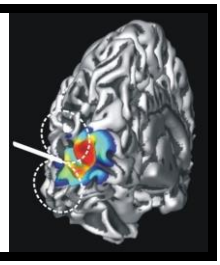
PS4097: Research Methods in Cognitive Neuroscience

Module organiser: Dr Daniela Balslev



Module summary:

Tremendous progress in technology allows now to observe the nervous system in action to understand the underpinnings of behaviour and cognition. This module showcases this cutting-edge approach with concrete examples. The topic is relevant not only to the students who wish to embark on a research career, but also to those interested in applied psychology where research in cognitive neuroscience is increasingly making an impact, i.e. clinical, social or forensic psychology.

The module is taught by a team of lecturers who have hands-on experience with the research methods that you will learn about. Each week, a lecturer will introduce a topic, and provide a paper for you read and discuss during a seminar the following week.

Learning objectives:

By the end of the module students should be familiar with:

- The principles behind the main methods in cognitive neuroscience (functional magnetic resonance imaging, computational modelling, brain stimulation, single cell recordings, electro- and magneto-encephalography)
- The advantages and the limitations for each of these methods
- The benefit of combining multiple methods to answer a research question.
- Evaluating and proposing research in cognitive neuroscience

Contributing staff:

Module organiser – Dr Daniela Balslev (DB), db87@st-andrews.ac.uk
Other contributors – Dr Tom Otto (TO), to7@st-andrews.ac.uk
Dr Justin Ales (JA) jma23@st-andrews.ac.uk
Dr Gareth Miles (GM) gbm4@st-andrews.ac.uk

Main topics:

The course is divided into the following 8 main sections:

1. Introduction to multimodal methods in cognitive neuroscience (what can be gained from combining multiple methods rather than using just one ?) (DB)
2. Scientific inquiry, hypothesis testing, behavioral modelling (TO)
3. Single cell recordings (GM)
4. Electroencephalography and magnetoencephalography (JA)
5. Transcranial magnetic stimulation (DB)
6. Functional magnetic resonance imaging, multimodal imaging (fMRI + TMS) (DB)
7. Functional magnetic resonance imaging, multimodal imaging (fMRI+EEG) (JA)
8. Patient studies /Neuropsychology (DB)

Each section will begin with an introductory lecture and be followed by a session in which students present relevant primary literature. Papers for presentations will be selected by the member of staff running each section.

Assessment:

Paper commentaries for non-presenting students (200 words). [10%]

All non-presenting students will be required to write a short (200 word) synopsis of papers that are presented in each section of the course. These synopses will take the form of a "*Nature* summary paragraph". Guidelines on this format will be provided in class and on Moodle. To prepare for the other elements of the assessment, the students will be encouraged to end this abstract with their own ideas for future research.

Research project presentations [10%]

Towards the end of the module, the students present a research proposal as a PowerPoint presentation. The research project will be based on a scientific question chosen by the student. Guidance will be offered in class and on Moodle. To prepare the students for the final piece of assessment, both peers and lecturer will provide feedback on the project. The assessment will be based on the presentation slides content and structure.

Research project proposal [80%]
After revising, the student submits the final version of the project proposal for evaluation. The project proposal will take the form of a grant application (no more than 2000 words).

Specific School regulations relating to absence reporting, penalties and rules for late submission of work, extensions for coursework, academic misconduct policy and Academic Alert can be found in the School of Psychology and Neuroscience Honours Handbook.

For further information see the University Handbook: http://www.st-andrews.ac.uk/studenthandbook

Timetable:

	Psychology Seminar Room	Psychology Seminar Room
	Tue (9–10 am)	**Tue (10-11am)**
Week 1	DB: Introduction and Multimodal Methods	TO: Scientific inquiry, hypothesis testing, behavioral modelling (intro)
Week 2	TO: Scientific inquiry, hypothesis testing, behavioral modelling (student led)	JA: Electroencephalography and magnetoencephalography (intro)
Week 3	JA: Electroencephalography and magnetoencephalography (student led)	DB: Brain Stimulation/Transcranial magnetic stimulation (intro)
Week 4	DB: Brain Stimulation/Transcranial magnetic stimulation (student led)	DB: Functional magnetic resonance imaging, multimodal imaging (fMRI + TMS) (intro)
Week 5	DB: Functional magnetic resonance imaging, multimodal imaging (fMRI + TMS) (student led)	GM: Single cell recordings (intro)
Week 6	GM: Single cell recordings (student led)	JA: Functional magnetic resonance imaging, multimodal imaging (fMRI+EEG) (intro)
Week 7	JA: Functional magnetic resonance imaging, multimodal imaging (fMRI+EEG) (student led)	DB: Patient studies /Advanced Neuropsychology (intro)
Week 8	DB: Patient studies /Advanced Neuropsychology (student led)	DB:Q&A
Week 9	Break	
Week 10	DB (and others, if relevant): Student project presentations (Note, this session is from 9:10 am to 12:55)	
Week 11	DB: Overview	