UCD School of Psychology

MSc in Behavioural Neuroscience
(One Year Full Time)

MSc Behavioural Neuroscience

Student Manual 2024-2025

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WELCOME

Welcome to the programme on behalf of all colleagues involved in teaching and research supervision on the MSc in Behavioural Neuroscience in 2024-2025. Welcome also to the School of Psychology, your academic home this year. We are very happy you chose to study with us at UCD.

The primary purpose of this manual is to provide details on the programme structure, with a particular emphasis on core modules that are designed to offer training in specific research skills and analysis (Behavioural Neuroscience Labs 1 & 2, Behavioural Neuroscience Research Project, Advanced Research Methods and Statistics), to encourage a critical approach to theory, ideas and research (Recent Papers in Behavioural Neuroscience), and to develop writing and research presentation skills (Knowledge Transfer, Recent Papers in Behavioural Neuroscience). We also offer advice on choosing option modules to complement your undergraduate training (be it in Psychology, Neuroscience or a related discipline). Also included below is information on the various student supports and facilities available on campus.

As programme directors, we are on hand to help; feel free to email either of us to ask a question or to arrange a meeting to chat in person (nuala.brady@ucd.ie, s.cooney@ucd.ie). For organisational and administrative matters related to the programme, please contact Mary Boyle (mary.boyle@ucd.ie).

For queries relating to specific modules, please contact the **module coordinator.**

In 2024-2025, Nuala will be away in the Autumn term, and Sarah will be away in the Spring term.

Nuala Brady & Sarah Cooney

Programme Directors, MSc Behavioural Neuroscience

SOME USEFUL LINKS

- Psychology is based in the College of Social Sciences & Law. Keep an eye out for interesting seminars and news (https://www.ucd.ie/socscilaw/) and note that we have two Student Advisers, Kieran Maloney (kieran.moloney@ucd.ie) and Holly Dignam (holly.dignam@ucd.ie) who are on hand to help. You can read about the confidential support service provided by Student Advisers at https://www.ucd.ie/studentadvisers/
- UCD Conway Institute is home to our colleagues in Neuroscience, see https://www.ucd.ie/conway/research/diseasefocusedresearch/neuroscience/ for information, including on seminars and events.
- The UCD Student Centre (https://www.ucd.ie/studentcentre/services/) links to information on clubs, societies, sports, dining, health services, the Student's Union (https://www.ucdsu.ie/)
- UCD Access and Lifelong Learning (https://www.ucd.ie/all/)
- Information for international students (https://www.ucdisc.com/)
- Thinking ahead to your next step, see UCD Careers (https://www.ucd.ie/careers/)
- UCD is Ireland's largest university with an expansive campus which boasts some lovely woodland walks: (https://www.ucd.ie/healthyucd/t4media/UCDWoodlandWalkMap_and_Guide.pdf)

PRACTICAL ISSUES ON ASSESSMENT

Our University is committed to sustainable development and works toward achieving a 'green campus' (https://ucdestates.ie/about/sustainability/). As a little step in helping this big endeavour, we run the MSc in Behavioural Neuroscience as a 'paperless programme' and have dispensed with the usual requirement that students submit hardcopies of assignments. All assessments should be submitted online via Brightspace. Please acquaint yourself with UCD's policy on late work submission, and note that forms can be completed electronically and emailed rather than printed and signed. Always use your ucdconnect address when communicating with module coordinators/academic staff (https://hub.ucd.ie/usis/!W_HU_MENU.P_PUBLISH?p_tag=GD-DOCLAND&ID=137)

More generally, **UCD's regulations and policy documents** are available at the Governance Document Library (https://www.ucd.ie/governance/documentlibrary/). This is a vast place, so we recommend you Search by Theme: Student if you need to consult the regulations or view any of the policies. Of particular note is **UCD's Student Plagiarism Policy** which outlines the standards of academic integrity to which all students in the university are expected to adhere (https://hub.ucd.ie/usis/W_HU_MENU.P_DOWNLOAD_FILE?p_filename=Student%20Plagiarism%20Policy.pdf&p_par), and which describes the procedures for investigating breaches of these standards and the associated penalties. Our library provides an excellent guide to avoiding plagiarism, with definitions, examples, and tips on rigorous citations, quotations, and so on (https://libguides.ucd.ie/academicintegrity). Our library also provides online tutorials and guides (including subject-specific guides) on resources, collections, searching, interlibrary loans, etc, and our dedicated librarian for Social Sciences is Vanessa Buckley (vanessa.r.buckley@ucd.ie).

HOW THE PROGRAMME IS STRUCTURED

The MSc Behavioural Neuroscience is a **90-credit Level 9 full-time programme** which runs over one year. At UCD, the academic year is divided into **three trimesters** (T1, T2 and T3, aka Autumn, Spring, and Summer). UCD publishes the dates associated with these trimesters and notes bank holidays, examinations and study periods. Please see https://www.ucd.ie/students/t4media/Academic_Calendars2024_25.pdf. Note that the 12-week Spring trimester is split into an initial seven-week and later five-week teaching block with a 2-week Fieldwork/Study period in between, during which there are no classes. This is a longstanding tradition at UCD. In recent years, many colleges/schools have introduced a one-week Study period in the Autumn trimester to reduce the formal teaching time to 11 weeks. At the graduate level, this is at the discretion of module coordinators.

The programme structure is sketched below in its most essential form but is described in full here: https://hub.ucd.ie/usis/!W_HU_MENU.P_PUBLISH?p_tag=PROG&MAJR=W461, and you can consult that link when you wish to get an introduction to a specific module, its aims and objectives, learning outcomes, and assessment strategies. When registered to a module, you will have access to Brightspace, where module coordinators/lecturers post syllabi, reading lists, lecture notes and/or recordings, resources, etc; for many modules, assessments are submitted via Brightspace.

Core Modules			
Trimester	Module ID	Module Name	Credits
Autumn	PSY40760	Adv Research Methods & Stats	5
Autumn	PSY40840	Behav Neuroscience Labs 1	7.5
Autumn	PSY40900	Recent Papers in Behav Neuroscience	5
Spring	PSY40850	Behav Neuroscience Labs 2	7.5
Summer	PSY40770	Knowledge Transfer	5
Year Long	PSY40780	Behav Neuroscience Research	30: 2.5-T1, 2.5- T2, 25-T3
Total Core Credits = 60			

	Option Modules		
Trimester	Module ID	Module Name	Credits
Autumn	PSY40910	Embodied & Social Cognitive Neuroscience	10
Autumn	PSY40820	Fundamentals of Neuropsych	10
Autumn	PSY40830	Advanced Cognitive Psych	10
Autumn	PSY40580	Foundations of Mindfulness	10
Autumn	PSY40640	Advanced Disabilities Studies	10
Spring	NEUR40110	Sensory Neuroscience	10
Spring	NEUR40120	Principles of Neuroscience	10
Spring	NEUR40130	Higher Cortical Function	10
Spring	PSY40790	Clinical Cases in Neuropsych	10
Spring	PSY40860	Topics in Psychological Sci	10
Spring	**PSY40930	Neurodevelopmental Disorders	10

**PSY40930 Neurodevelopmental disorders will not run in 2024-2025 as Dr Flavia Santos is on sabbatical leave.

- The 90 credits comprise 60 credits from core modules that are compulsory on the programme and 30 credits from optional modules.
- The 60 cores include 30 credits for **PSY40770 Behavioural Neuroscience Research Project** (aka 'Project') which is split as 2.5 credits in T1, 2.5 credits in T2, and 25 credits in T3.
- **PSY40840** and **PSY40840 (**Labs 1 and Labs 2 in Trimester 1 and 2 respectively) are 7.5 credit core modules
- In T1 (Autumn) you take Project (2.5) plus Labs 1 (7.5) plus Adv Research Methods & Stats (5) and Recent Papers in Behav Neuroscience (5) for 20 core credits**. You should take one option for a total of 30 credits**

- In T2 (Spring) you take Project (2.5) plus Labs 2 (7.5) for 10 core credits. **You should take 2 options for a total of 30 credits.**
- In T3 (Summer) you take Project (25) plus Knowledge Transfer (5) **for 30 core credits.**
- At UCD a programme structure cannot require a student to take more than 30 credits per trimester and **a student cannot take more than 40 credits**, and you should bear the latter constraint in mind when choosing options. You cannot exceed 40 credits due to workload considerations.
- Regarding advice to students who have completed their undergraduate degree in Psychology with us at UCD, please consider options other than the graduate variants of undergraduate modules you have taken.
- Professor Klaus Kessler joined the UCD School of Psychology in 2021 as Full Professor of Affective, Behavioural and Cognitive Neuroscience and is offering a module in T1, **PSY40910 Embodied & Social Cognitive Neuroscience**.
- For students with a specific interest in Neuropsychology we recommend **PSY40790 Clinical Cases in Neuropsychology** as an option.
- For students with an interest in Decision Making (thinking, planning, rationality, political psychology, nudges) we recommend you look closely at **PSY40860 Topics in Psychological Science** which is coordinated by Associate Professor Mick O'Connell
- It has been a pleasure to work with our colleagues in Neuroscience to establish this programme and we advise students with a pure psychology background to look to Neuroscience offerings in T2. You can read about these modules by following the programme structure link above:

    NEUR40110 Sensory Neuroscience (Professor John O' Connor)
    NEUR40120 Principles of Neuroscience (Associate Professor Oliver Blacque)
    NEUR40130 Higher Cortical Function (Professor John O'Connor)

***********AN IMPORTANT NOTE ON TIMETABLING ***********
We have timetabled, so there are no obvious clashes between modules. However, when students register online, they may not be able to register if there is a minor clash, e.g., Students are split into small groups for Labs 2, and it may be the case that attending your practical in one week may mean you have a clash with a Neuroscience lecture for that one week. We encourage you to ignore these minor clashes (lecture notes are available online, and we can try to move your practical group to accommodate you). If this happens during your registration please get in touch with Mary (mary.boyle@ucd.ie) and she will be able to register you to the module manually.

Please note also that at UCD, all teaching sessions end at 10 minutes to the hour, so you will have time to walk from one building to the next between classes.

ADVANCED RESEARCH METHODS AND STATISTICS PSY40760

Module Co-ordinator: Sarah Cooney
Lecturers: Dr Monika Pilch and Dr Sarah Cooney

This module is designed for postgraduate students completing the Masters in Behavioural Neuroscience and aims to support them in developing their quantitative research skills to an advanced level. The module will focus on acquiring the methodological and analytical skills necessary to complete a research project of publishable quality. The topics covered include quantitative design analysis techniques. Teaching methods will include classroom seminars and advanced methodology laboratories, and students will be expected to complete set tasks and reading in between sessions. This year, we are introducing workshops in R programming to give students hands-on experience in developing programming skills for data management, visualisation and analysis.

The module includes lectures (morning session) and hands-on lab activities (afternoon session). The lab activities focus on task-based learning in pairs or groups. Students are also encouraged to reflect on the nature of debates in research design and consider how they might apply to their previous experience and planned research activity.

Coffee breaks and lunch breaks are provided during the sessions.

