been awarded an Athena Swan Silver Award. We positively welcome applications from underrepresented groups.

<http://hr.qmul.ac.uk/equality/>

<https://www.qmul.ac.uk/sbbs/about-us/athenaswan/>

## References

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