Core and Recommended Texts

Jhangiani, R.S., Chiang, I.A., Cuttler, C., & Leighton, D.C. (2019). Research Methods in Psychology, 4th Edition. **Free to download** at https://kpu.pressbooks.pub/psychmethods4e/

Herzog, M., Francis, G. & Springer, C. (2019). Understanding statistics and experimental design: How not to lie with statistics. Springer. https://www.springer.com/gp/book/9783030034986 **Free / Open Access (50 pages**)

Lakens, D (2022). Improving Your Statistical Inferences. **Free online.** Retrieved from https://lakens.github.io/statistical_inferences/.

Poldrack., R (2019) Statistical Thinking for the 21st Century
https://statsthinking21.github.io/statsthinking21-core-site/ **Free online**

Thulin, M. (2021). Modern Statistics with R. Eos Chasma Press. ISBN 9789152701515. R
https://modernstatisticswithr.com/index.html **Free online**

RECENT PAPERS IN BEHAVIOURAL NEUROSCIENCE PSY40900

Module Coordinator: Dr Sarah Cooney

This module introduces students to recent scientific findings and trends in Behavioural Neuroscience via a series of research seminars delivered by academics and by critically analysing recent papers in leading scientific journals. The seminars will cover recent developments and research trends, and encourage students to think critically about the following:

1. What are the most pressing and pertinent research questions in areas such as neuropsychology, cognition and perception?
2. What methodologies and experimental techniques are currently employed to examine these questions?
3. What are the avenues for future research?
4. How are research outputs best conveyed through different dissemination mediums, including oral presentations and empirical research papers?

Module Schedule

Date	Structure	Speaker
11/09/24	**Research seminar**	Dr Alan O'Dowd
25/09/24	**Research seminar**	Professor Klaus Kessler
02/10/24	**Paper review**	Dr Sarah Cooney
09/10/24	**Research seminar**	Assoc. Prof Ciara Greene
23/10/24	**Research seminar**	Assoc Prof Keith Gaynor

BEHAVIOURAL NEUROSCIENCE LABS

In PSY40840 (Behavioural Neuroscience Labs 1) and PSY40850 (Behavioural Neuroscience Labs 2), students will complete brief rotations in four experimental laboratories in the School of Psychology and gain practical experience of collecting data using common Behavioural Neuroscience methods. Students will develop skills in experimental design, data collection and analysis, using a variety of experimental and statistical approaches. In Labs 1 the methodologies include eye-tracking, virtual reality and neuropsychological assessment, and Labs 2 will focus on electroencephalography (EEG) / event-related potentials (ERP) and will include a theoretical introduction to magnetoencephalography (MEG). Dates, times and room numbers are available in the timetable but as we have recently refurbished laboratory space, there may be last minute changes: all labs will be in the E1 area of the Arts Building and the module coordinators (Ciara Greene in T1 and Patricia Gough in T2 will advise you of exact locations if there are any changes to the timetable).

PSY40840 BEHAVIOURAL NEUROSCIENCE LABS 1

Laboratory 1 Eye Tracking Lab

Laboratory 2 Neuropsychological Assessment

Laboratory 3 Virtual Reality and Social Cognition Lab

PSY40850 BEHAVIOURAL NEUROSCIENCE LABS 2

Laboratory 4 Event-Related Potential (ERP) Lab and Transcranial Magnetic Stimulation (TMS)

Details on the individual labs follow below

Lab Instructor: Ciara Greene
Lab Demonstrators: TBA

Introduction

Eye tracking is a non-invasive method that uses near-infrared sensors to establish where another person is looking (see Figure 1). Eye tracking has many real-world applications: it can be used in market research to establish which parts of a display or advertisement consumers are interested in, or it can be used as a communication aid by people with physical disabilities. There are many examples of eye-tracking methods in psychological research; for example, an attention researcher may wish to track the focus of a participant's attention or monitor how quickly they can detect a given stimulus [1, 2] or a sports psychologist may wish to compare the gaze behaviour of novice and expert athletes to understand how performance changes with experience [3]. Some eye tracking studies in psychology include monitoring how quickly participants detect the presence of a stimulus onscreen and how long they choose to spend looking at particular stimuli. Other approaches include the examination of saccades and antisaccades, where very brief eye movements towards and away from a salient stimulus are measured, and pupillometry, in which the researcher examines the dilation and contraction of the pupil during cognitive tasks.
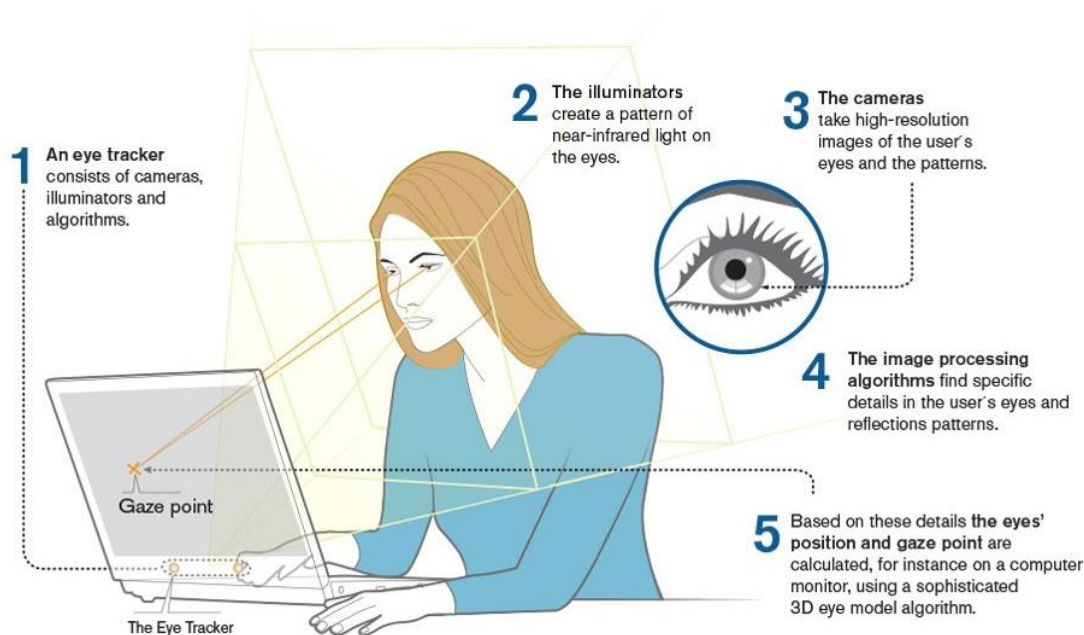

Figure 1. Illustration of the eye tracking process (© Tobiipro.com)

In general, there are two kinds of eye trackers: fixed or screen-mounted trackers are attached to a computer monitor and are used to assess eye movements in response to stimuli that appear on the screen (Figure 2A). Wearable eye trackers (Figure 2B) usually look like glasses and are worn near the participant's eyes to track gaze behaviour in the real world – for example, while playing golf or walking around a supermarket. Fixed eye trackers are usually more accurate and record data with higher precision. The School of Psychology has both kinds of eye trackers. Our fixed eye tracker – the Tobii X3 120 – captures 120 eye gaze data points per second.

Figure 2. Images of the fixed (left) and wearable (right) eye trackers used in the School of Psychology. The eye tracker in panel A is the Tobii X3 120. In the lower panel, the X3 120 is attached to the bottom of the computer monitor as a participant performs a task. Panel B depicts the Tobii Glasses 2; in the lower panel, a participant wears the glasses while practicing golf.

Gaze behaviour and emotional faces

Previous research indicates that gaze patterns tend to vary depending on the emotion expressed on a face. Positive emotions may be expressed more on the lower half of the face, while negative emotions are primarily expressed in the upper half of the face [4]. As a result, people typically spend more time looking at the mouth when processing happy faces compared to fearful faces, and more time looking at the eyes when processing fearful faces compared with happy faces [5].

In this lab, we will use a fixed eye tracker to record gaze behaviour during passive viewing of emotional faces. This lab will use video stimuli described in a recent paper [6]. These videos show a woman expressing happiness, fear and no particular emotion (neutral condition; see Figure 3). We will test the hypotheses 1) that people spend more time looking at the eyes in the fearful condition relative to the happy condition, and 2) that people spend more time looking at the mouth in the happy condition relative to the fearful condition. We will also look at other eye tracking metrics, including the location of the participant's first fixation and time to first fixation on a given region.

Lab Details

- Students will act as both experimenter and participant in an eye tracking task
- You will learn how to set up the experiment and calibrate the eye tracker for a new participant
- You will learn how to define dynamic areas of interest (AOIs) that track moving features in the videos, and extract eye movement data from each AOI.
- You will conduct a group analysis of data recorded from all students in the class (N = 10), and test the hypotheses listed above.
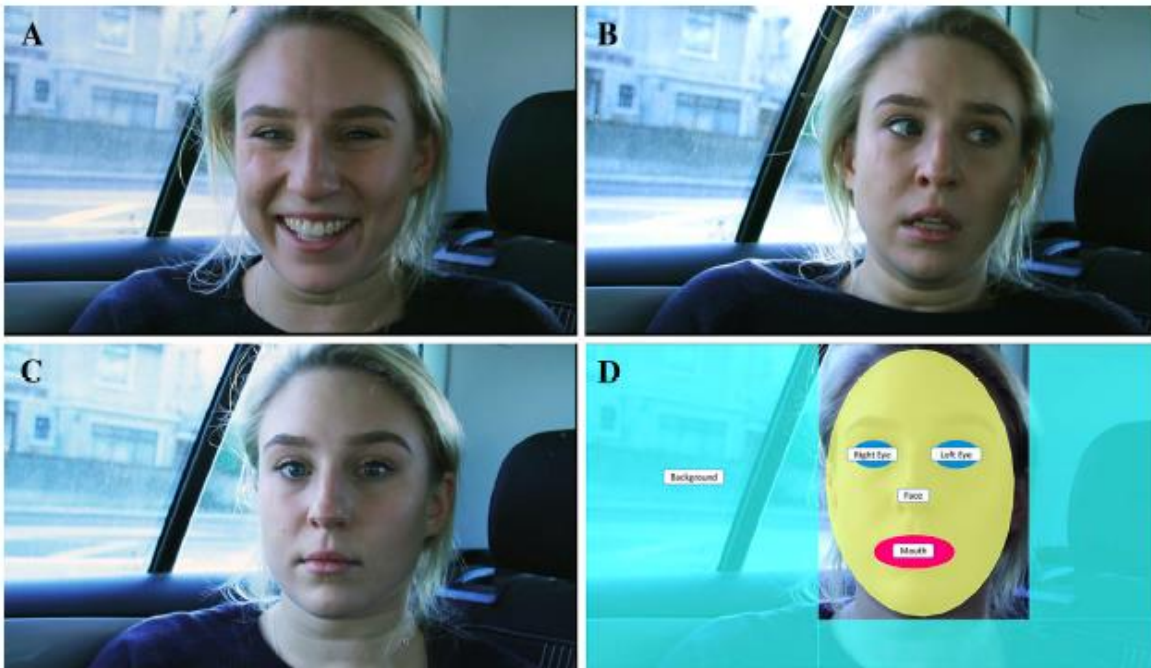
Figure 3. Screenshots from the (A) happy, (B) fearful and (C) neutral video clips, taken from Greene, Suess and Kelly (2020) [6]. Panel D indicates AOIs over the eyes, mouth, whole face and background.

Research Skills

- Running an eye tracking experiment using Tobii Pro Lab software
- Conducting eye tracking data analysis using Tobii Studio software, including visualisation of eye tracking metrics (heat maps, fixation counts etc.)
- Writing a lab report based on eye tracking data

References

1.   Barnhart, A.S. and Goldinger, S.D. (2014). Blinded by magic: Eye-movements reveal the misdirection of attention. *Frontiers in Psychology*, 5: 1461.

2.   Chen, N.T.M., Clarke, P.J.F., Watson, T.L., MacLeod, C., and Guastella, A.J. (2015). Attentional bias modification facilitates attentional control mechanisms: Evidence from eye tracking. *Biological Psychology*, 104: 139-146. https://doi.org/10.1016/j.biopsycho.2014.12.002

3.   Campbell, M.J. and Moran, A.P. (2014). There is more to green reading than meets the eye! Exploring the gaze behaviours of expert golfers on a virtual golf putting task. *Cognitive processing*, 15(3): 363-372.

4.   Dimberg, U. and Petterson, M. (2000). Facial reactions to happy and angry facial expressions: Evidence for right hemisphere dominance. *Psychophysiology*, 37(5): 693-696.

5.   Wagner, J.B., Hirsch, S.B., Vogel-Farley, V.K., Redcay, E., and Nelson, C.A. (2013). Eye-tracking, autonomic, and electrophysiological correlates of emotional face processing in adolescents with autism spectrum disorder. *Journal of autism and developmental disorders*, 43(1): 188-199.

6.   Greene, C.M., Suess, E., and Kelly, Y. (2020). Autistic traits do not affect emotional face processing in a general population sample. *Journal of autism and developmental disorders*: 1-12.

Useful background resources:

Tobii Studio User's Manual https://www.tobiipro.com/siteassets/tobii-pro/user-manuals/tobii-pro-studio-user-manual.pdf

Holmqvist, K., Nyström, M., Andersson, R., Dewhurst, R., Jarodzka, H., & Van de Weijer, J. (2011). *Eye tracking: A comprehensive guide to methods and measures*. OUP Oxford [Most of this book is available in e-book format through Google books]

Andrychowicz-Trojanowska, A. (2018). Basic terminology of eye-tracking research. *Applied Linguistics Papers,* (25/2), 123-132

NEUROPSYCHOLOGY TESTING LAB

Lab Instructor: Jessica Bramham
Lab Demonstrator: TBC

Please note that Professor Bramham may change the details of the lab this year.

Introduction

Dementia is a term used to describe a series of symptoms affecting cognitive (e.g., memory, attention), behavioural (e.g. depression, anxiety, agitation) and social abilities, which impair a person's daily functioning. Neuropsychological assessment is a performance based method to observe and measure cognitive function and mental status and one of its core purposes is to help detect the presence of cognitive impairment and/or behavioural changes and the possible relationship with an underlying brain pathology and dysfunction. A neuropsychological evaluation is often essential in the diagnosis of neurological illnesses and different types of dementia such as dementia due to Alzheimer's disease.

Most cognitive tests used in clinical neuropsychological evaluations yield a single overall achievement score in order to determine the presence of cognitive impairment. However, the use of a single-score method for quantifying performance masks the multifactorial nature of the cognitive functions that are required for successful performance on most tests. Thus, an impaired score on any given cognitive test might be attributable to a range of underling cognitive deficits, the nature of which is hidden within a single score and fails to provide information regarding the primary neurocognitive mechanism responsible for defective performance. Exclusively relying on this quantitative method of neuropsychological evaluation may lead to erroneous clinical interpretations. For example, two patients with very different underlying brain pathology/dementia type may achieve the same total score by way of relying on different spared cognitive processes or because of different cognitive deficits.

In order to circumvent these shortcomings, neuropsychological interpretation of test performance can be complemented with a process-based approach methodology, which emphasizes the importance of the finer analysis of the cognitive strategies favoured by a patient in the course of solving the test –whether it is passed or failed –as well as the qualitative analysis of the errors made. A process-based approach can help draw a more reliable neuropsychological profile of patients as well as identifying their cognitive strengths and the difficulties they face when dealing with challenges in the real world, helping family members better understand their loved ones behaviour and inform a rehabilitation plan and make decisions regarding power of attorney etc.

Common misconceptions surrounding a diagnosis of dementia, e.g. dementia is a normal part of ageing, or that there is no value in pursing treatment, may lead to delayed diagnosis, limiting the potential for early intervention (Glynn, et al., 2017). Research has identified several modifiable lifestyle risk factors which, if controlled, may help delay the onset of symptoms of dementia (Livingston et al., 2017; 2020).

In this lab, we will first build upon our understanding of the different types of dementia, the clinical implications of current research findings and the value of the process-based approach to neuropsychological evaluation in order to make a differential diagnosis and rehabilitation plan, before moving on to discuss a case study (see below).

We will then practice the administration and neuropsychological interpretation of some cognitive tests.

There are a number of factors a clinician must take into consideration when choosing an appropriate neuropsychological assessment during the diagnosis process. For example, due to the nature of the condition, short cognitive screening measures, such as the Mini Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA), may be recommended rather than longer assessment batteries, always taking into consideration appropriate demographically corrected norms and culturally appropriate measures.

In the lab we will discuss the application of the process-based approach with a range of commonly used cognitive tests in clinical practice. Special attention will be given to the MoCA and its process-based approach version (MoCA-PA) and the EirPrVLT-12, a list learning tests that was culturally adapted for an Irish population (Corboy et al., 2020), which is a version of the California Verbal Learning Test (CVLT) and provides a granular insight into distinct learning and memory processes.

Lab details

- Background of the neuropathology of dementia and the 'current state of play' in dementia research - treatment, diagnosis & misconceptions
- Introduction to a range of neuropsychological tests used in dementia diagnosis
- Introduction to the process-based approach to neuropsychological evaluation
- Introduction of the MoCA-PA and EirPRVLT
- Case study of a person with impaired cognitive function (see below)
- Students will act as both the clinician and patient partaking in a neuropsychological assessment

Case study

A 56-year-old, right-handed, married man was referred to the memory clinic with a history of progressive cognitive impairment, with predominant word finding difficulties and visuospatial alterations. He had a past medical history significant for ischemic heart disease with coronary artery stenting 2 years previously. Medications included aspirin and atorvastatin. He consumed alcohol in moderation and was a non-smoker. He had recently stopped working as a taxi driver because of his cognitive impairment. Subjectively he described difficulty judging distances noting that he often hit door handles when reaching for them. Previously an avid reader of crime novels he described difficulties keeping his attention on the line "jumping from line to line" and he had trouble remembering what he had read. He reported difficulty with mental calculations but described his day to day memory as "not too bad." His wife gave a 2-year history of cognitive difficulties of gradual onset and progressive deterioration. Initially noticing difficulties retrieving words noting that he often "comes out with the wrong word." She felt that over time his driving had become erratic, reporting that he "didn't keep to his own lane." She described him as "clumsier" noting that "if there was a glass he'd knock it over." She also noted a functional decline with difficulties using kitchen appliances and limited use of his mobile phone. She felt that his memory was poor; he did not "retain much" and that he frequently forgot to carry out intended activities. Formal neuropsychological evaluation, MRI brain scan and Cerebrospinal Fluid biomarkers were conducted.

Prescribed reading (& watching) in advance of lab:

Blanco-Campal. A., Diaz-Orueta, U., Navarro-Prados., Burke, T., Libon, D., & Lamar, M. Features and psychometric properties of the Montreal Cognitive Assessment: Rapid review and proposal of a process based approach version (MoCA-PA). Applied Neuropsychology: doi.org/10.1080/23279095.2019.1681996

Corboy, H., Blanco-Campal, A., Bates, R., Bramham, J., Libon, D. J. & Greene, C. (2020). The development, validation and normative data study of the English in Ireland adaption of the Philadelphia repeatable Verbal learning Test (EirPrVLT-12) for use in an older adult population. Clinical Neuropsychology, 34 (sup1): 83-109

Diaz-Orueta, U., Blanco-Campal, A., Lamar, M., Lion, D.J., & Burke, T. Marrying Past and Present Neuropsychology: Is the future of the process-based approach technology based? Frontiers in Psychology, Vol 11:Article 361. doi:10.3389/fpsyg.2020.00361

Diaz-Orueta, U., Blanco-Campal, A., & Burke. T. Rapid review of cognitive screening instruments in MCI: Proposal for a process based approach modification of overlapping cognitive tasks between instruments to enhance clinical detection. International Psychogeriatrics (2018), 30:5, 663–672

Fitzpatrick, D., Blanco-Campal., & Kyne, L. "A case of overlapping posterior cortical atrophy and logopenic syndrome". Neurologist (2019) Mar; 24(2):62-65

Livingston, G. Sommerlad, A., Orgeta, V., Costafreda, S. G., Huntley, J., Ames, D., ...Mukadam, N. (2017). Dementia prevention, intervention, and care. *The Lancet Commissions, 390,* 2673-2734. https://dx.doi.org/10.1016/S0140-6736(1)31363-6

Livingston, G., Huntley, J., Sommerlad, A., Ames, D, Ballard, C., Banerjee, S., …, Mukadam, N. (2020). Dementia prevention, intervention, and care: 2020 report of the Lancet Commisson. *The Lancet Commissons, 396,* 413-416.

Milberg, W.P., Hebben, N., & Kaplan, E. (2009). The Boston Process Approach to Neuropsychological Assessment. In Grant, I., & Adams, K.M. Neuropsychological Assessment of Neuropsychiatric Disorders.

Youtube – 'Barbara's story' - Perspective of living with dementia (NHS short video): https://youtu.be/VFXirEnjfTI

References

Glynn, R. W., Shelley, E., & Lawlor, B. (2017). Public knowledge and understanding of dementia: evidence from a national survey in Ireland. Age and Ageing, 46, 865-869.

Harvey, P. (2012). Clinical applications of neuropsychological assessment. Dialogues – Clinical Neuroscience 14, 91- 99.

Pink, J., O'Brien, J., Robinson, L., Longson, D. (2018). Dementia: assessment, management and support: summary of updated NICE guidance. *BMJ, 361,* 1-6.

Lab Instructor: Dr Brendan Rooney
Lab Demonstrator: TBC

Introduction
Social cognition refers to the neurological and cognitive processes underlying our engagement with social information (e.g. discerning mental states from facial expressions, conveying subtle intentions in language, predicting behaviours of individuals in different contexts, etc.). For the most part, humans are very skilled at processing social information. Deficits in social cognition have been identified in people with various types of dementia, Autism (Baron-Cohen et al., 1997), schizophrenia (Brüne, 2005; Harrington et al., 2005) and borderline personality disorder (Bateman & Fonagy, 2010). To identify and treat these conditions, health professionals rely heavily on standardised neuropsychological assessments. For example, the Reading the Mind in the Eyes test (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997) assesses recognition of mental states from facial features using cropped photos of faces to show only the eyes (see Figure 1 and additional details are further below).
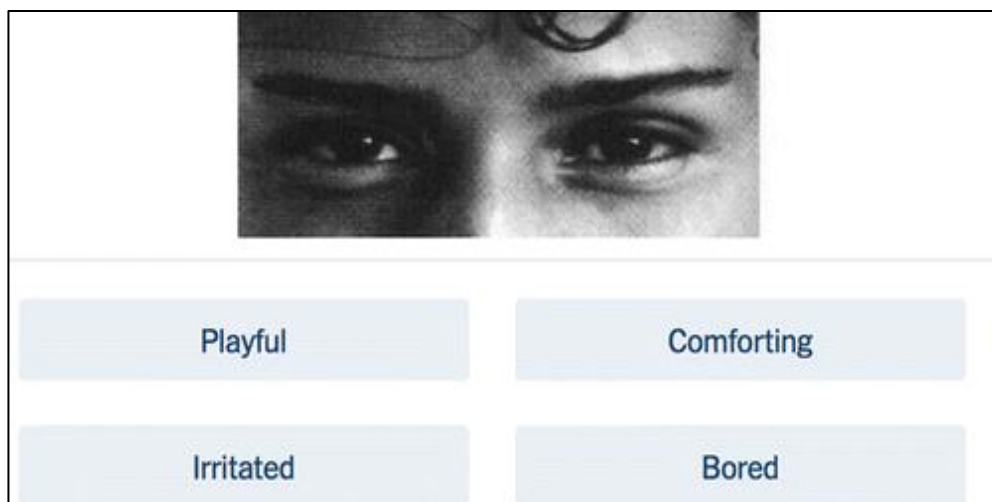

Figure 1. Example trial from the RMET test. Participants are required to select one of four possible mental states that the person in the picture is expressing.

Indeed such cognitive and neuropsychological assessment tests are fundamental to understanding, diagnosis and treatment of neuroscientific processes and psychological problems. Tests like this have been used for decades with large populations, so any individual's score can be compared to a norm; **Traditional standardised tests are useful to researchers and practitioners in their relative precision, control and objectivity**.

Despite the benefits to using traditional standardised assessments, previous researchers have argued that traditional tests are limited because they do not tap into real-life functions and behaviours (Goldstein, 1998; T. Parsons, 2016). Researchers argue that existing neuropsychological procedures using text descriptions or simple static images, are built around relatively abstract, context-free scenarios that assess what are called "cold" cognitive processes. They do not assess real-life, adaptive cognitive function on tasks that are emotionally laden. For this reason, researchers have called for more naturalistic methods of assessing social cognition (e.g. Zaki & Ochsner, 2009). Researchers and

practitioners argue for the development of "function-led" neuropsychological assessments that are based on directly observable everyday behaviours (e.g. Parsons et al., 2015). Rather than assessing how much someone can differentiate between a positive or negative emotional expression from a picture, a clinician might prefer to ask, for example, whether the patient can interact as part of a team with colleagues in a new job. In behavioural sciences, this "realism" is referred to as *ecological validity*.

While meaningful, using real-world activities in assessment can be problematic. Aside from the fact that, observing a patient in a new job is time-consuming, it does not provide a consistent measure of their ability. On any particular day the work demands might be higher than normal, or a team member might be replaced by a different person who is more or less friendly, making it difficult to benchmark performance. Hence **there is often a trade-off between the precision or control of a measure and its realism or ecological validity.** It should also be noted that even when naturalistic tasks are designed in an ad-hoc fashion for specific research purposes, researchers often need to compare findings with more traditional standardised tests to comment on the validity of those findings.

One possible way to address this issue is by using media entertainment technology (movies, video games and virtual reality). Media entertainment scenarios and stories are highly designed experiences that can be adapted and carefully controlled to move emotion and capture attention with precision. Yet they also offer high levels of "natural" complexity, sophisticated social interactions and emotional realism. Virtual Reality (VR) is one such technology that may offer an exciting solution to the problems above by allowing for the presentation and control of dynamic simulated real-world situations that can be used for assessment of neurocognitive and affective processing. Using VR, researchers and clinicians can assess people on more realistic tasks, while maintain control over how they are presented.

Lab Details

- You will learn how to set up the VR system and calibrate the scenario to suit the room.
- You will demo some VR scenarios.
- You will act as both experimenter and participant in a VR-based social cognition assessment – although your data will not be used for the analysis.
- You will complete and score a number of "traditional" social cognition assessments.
- You will select variables from a larger pool of previously collected data to answer a research question that you develop yourself.
- You will draft a skeleton rationale/hypothesis, and an analysis plan with associated documentation (with analysis code/syntax).

Research Skills

- Setting up and calibrating a VR system.
- Running a VR-based assessment of participants' social cognition.
- Drafting a rationale and hypotheses that can be tested.
- Scoring various tests and measures of social cognition.
- Preparing documentation including an analysis plan and summary findings with analysis code/syntax.

Additional details on social cognition assessments

Virtual Environment Café (VEC) and Human Emotion Attribution
This assessment includes (i) a VR environment as the stimulus and (ii) a response measure, described separately below.

(i) Stimulus: Virtual Environment Café (VEC; See Rooney et al., 2018).
The VEC is a virtual environment depicting a café scene where the participant sits opposite another character at a table (see Figure 2). The environment consists of generic visuals and sounds associated with a small coffee shop (i.e., barista, customers, and ambient chatter). The virtual human seated across from the participant initially makes eye contact after a period of approximately 20-30 seconds with "a probe gaze". The probe gaze would last for approximately 1 second, followed by a longer gaze. This is always followed by a 30 second neutral period where no eye contact would take place. Participants spend approximately 2 minutes viewing the scene.
Note: within this scenario it is possible to change the apparent gender of the character and the avatar (user-body). It is also possible to manipulate whether or not the character makes eye contact with the participant or if they make no eye-contact (averting their gaze).

Figure 2. Images of the Virtual Environment Café from the user perspective. User sits opposite either female or male character.

(ii) Measure: Human Emotion Attribution (Demoulin et al., 2004).
A key feature of social cognition is the extent to which a person recognizes and understands the mental states of others. This has been referred to as "Theory of Mind" but also using terms such as mental state attribution (e.g. Bálint et al., 2020), mentalizing (e.g. Frith & Frith, 2003), mental state inference or mind-mindedness (e.g. Meins et al., 2014).
This test assesses whether people "humanise" or dehumanise the target character in the VR café by measuring the extent to which people attribute basic or more complex emotions to the character. Various emotions are considered to be "uniquely human" while others are considered to be shared

with other non-human animals (Demoulin et al., 2004). This test requires participants to indicate on a five-point scale, how frequently they believed the target character experiences a list of various emotions. These are then classified into primary emotions (e.g. pleasure, disgust) or secondary emotions (e.g. compassion, contempt).

Reading the Mind in the Eyes Test (RMET; Baron-Cohen et al., 1997).
This test is one of the most widely used tests of social cognition. The RMET assesses recognition of mental states from facial features. Specifically, it uses 36 photographs of pairs of human eyes each surrounded with 4 mental state terms (See Figure 1). The participant must choose the word that best describes what the individual in the picture is thinking or feeling based on the cropped image depicting only the region around the eyes.

Animations Task (Abell et al., 2000; Castelli et al., 2000; White et al., 2011).
This is a visual test assesses the extent to which people make mental attribution to inanimate objects. The task comprises 12 short (35–45s) videoclips (plus a few practice clips) that feature pairs of animated geometric stimuli (i.e., red and blue triangle shapes). There are four trials within each of three conditions: random (e.g., drifting movement of the triangles), simple goal-directed movement (e.g., the triangles bounce off each other as if fighting), complex interaction, or ToM type (e.g., one triangle appears to push and coax another repeatedly out of a central box, each triangle reacting in a varied way to the other's movements). When adapted for use in fMRI studies, participants are required to categorize each video-clip as containing (a) no interaction/random (b) simple interaction/goal directed movement, or (c)mental-state-related/complex social interaction.
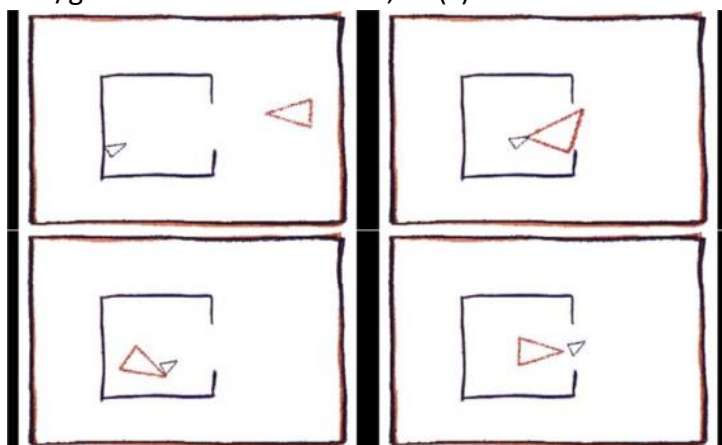

Figure 3. Images from the Animations Task showing two triangles moving around a space to give the illusion of social interaction.

Autism-Spectrum Quotient-Short (Hoekstra et al., 2011).
Autism, or autism spectrum disorder (ASD), refers to a broad range of conditions characterized by lower scores in measures of social cognition (in addition to other related skills and behaviours). Autism spectrum conditions are commonly conceptualized as dimensional, representing the extreme end of one or more continuously distributed traits in the general population (Constantino & Todd, 2003). The Autism Spectrum Quotient-Short (ASQ-S; Hoekstra et al., 2011) assesses participants' level of ASD traits. Participants self-rate their agreement with 28 items relating to social skills, attention switching, imagination and attention to detail. Higher scores indicate greater ASD traits. The measure has good psychometric properties in both ASD and non-ASD samples, with reliability scores ranging from 0.77 to 0.86 (Hoekstra et al., 2011).

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Meins, E., Fernyhough, C., & Harris-Waller, J. (2014). Is mind-mindedness trait-like or a quality of close relationships? Evidence from descriptions of significant others, famous people, and works of art. *Cognition*, *130*(3), 417–427. https://doi.org/10.1016/j.cognition.2013.11.009

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Rooney, B., Burke, C., Balint, K., O'leary, T., Parsons, T., Lee, C. T., & Mantei, C. (2018). Virtual reality, presence and social cognition: The effect of eye-gaze and narrativity on character engagement. *Proceedings of the 2017 23rd International Conference on Virtual Systems and Multimedia, VSMM 2017*. https://doi.org/10.1109/VSMM.2017.8346272

White, S. J., Coniston, D., Rogers, R., & Frith, U. (2011). Developing the Frith-Happé animations: A quick and objective test of Theory of Mind for adults with autism. *Autism Research*, *4*(2). https://doi.org/10.1002/aur.174

Zaki, J., & Ochsner, K. (2009). The need for a cognitive neuroscience of naturalistic social cognition. *Annals of the New York Academy of Sciences*, *1167*, 16–30. https://doi.org/10.1111/j.1749-6632.2009.04601.x

Lab Instructor: TBC
Lab Demonstrator: TBC

Introduction

EEG is a non-invasive technique for measuring activity in the brain. The technique measures voltage changes across time through the application of conductive electrodes to the scalp. The voltage at each active electrode is measured relative to a reference electrode. In order to simplify the task of placing electrodes, and to ensure the correct spacing of electrodes, participants wear an EEG cap to which electrodes are attached (See Figure 1. Some systems use a net rather than a cap). A good connection (between the scalp and the electrodes) is maintained through the use of conductive electrode gel. It is possible to record EEG with few electrodes, however, some of the standard number of electrodes used are 32, 64, 128, 256 electrodes. Once the cap has been placed correctly and gel has been applied to aid the connection between the scalp and electrodes, a check is made for the quality of data at each electrode. Any electrode showing high levels of noise will be worked on (e.g. application of more gel). Visualisation of the signal being picked up at each electrode continues through the experimental session. EEG detects voltage changes in the order of micro-volts. As these changes are extremely small, the EEG system uses an amplifier to amplify the signal. Depending on the system used, amplification can occur at the electrode or at a separate amplifier. The small voltage changes mean that the control of any noise in the testing environment is particularly important. EEG has high temporal specificity as it picks up voltage changes in milliseconds across time. As this is happening for every electrode across time, EEG generates a lot of data.

EEG data can be recorded when people are in a different state or when they are performing a task. It is possible to use EEG in two main ways: to analyse the EEG data itself, looking at, for example, the different frequency bands present under different conditions e.g. alpha activity (low frequency) is associated with a relaxed state. The other main way is to use the EEG data to create **ERP** data. As the name suggests ERPs are potentials related to particular events in an experimental paradigm. Some classical ERPs have been identified in the literature and have been repeatedly demonstrated e.g. the P100 and N100 (1) are associated with activation of the visual cortex on presentation of a visual stimulus, the N170 (2) is associated with the presentation of face stimuli, and the **N400** (which we will look at in this lab (3)) is associated with meaning and context.
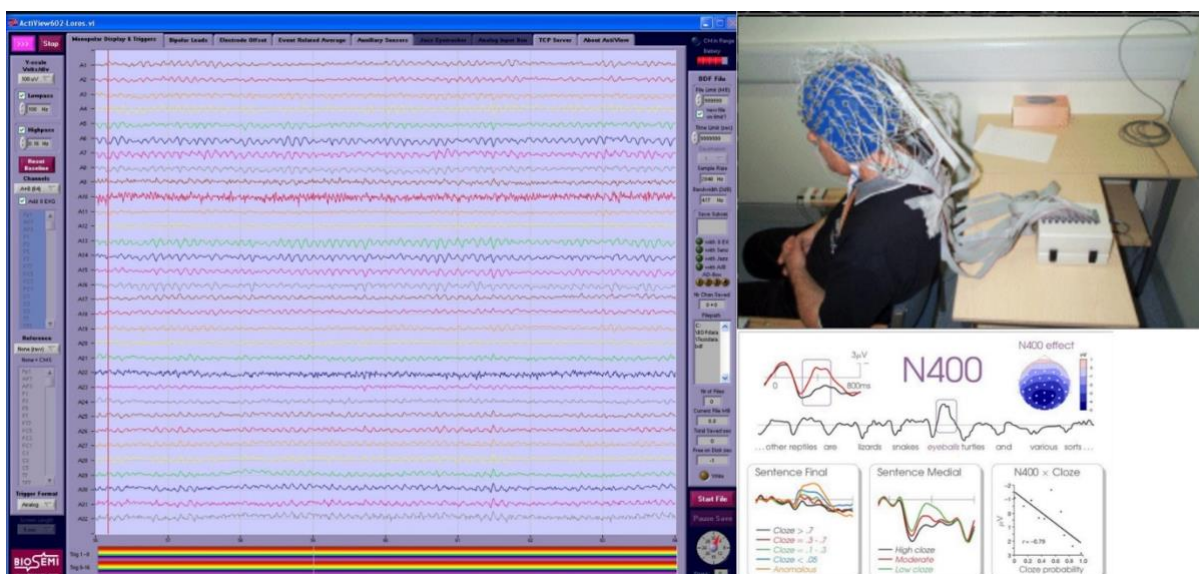
Figure 1: (Clockwise) Screen showing visualisation of EEG data during acquisition using ActiView software; A participant following set up of the EEG cap for recording (Biosemi EEG system); A depiction of the classic N400 ERP component.

ERP data is retrieved by epoching the EEG data (see Figure 2). Let us use a simple example to explain how this is done. Imagine we have a very simple experiment where we present participants with houses and faces and we want to see how the ERP response differs in each condition. For this example, let us suppose we use 32 electrodes. The task/stimuli are presented on a task/stimulus computer and the software handling this sends a code to the EEG recording software every time a stimulus (house or face) is presented. Our continuous EEG signal, for each participant, has labels on it, showing in time when the stimuli appeared (a different code is used for different conditions). Once the EEG recording is complete the continuous signal for every electrode (32 in this example) can be sliced into epochs surrounding each event. This involves slicing from e.g. 100ms before the event (baseline) to e.g. 500ms after the event. Following some standard checks and corrections (to be discussed in our lab) all slices of data associated with house stimuli at each electrode can be averaged together to form an ERP. The same is then done for the face stimuli. The ERP is thought to represent true changes related to the given event because by averaging together lots of face events we get rid of any noise in the signal that occurs by chance on any trial. The same is then done for all our participants data and we can then compare our ERP data for the two conditions across participants. We can also visualise our group ERP data by looking at a "grand average" which is the average ERP at each electrode per condition across participants. For our hypothetical experiment here, we might expect that our analysis would show a significant difference in the ERP signal so that for the face condition there would be an increased negative-going part of the wave at around 170ms (N170 referred to above). N and P refer to the polarity of the component (i.e. positive or negative), and the number following refers to the latency of the response in ms i.e. how long after the event the deflection occurs.
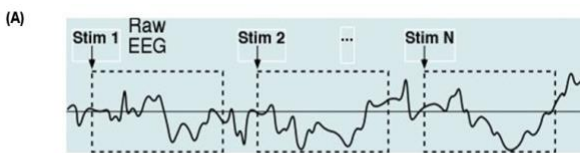
A - an example of raw EEG data from a single electrode channel.
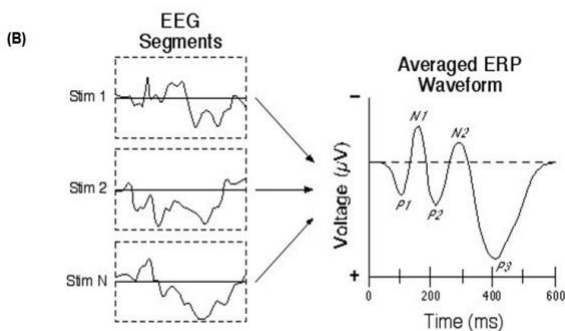
B - an example of epoching raw EEG data and averaging to create an ERP.

Figure 2: An illustration of the method for creation of an ERP. The continuous EEG data (A) is epoched and segments from the same condition are averaged together (B).

In our lab we will be looking at a semantic (meaning) task and the classic N400 component. The task will involve participants making a judgement on every trial about whether a pair of words are related in meaning or not. ERP analyses will compare responses to the condition where there is a semantic (meaning) relationship versus the condition where there is none.

Lab Details

- Students will act as both experimenter and participant in an EEG/ERP experiment with a parallel behavioural task.
- You will learn how to set up an EEG cap and record data.
- You will run a behavioural task using Presentation software in parallel with EEG recording and you will learn how the presentation of task stimuli is linked with your EEG data.
- You will take part in an analysis session to analyse data based on 40 participants (4)
- You will analyse performance on the behavioural task.
- You will learn how to clean and epoch individual data in order to create individual ERPs for each condition.
- You will perform a group analysis of the ERP data and be able to present that visually.

Research Skills

- Running a behavioural task in Presentation (https://www.neurobs.com/)
- EEG data collection using a Biosemi system and ActiView software (https://www.biosemi.com/)
- Analysis of EEG data using EEGLAB/ERPLAB Toolbox (ERPLAB Toolbox — ERP Info) (5)
- Creating figures to present your ERP results as part of your lab report.

References

(1) Luck, S.J. (1995) Multiple mechanisms of visual-spatial attention: recent evidence from human electrophysiology. *Behavioural Brain Research*, 71, 113-123

(2) Amihai, I., Deouell, L.Y., and Bentin, S. (2011). Neural adaptation is related to face repetition irrespective of identity: a reappraisal of the N170 effect. *Experimental Brain Research*, 209, 193-204

(3) Kutas, M., and Federmeier, K.D. (2011) Thirty Years and Counting: Finding Meaning in the N400 Component of the Event-Related Brain Potential (ERP). *Annual Review of Psychology,* 62, 621-647

(4) Kappenman, E. S., Farrens, J. L., Zhang, W., Stewart, A. X., & Luck, S. J. (2020). ERP CORE: An open resource for human event-related potential research. NeuroImage. https://doi.org/10.1016/j.neuroimage.2020.117465

(5) Lopez-Calderon, J., & Luck, S. J. (2014). ERPLAB: An open-source toolbox for the analysis of event-related potentials. Frontiers in human neuroscience, 8, 213. [Click here for free access]

Useful background resources:

Luck, S.J. (2014). An Introduction to the Event-Related Potential Technique (2nd Edition). MIT Press. (ProQuest Ebook Central - Detail page)

Luck, S. J., & Kappenman, E.S. (Eds.). (2012). The Oxford Handbook of Event-Related Potential Components. New York: Oxford University Press.

For lots of free resources including explanatory videos see ERP Info from Steve Luck and Emily Kappenman at UC Davis.

Transcranial Magnetic Stimulation (TMS)

Following the ERP lab described above, you will take part in a session on Transcranial Magnetic Stimulation (TMS). This will include a theoretical introduction as well as a demonstration of the TMS and neuronavigation equipment in the School. Following the TMS session, it is expected that you should have an appreciation of the theory behind TMS and how it compares to EEG and other Cognitive Neuroscience techniques, that you should understand the strengths and weaknesses of TMS, and that you should understand the basic elements of a TMS set up and be able to assist in a practical session. In order to measure this understanding, you will be required to submit answers to a set of questions provided to you at the TMS session.

Useful background resources

Hartwigsen, G., & Silvanto, J. (2022). Noninvasive brain stimulation: Multiple effects on cognition. *The Neuroscientist*, 1073858221113806.

Rossi S, Hallett M, Rossini PM, Pascual-Leone A and The Safety of TMS Consensus Group. (2009) Safety, ethical considerations, and application guidelines for the use of transcranial magnetic stimulation in clinical practice and research. Clinical Neurophysiology 120, 2008–2039

Siebner, H. R., Funke, K., Aberra, A. S., Antal, A., Bestmann, S., Chen, R., ... & Ugawa, Y. (2022). Transcranial magnetic stimulation of the brain: What is stimulated?–a consensus and critical position paper. *Clinical Neurophysiology*, *140*, 59-97.

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PSY40780 BEHAVIOURAL NEUROSCIENCE RESEARCH

Module Coordinator: Nuala Brady/Sarah Cooney

Short Description: Each student will work with a member of academic staff in the School of Psychology to complete a research project that is part of ongoing research in the school. The purpose is to enable students gain hands-on experience in conducting research under close supervision where they will have the opportunity to engage in aspects of research such as (a) reviewing the research literature, (b) considering ethical issues associated with the research with reference to ethical guidelines, (c) collecting data using specialised research equipment or standardised assessments, (d) accessing pre-existing data, (e) managing, visualising and analysing data using a statistical package and (f) writing a research article in the recommended publication style of an academic journal chosen in consultation with the supervisor.

The Projects document describes the projects offered in 2024-2025. It includes a concise description of each project and suggested background readings. Most projects are from staff members in the Affective, Behavioural, and Cognitive Neuroscience (ABC) research group, with some from staff in other research groups. Several projects are collaborative, offering students an opportunity to work with more than one member of staff. Details of project submission deadlines are given on Brightspace.

Assessment includes a literature review in T2, and the submission of your final research thesis is written up as a journal article submission in T3.

MSc Behavioural Neuroscience Research Projects 2024/2025

[Academic Staff - UCD School of Psychology](#)

	Projects with funding	
Name	**Project/Research area**	**Garda vetting required?**
Dr Katie Gilligan Lee	**Project 1:** Cognitive interference in the Spatial domain: Designing a dual-paradigm protocol to investigate the role of spatial reasoning for mathematics.	Yes
Dr Judith Bek, Assoc Prof Nuala Brady, Dr Sarah Cooney	Dance and music for Parkinson's disease	No
Dr Judith Bek, Assoc Prof Nuala Brady, Dr Sarah Cooney	The influence of experience in sports on motor imagery	No
Professor Nuala Brady	Brain lateralization in reading words and faces in dyslexia	No
Dr Meadhbh Brosnan	Neural signatures of response speed in younger and older adults	No
Dr Sarah Cooney	The bodily self: Interoception, Emotions and Body image	No
Assoc Prof Michelle Downes	An exploration of executive functions in screen and non-screen play in 12-18 month olds	
Associate Prof. Ciara Greene/Prof Klaus Kessler	Neurophysiological markers of eyewitness memory distortion	No
Prof. Klaus Kessler/Dr Keith Gaynor	EEG Neuromarkers of Psychosis-like thought patterns	No
Dr Áine Ní Choisdealbha Prof Klaus	An EEG investigation of motor imagery use during the hand laterality task	No

Kessler, Prof Nuala Brady		
Dr Áine Ní Choisdealbha Prof Nuala Brady	Localising hand- and foot-related motor activation in the developing brain	Yes
Dr Monika Pilch	How fear of death affects individuals' engagement in advance care planning? Using eye-tracking methodologies to establish the role of impulsivity, emotional responding, and attentional bias in the avoidance of illness, disability, and death.	No
Dr Brendan Rooney	**TBA**	

Dr Katie Gilligan Lee

Project 1:
Cognitive interference in the Spatial domain: Designing a dual-paradigm protocol to investigate the role of spatial reasoning for mathematics.

Supervisor: Dr. Katie Gilligan-Lee

Details of funding: The student will be joining an international collaboration that is being led by Dr. Katie Gilligan-Lee (UCD) and Dr. Cori Bower (California State University). Other collaborators include Prof. Kelly Mix and Victoria Alexander (University of Maryland), and Dr. Zachary Hawes (University of Toronto).

The student will be hired to work as a research assistant on this project for one day per week for approximately 30 weeks. In this capacity, they will work with the broader team to design the spatial interference paradigm, write a study pre-registration, collect data, curate data, assist with data analysis, and contribute to publication writing. They will attend team meetings (remotely).

The student will use data collected to complete their MSC dissertation. This will be on a tangential question to the main research questions of the project. The student will not be paid for the specific time they spend working on their MSC thesis, e.g., writing or analysis specific to their thesis question.

Background:
Spatial thinking is the ability to reason about shape and space. It is essential for everyday living, e.g., filling the dishwasher, navigating to college. Beyond its' importance in everyday living there is convincing evidence of an association between children and adults' spatial skills and their math performance (e.g., Atit et al., 2022). This evidence has recently been expanded to suggest a causal effect of spatial skill on mathematics, that is that training spatial skills leads to gains in mathematics performance (Hawes, Gilligan-Lee & Mix, 2022). However, the mechanisms that underpin space-mathematics relations remain undetermined, and it is still unclear under what conditions and for whom spatial skills can optimally support math problem solving
Aim: The aim of this project is to understand which cognitive developmental mechanisms (spatial cognition, language, and executive function) better support different types of math problem solving by implementing various types of interference during math problem solving. We will use a dual-task paradigm to generate interference.

In studies using the dual-task paradigm, an individual is presented with two tasks to solve simultaneously: a target problem/task (e.g., mathematics) and the interference task (e.g., spatial task). If the target task requires the cognitive skills being utilised in the interference paradigm, then performance and reaction time on the target task (mathematics) will be degraded when interference is present.

Method:
Design: This is a cross-sectional behavioural study. Participants will complete mathematics assessments in the presence and absence of different forms of cognitive interference. The specifics of the interference paradigm have yet to be established but this may require face-to-face or online cognitive assessments.

Participants: Across two phases this project will investigate the efficacy of our spatial interference paradigm on mathematics problem solving in (a) adults, and (b) children aged 10-12 years.

Background reading: Atit, K., Power, J.R., Pigott, T. et al. (2022). Examining the relations between spatial skills and mathematical performance: A meta-analysis. Psychonomic Bulletin and Review, 29, 699–720. https://doi.org/10.3758/s13423-021-02012-w

Hawes Z.H., Gilligan-Lee K.A.G., Mix K.S (2022). Effects of spatial training on mathematics performance: A meta-analysis. Developmental Psychology, 58(1):112-137. https://doi:10.1037/dev0001281

Esmaeili Bijarsari, S. (2021). A current view on dual-task paradigms and their limitations to capture cognitive load. Frontiers in psychology, 12, 648586

Other comments:
The student's specific research questions will be determined with their input once their project begins. However, the overarching goal of the project is to establish the mechanistic role of spatial reasoning in mathematics performance.

It is anticipated/encouraged that the student who completes this project will become an active member of the Cognition, Development and Learning Lab. This will include attending lab meetings, journal clubs and writing groups where possible.

Please feel free to contact me with any questions that you might have (katie.gilligan-lee@ucd.ie)

Dr Judith Bek

Project 1: Dance and music for Parkinson's disease

Supervisor(s): Dr Judith Bek**,** Associate Professor Nuala Brady, Dr Sarah Cooney

Garda Vetting: No

Background: Dance is found to have beneficial effects for people with Parkinson's disease (PD), including improvements in movement (e.g., gait and balance) and non-motor symptoms such as mood and cognition. Unlike other forms of physical therapy or exercise, dance is a multidimensional activity involving many elements that could influence outcomes. For example, music is intrinsic to most forms of dance, and music-based therapies can be effective for people with PD, but its role within outcomes of dance for PD is unclear. Additionally, therapeutic dance programs for PD are increasingly delivered through online platforms, which allows greater access and flexibility, but it can be more difficult to evaluate the effects of dance in this digital context.

This study will investigate the impact of music within dance for people with PD on motor and non-motor outcomes. The study will be conducted online, using new video-based motion capture techniques to analyse movements remotely.

Participants will practice a series of dance sequences from video demonstrations with or without music, and measures of movement (kinematics) and mood will be compared between groups.

Suggested background reading:
- Bek, J., Arakaki, A. I., Lawrence, A., Sullivan, M., Ganapathy, G., and Poliakoff, E. (2020). Dance and Parkinson's: a review and exploration of the role of cognitive representations of action. Neurosci. Biobehav. Rev. 109, 16–28. doi: 10.1016/j.neubiorev.2019.12.023
- Bek, J., Groves, M., Leventhal, D., and Poliakoff, E. (2021). Dance at home for people with Parkinson's during COVID-19 and beyond: participation, perceptions, and prospects. Front. Neurol. 12:678124. doi: 10.3389/fneur.2021.678124
- Karageorghis, C. I., Rose, D., Annett, L. E., Bek, J., Bottoms, L., Lovatt, P. J., et al. (2020). The BASES expert statement on the use of music for movement among people with Parkinson's. Sport Exerc. Sci.

Weblinks:

Other comments:

Project 2: The influence of experience in sports on motor imagery

Supervisors: Dr Judith Bek, Assoc Prof Nuala Brady, Dr Sarah Cooney
Garda Vetting: No
Background: Motor imagery (imagined movement with associated images and sensations) is an established technique for training and rehabilitation in sport, and has more recently been applied in interventions for patients with neurological conditions. Individual differences in motor imagery ability are widely documented, but the sources of these differences are not well understood. In addition to influences of demographic characteristics such as age and gender, motor imagery ability may also be altered through experience with activities that promote the use of imagery or engage aspects of the body schema. A recent study found that experience in sports and music influenced performance on an implicit test of motor imagery/body schema (hand laterality judgement), but not a self-report (questionnaire) measure of motor imagery.

This study will take a systematic approach to understanding the influence of experience in sports on motor imagery and body schema, by comparing groups of participants with and without experience in different types of sports and activities (e.g., team sports, individual sports, dance) on a range of measures designed to assess dimensions of motor imagery and body schema

Background Reading:
- Bek, J., O'Farrell, R., & Cooney, S. M. (2024, preprint). Experience in sports and music influences implicit motor imagery. https://doi.org/10.31234/osf.io/s928z
- Ladda, A. M., Lebon, F., & Lotze, M. (2021). Using motor imagery practice for improving motor performance – A review. *Brain and Cognition*, *150*, 105705. https://doi.org/10.1016/j.bandc.2021.105705
- Moran, A., & O'Shea, H. (2019). Motor imagery practice and skilled performance in sport: From efficacy to mechanisms. In *Skill Acquisition in Sport* (3rd ed.). Routledge

Assoc. Professor Nuala Brady

Project no 1 Brain lateralization in reading words and faces in dyslexia

Supervisor: Nuala Brady

Background:
Developmental dyslexia is very common with prevalence estimated between 5% and 17%, and dyslexia is often associated with neurodevelopmental disorders such as ADHD and autism. Traditionally, anomalous phonological processing – the way in which words are sounded out - has been considered the primary deficit underlying dyslexia. Recent findings argue for a reconceptualization of dyslexia as a multifaceted disorder, one in which anomalous visual processing may occur independently of or in conjunction with poor phonological processing (e.g., Sigurdardottir et al., 2015; Gabay et al., 2017; Brady et al, 2021). This project will investigate brain lateralisation in young adults with dyslexia, using eye tracking methodology to investigate visual field bias in viewing faces (Åsberg Johnels et al., 2022) and in viewing both isolated words and sequential words during a natural reading task, and will examine the relation of visual field bias to reading scores,

The School of Psychology has invested in state of art eye tracking technology (both stationary and portable Eye Link systems) and this project will allow for analysis of pupil diameter data coordination as well as visual field bias during all tasks. This project would suit students with an interest in dyslexia and its relationship to neurodevelopmental conditions.

Background Reading:
- Brady, N., Darmody, K., Newell, F. N., & Cooney, S. M. (2021). Holistic processing of faces and words predicts reading accuracy and speed in dyslexic readers. *PloS one*, *16*(12), e0259986.

- Sigurdardottir HM, Ivarsson E, Kristinsdottir K, Kristjansson A. Impaired Recognition of Faces and Objects in Dyslexia: Evidence for Ventral Stream Dysfunction? Neuropsychology. 2015;29: 739–750. pmid:25643213

- Gabay Y, Dundas E, Plaut D, Behrmann M. Atypical perceptual processing of faces in developmental dyslexia. Brain and Language. 2017;173: 41–51. pmid:28624595

- Åsberg Johnels, J., Galazka, M. A., Sundqvist, M., & Hadjikhani, N. (2022). Left visual field bias during face perception aligns with individual differences in reading skills and is absent in dyslexia. *British Journal of Educational Psychology*

Web Links:
https://www.ucdperceptionmotorcog.com/team-extended

Other Comments
Would suit two students working together, great opportunity to develop skills in the acquisition and analysis of eye tracking data 31/7

Dr Meadhbh Brosnan

Project: Neural signatures of response speed in younger and older adults

Supervisors: Dr Meadhbh Brosnan

Garda Vetting: No

Background: Response speed, i.e., the speed at which individuals can respond to sensory sensory information in the environment, is considered a foundational facet of cognition on which all higher cognitive functions rely[1]. As such, response speed is impaired in a wide range of clinical conditions including ADHD, dyslexia, depression, stroke, and Alzheimer's Disease (e.g.[2]). Several lines of work indicate a critical role for frontal regions of the brain in response speed. For example, frontal lesions acquired through stroke lead to response speed deficits[3]. Correspondingly, stimulating the frontal lobes using transcranial electrical stimulation (TeS) improves response speed in older adults[4].

Despite these findings, we lack an understanding of the precise mechanisms by which frontal regions modulate speed. Electroencephalography (EEG) offers excellent temporal resolution to explore activity in frontal regions of the brain in near real-time. This project will use EEG to identify frontal signatures contributing to inter-individual differences in response speed in both healthy younger and older adults. An existing EEG dataset will be used to examine these neural metrics (for recent work using this dataset see[5]). The outcomes of this project will inform the development of novel neuroscience-led approaches to rehabilitation interventions aimed at remediating cognitive deficits in a wide range of clinical cohorts.

The MSc candidate will examine neural EEG metrics using customised MATLAB codes (no prior experience necessary), will attend regular lab meetings at the Translational and Cognitive Neuroscience UCD lab (https://meadhbhbrosnan.com), and will have the opportunity to collaborate with graduate students and colleagues locally and internationally (https://meadhbhbrosnan.com/people/). Funding will be available to attend, and present project findings, at an international conference

Background reading:

1. Salthouse, T.A., 1996. The processing-speed theory of adult age differences in cognition. *Psychological review*, *103*(3), p.403.
2. Edwards, J.D., Xu, H., Clark, D.O., Guey, L.T., Ross, L.A. and Unverzagt, F.W., 2017. Speed of processing training results in lower risk of dementia. *Alzheimer's & Dementia: Translational Research & Clinical Interventions*, *3*(4), pp.603-611.
3. Duncan, J., Bundesen, C., Olson, A., Humphreys, G., Chavda, S. and Shibuya, H., 1999. Systematic analysis of deficits in visual attention. *Journal of Experimental Psychology: General*, *128*(4), p.450.
4. Brosnan, M.B., Demaria, G., Petersen, A., Dockree, P.M., Robertson, I.H. and Wiegand, I., 2018. Plasticity of the right-lateralized cognitive reserve network in ageing. *Cerebral Cortex*, *28*(5), pp.1749-1759.
5. Brosnan, M., Pearce, D.J., O'Neill, M.H., Loughnane, G.M., Fleming, B., Zhou, S.H., Chong, T., Nobre, A.C., Connell, R.G. and Bellgrove, M.A., 2023. Evidence accumulation rate moderates the relationship between enriched environment exposure and age-related response speed declines. *Journal of Neuroscience*, *43*(37), pp.6401-6414.

Useful web links: https://meadhbhbrosnan.com

Dr Sarah Cooney

Project: The bodily self: Interoception, Emotions and Body image

Supervisor: Dr Sarah Cooney

Garda Vetting: No

Background: Interoception is a multidimensional construct that refers to sensing, becoming aware of, and interpreting internal physiological signals from key bodily systems (e.g., gastrointestinal, respiratory, and cardiovascular systems) (e.g., Garfinkel et al., 2015).

Building on peripheral theories of emotions, interoception is linked to recognising and regulating emotional states (James, 1884; Damasio, 1994; Craig, 2004). It has been proposed that where there is poor emotion recognition (Alexithymia), there is an impairment in processing and interpreting internal bodily signals (Brewer et al., 2016). Evidence suggests that atypical interoception and emotion recognition are experienced in several mental health conditions, including conditions where a disturbance in body image is a central diagnostic feature, e.g., Anorexia Nervosa (Jacquemot & Park, 2020: Pollatos et al., 2008).

Indeed, interoception has a strong association with body image (e.g., Naraindas & Cooney, 2023), whereby low interoception predicts heightened negative attitudes towards the appearance of the body in those *with* and *without* eating disorders (see Badoud & Tsakiris, 2017 for review). The current project investigates the interrelationship between dimensions of internal body awareness (interoception), body image and the ability to recognise emotional states. Taking a psychological network approach (Borsboom., 2017), this project aims to identify intervention points and outcomes for future interoceptive-based interventions.

The successful candidate will benefit from working closely with members of the UCD Body Lab, including a current PhD student. The project is ideal for someone with an interest in research design and advanced statistical analysis, with opportunities to pursue a research PhD in the future. The student will be expected to show initiative and be highly motivated to acquire the required technical skillsets.

Background Reading:

- Naraindas, A. M., & Cooney, S. M. (2023). Body image disturbance, interoceptive sensibility and the body schema across female adulthood: A pre-registered study. *Frontiers in Psychology*, *14*, 1285216.
- Borsboom D (2017) A network theory of mental disorders. World Psychiatry 16:5–13.https://doi.org/10.1002/wps.20375
- Garfinkel, S. N., Seth, A. K., Barrett, A. B., Suzuki, K., & Critchley, H. D. (2015). Knowing your own heart: distinguishing interoceptive accuracy from interoceptive awareness. *Biological psychology*, *104*, 65-74.
- Pollatos O, Kurz A, Albrecht J, Schreder T, Kleemann A, Schöpf V, et al. Reduced perception of bodily signals in anorexia nervosa. Eating Behav (2008) 9(4):381–8. doi: 10.1016/j.eatbeh.2008.02.001
- Tsakiris M, Jimenez A, Costantini M. Just a heartbeat away from one's body: interoceptive sensitivity predicts malleability of body-representations. Proc R Soc B: Biol Sci (2011) 278(1717):2470–6. doi: 10.1098/rspb.2010.2547 Brewer, R., Cook, R., & Bird, G. (2016).
- Borsboom D (2017) A network theory of mental disorders. World Psychiatry 16:5–13.https://doi.org/10.1002/wps.20375
- Brewer, R., Cook, R., & Bird, G. (2016). Alexithymia: a general deficit of interoception. *Royal Society open science*, *3*(10), 150664.
- Jacquemot, A. M. M. C., & Park, R. (2020). The role of interoception in the pathogenesis and treatment of anorexia nervosa: a narrative review. *Frontiers in psychiatry*, *11*, 281.
- Badoud, D., & Tsakiris, M. (2017). From the body's viscera to the body's image: Is there a link between interoception

Associate Professor Michelle Downes

Project 1: An exploration of executive functions in screen and non-screen play in 12-18 month olds

Supervisor(s): Assoc Professor Michelle Downes

Background: Infants and toddlers are exposed to screens in active ways (to entertain, educate, distract), and passively (background TV, parent phone use) from very early on in life. The current study plans to address existing research gaps in our knowledge of infant behaviour in the context of screens and how interaction with screens links to other developmental skills in the context of play. Measures will include an eye-tracking paradigm, an adapted version of ScreenQ (a 15-item parent report measure of screen exposure), the Early Executive Functions Questionnaire and a tabletop play tool. Items from the Bayley Scales of Infant Development (BSID-IV) will be used. A better understanding of how digital devices are used during infancy and the potential impact on cognitive development will allow for development of effective early interventions.

Suggested background reading:
Hendry, A., & Holmboe, K. (2021). Development and validation of the Early Executive Functions

Questionnaire: A carer-administered measure of executive functions suitable for 9- to 30-month-olds. *Infancy*, *26*(6), 932-961. https://doi.org/10.1111/infa.12431
Downes, M., Kelly DJ., Day, K., Marlow, M., & de Haan, M. (2018). Visual Attention Control Differences in 12 month old preterm infants. *Infant Behavior & Development*. DOI: 10.1016/j.infbeh.2018.01.002.

McHarg, G., Ribner, A. D., Devine, R. T., & Hughes, C. (2020). Screen time and executive function in toddlerhood: A longitudinal study. *Frontiers in Psychology*, *11*, 570392.

Weblinks: www.ucdbabylab.com

Other comments:
This project is best suited to a student who would like to obtain in-person lab experience working with children and has a specific interest in developmental neuropsychology/ developmental cognitive neuroscience. As this project would involve recruitment of infants the student would be flexible in terms of lab sessions to suit family schedules which could sometimes fall on weekends. Garda clearance will be required

Associate Professor Ciara Greene

Project 1: Neurophysiological markers of eyewitness memory distortion

Supervisor(s): Assoc Professor Ciara Green, Professor Klaus Kessler

Background: Previous research has demonstrated that eyewitness memory can be substantially affected by exposure to post-event misinformation. For example, if an eyewitness to a car crash sees a car drive through a green light, but later reads a newspaper report suggesting that the car had broken a red light, there is a good chance that they will later remember seeing the red light during the original event.

This project will use EEG to investigate the neurophysiological underpinnings of misinformation acceptance. Little is known about the precise EEG markers of memory distortions, but episodic memory has been linked to medial temporal lobe (MTL) functioning in interaction with prefrontal cortex (PFC), which also seems to play a crucial role in the formation of misinformation and the distinction between false and true memories (for review, e.g. Lentoor, 2023). Episodic memory processing has also been linked to theta brain oscillations (3-7Hz) that can be measured using EEG (for review, e.g. Herweg et al., 2020).
EEG will be recorded with the School's new mobile 64 electrodes system. You will have the opportunity to learn about brain oscillations and how these make our mind "tick". EEG data analysis will be conducted using advanced MATLAB toolboxes such as EEGlab and Brainstorm (see links below), adding to the student's transferrable skills. However, for achieving the best learning outcome with this project a technically minded approach is of the essence. Students will be expected to show initiative and independence in their learning. We are therefore seeking dedicated and technically minded students who would conceive of this challenge as an opportunity.

Suggested background reading:

Brassil, M., O'Mahony, C.J. & Greene, C.M. (2024). Do cognitive abilities reduce eyewitness' susceptibility to the misinformation effect? A systematic review. *Psychonomic Bulletin and Review.* https://doi.org/10.3758/s13423-024-02512-5
Friehs, M.A., Greene, C.M., Pastötter, B. (2021). Transcranial Direct Current Stimulation Differentially Affects True and False Memories in the DRM Task. *European Journal of Neuroscience, 54*(2), 4609-4620*.* https://doi.org/10.1111/ejn.15337.
Lentoor, A. G. (2023). Cognitive and neural mechanisms underlying false memories: misinformation, distortion or erroneous configuration?. *AIMS neuroscience*, 10(3), 255..
Herweg, N. A., Solomon, E. A., & Kahana, M. J. (2020). Theta oscillations in human memory. *Trends in cognitive sciences*, *24*(3), 208-227.

Weblinks:
www.ucdattentionmemory.com
https://www.ucd.ie/psychology/t4media/MNClabequipment.pdf
Links to analysis software:
https://sccn.ucsd.edu/eeglab/index.php
https://neuroimage.usc.edu/brainstorm/Introduction

Other comments:
All enquiries welcome. Just email Dr Ciara Greene ciara.greene@ucd.ie or Prof Klaus Kessler klaus.kessler1@ucd.ie

Prof. Klaus Kessler

Project 1: **EEG Neuromarkers of Psychosis-like thought patterns**
Supervisors: Prof. Klaus Kessler & Associate Prof. Keith Gaynor (UCD)
Garda Vetting: No

Background: Recent reviews (e.g., Perrottelli et al., 2021) have highlighted that abnormal Electroencephalography (EEG) indices in patients with chronic schizophrenia can also be observed in high-risk (but subclinical) subjects and in the prodromal phase of psychosis (Atagun et al., 2020; Haigh et al., 2017; Reilly et al., 2018; Tada et al., 2019;). This supports the hypothesis that cerebral network dysfunctions appear early in the course of the disorder (Fusar-Poli et al., 2012; Kahn & Sommer, 2015) and may aid the prediction of high-risk individuals who will transition to psychosis. Crucially, most previous studies rely on only one EEG index (but see Zimmermann et al., 2010) for comparisons of high-risk (HR), first-episode psychosis (FEP) subjects, and healthy controls (HC).

Within the larger project in collaboration with the Dublin & East Treatment & Early Care Team (DETECT) – Early Intervention in Psychosis (EIP) Service, we aim to expand on previous research by (i) studying multiple EEG indices previously associated with aberrations in psychosis, (ii) examining several established tasks that tap into different neurocognitive subsystems associated with psychosis (e.g. perceptual, affective, social, executive), and (iii) including a clinical FEP group, a HR group, with two HC control groups (one with low and one with high non-clinical psychosis-proneness).

The aim for the MSc students will be to collect data (in person) for contrasting the two HC groups in the first instance. Each student will focus on one particular task. Psychosis-proneness will be assessed through self-report questionnaires. EEG will be recorded with the School's new mobile 128 electrodes system that is certified as medical equipment and will also be used for testing FEP and HR patients at a later stage of the overall project. You will have the opportunity to learn about brain oscillations and how these make our mind "tick". EEG data analysis will be conducted using Matlab toolboxes, adding to the students' transferrable skills. MSc students will also be given the opportunity to engage with the DETECT team and its service provision and clinical testing may commence towards the end of the MSc course, expanding the students' experience. We are seeking dedicated and skilled candidates who would conceive of this challenge as an opportunity.

Background reading:
Perrottelli, A., Giordano, G. M., Brando, F., Giuliani, L., & Mucci, A. (2021). EEG-based measures in at-risk mental state and early stages of schizophrenia: a systematic review. Frontiers in psychiatry, 12, 653642.
Zimmermann, R., Gschwandtner, U., Wilhelm, F. H., Pflueger, M. O., Riecher-Rössler, A., & Fuhr, P. (2010). EEG spectral power and negative symptoms in at-risk individuals predict transition to psychosis. Schizophrenia research, 123(2-3), 208-216.

Web links:
https://people.ucd.ie/klaus.kessler1
https://www.ucd.ie/psychology/t4media/MNClabequipment.pdf
https://people.ucd.ie/keith.gaynor
http://www.detect.ie/index.html

Dr Áine Ní Choisdealbha

Project 1: An EEG investigation of motor imagery use during the hand laterality task

Supervisor (s): Dr Áine Ní Choisdealbha, Prof Klaus Kessler, Prof Nuala Brady

Garda Vetting: No

Background: Mentally rotating visually-presented stimuli is a visuo-spatial task that typically requires abstract reasoning. However, there are variants of this task in which the stimuli used are images of bodies or parts of bodies, and these tasks can be performed with reference to one's own body and motor system. For example, in the hand laterality task, participants must determine if a presented hand is a left or right hand. Behavioural research has shown that participants perform the hand laterality judgment by generating a motor image of their own hand and mentally rotating it to match the stimulus. However, visual strategies are also possible, and there are reasons why they might be used instead of motor imagery. These include individual differences in hand dominance, the biomechanical difficulty of rotating to match the presented hand, and perception of the hand as being shown from a "self" or "other" perspective.

In this project, we will measure neural correlates of motor imagery during EEG as participants perform the hand laterality task. We will examine how mu desynchronization (our target measure of motor activation) changes with the biomechanical difficulty of the task, which will be manipulated in two ways – by presenting the stimulus hands at different angles of rotation, and by placing the participants' hands in an unfamiliar posture. Results will tell us more about when the switch between visual and motor strategies occurs in the hand laterality task.

Background Reading:
Ní Choisdealbha, Á., Brady, N., & Maguinness, C. (2011). Differing roles for the dominant and non-dominant hands in the hand laterality task. *Experimental Brain Research*, *211*, 73-85.

Osuagwu, B. A., & Vuckovic, A. (2014). Similarities between explicit and implicit motor imagery in mental rotation of hands: An EEG study. *Neuropsychologia*, *65*, 197-210.

Pfurtscheller, G., Brunner, C., Schlögl, A., & Da Silva, F. L. (2006). Mu rhythm (de) synchronization and EEG single-trial classification of different motor imagery tasks. *NeuroImage*, *31*(1), 153-159.

Useful Web Links: https://www.ucdperceptionmotorcog.com/team-extended

Other Comments: Would suit two students working together, great opportunity to develop skills in EEG acquisition and data analysis

Dr Áine Ní Choisdealbha

Project 1: Localising hand- and foot-related motor activation in the developing brain

Supervisor(s): Dr Áine Ní Choisdealbha, Prof Nuala Brady

Garda Vetting: Yes

Background: Infants from at least 5 months of age show some ability to anticipate the goals of familiar actions performed by others. For example, they may look to an adult's mouth if they see them pick up a cup, and after learning that an adult prefers a particular toy, they will indicate surprise if the adult reaches for a different one. The same results are not always found for a non-human actor, like a mechanical claw, engaged in the same activities. One theory of why infants are better at detecting the goals of human actors is that they use motor representations of their own bodies to match their own sensorimotor experience to the other person. Studies recording brain activity from infants show that motor activation does occur during action perception.
Infants from at least 5 months of age show some ability to anticipate the goals of familiar actions performed by others. For example, they may look to an adult's mouth if they see them pick up a cup, and after learning that an adult prefers a particular toy, they will indicate surprise if the adult reaches for a different one. The same results are not always found for a non-human actor, like a mechanical claw, engaged in the same activities. One theory of why infants are better at detecting the goals of human actors is that they use motor representations of their own bodies to match their own sensorimotor experience to the other person. Studies recording brain activity from infants show that motor activation does occur during action perception.

This activation occurs in a number of brain regions, including but not limited to primary motor cortex. One feature of primary motor cortex is that it is somatotopic, that is, motor activity involving different parts of the body occurs in different regions. In this project, we will examine how motor activation occurs in the infant brain across the first year of life in response to different hand- and foot-related actions, and how this changes with age as infants gain relevant skills in reaching, grasping, and locomotion. We will use standardised questionnaires to obtain a measure of infants' own motor development, to understand how experience of using the hands and feet affect infants' responses to these actions.

Background Reading:
de Klerk, C. C., Johnson, M. H., & Southgate, V. (2015). An EEG study on the somatotopic organisation of sensorimotor cortex activation during action execution and observation in infancy. *Developmental Cognitive Neuroscience*, *15*, 1-10.
Saby, J. N., Meltzoff, A. N., & Marshall, P. J. (2013). Infants' somatotopic neural responses to seeing human actions: I've got you under my skin. *PLoS One*, *8*(10), e77905.
Southgate, V., Johnson, M. H., Karoui, I. E., & Csibra, G. (2010). Motor system activation reveals infants' on-line prediction of others' goals. *Psychological Science*, *21*(3), 355-359.

Useful Web Links:
https://www.ucdperceptionmotorcog.com/team-extended

Dr. Monika Pilch
Project 1: How fear of death affects individuals' engagement in advance care planning? Using eye-tracking methodologies to establish the role of impulsivity, emotional responding, and attentional bias in the avoidance of illness, disability, and death.

Dr Monika Pilch

Background:

Advance care planning (ACP) allows people to reflect on future care scenarios and make decisions that will affect their end-of-life experience (1–4). While death is inevitable, ACP is especially crucial for those with life-limiting conditions (5). These individuals often face decisions that may cause short-term emotional suffering (e.g., confronting death through active planning), but are essential for shaping future care quality (6). Avoiding ACP due to emotional discomfort can lead to long-term negative consequences, such as dying in an unintended place. This decision-making process, known as intertemporal choice, involves weighing short-term against long-term outcomes (7). The conceptual model outlined in *Fig.* **A1** (Appendix A) provides one interpretation of how impulsivity might affect illness/disability/death avoidance. The current project will use eye-tracking methodologies to investigate intertemporal choice and the role that impulsivity (i.e., the prioritization of short-term consequences) plays in avoiding illness, disability, and death. It will also explore a range of theoretically relevant factors.

Background reading:

1. Sudore RL, Lum HD, You JJ, Hanson LC, Meier DE, Pantilat SZ, et al. Defining Advance Care Planning for Adults: A Consensus Definition From a Multidisciplinary Delphi Panel. J Pain Symptom Manage. 2017;53(5):821–32.
2. Piers RD, van Eechoud IJ, Van Camp S, Grypdonck M, Deveugele M, Verbeke NC, et al. Advance Care Planning in terminally ill and frail **References**
1. Sudore RL, Lum HD, You JJ, Hanson LC, Meier DE, Pantilat SZ, et al. Defining Advance Care Planning for Adults: A Consensus Definition From a Multidisciplinary Delphi Panel. J Pain Symptom Manage. 2017;53(5):821–32.
2. Piers RD, van Eechoud IJ, Van Camp S, Grypdonck M, Deveugele M, Verbeke NC, et al. Advance Care Planning in terminally ill and frail older persons. Patient Educ Couns [Internet]. 2013;90(3):323–9. Available from: http://dx.doi.org/10.1016/j.pec.2011.07.008
3. Jimenez G, Tan WS, Virk AK, Low CK, Car J, Ho AHY. Overview of Systematic Reviews of Advance Care Planning: Summary of Evidence and Global Lessons. J Pain Symptom Manage. 2018;56(3):436–59.
4. Sudore RL, Fried TR, Terri RF. Redefining the "Planning" in Advance Care Planning: Preparing for End-of-Life Decision Making. Ann Intern Med. 2010;153(4):256–61.
5. Zwakman M, Jabbarian LJ, van Delden JJM, van der Heide A, Korfage IJ, Pollock K, et al. Advance care planning: A systematic review about experiences of patients with a life-threatening or life-limiting illness. Palliat Med. 2018;32(8):1305–21.
6. Sun HY, Li AM, Chen S, Zhao D, Rao LL, Liang ZY, et al. Pain now or later: An outgrowth account of pain-minimization. PLoS One. 2015;10(3):1–17.
7. Bulley A, Henry J, Suddendorf T. Prospection and the present moment: The role of episodic foresight in intertemporal choices between immediate and delayed rewards. Rev Gen Psychol. 2016;20(1):29–47.

THE BEHAVIOURAL NEUROSCIENCE MEDAL

Each year, the **Behavioural Neuroscience Medal** recognises the best student in the Masters in Behavioural Neuroscience. The award will be presented at the annual School of Psychology awards ceremony (usually held in December of the following academic year).
All students in the Masters in Behavioural Neuroscience are eligible for this award.
The award will be presented to an outstanding student who performs at the top of their class, reflected by the highest GPA gained that year. In the case of a tie, the student with the highest grade in their research project will receive this award.