

Common mechanisms for decision-making and working memory in health and old age

Information Sheet

Site	Trinity College Institute of Neuroscience, Lloyd Building, Trinity College, Dublin 2
Principal Investigator	Prof. Redmond O'Connell Trinity College Institute of Neuroscience, Lloyd Building, Trinity College, Dublin 2 Telephone: (01) 896 4543 Email: reoconne@tcd.ie
Co-Investigator	Dr Peter Murphy Jade Duffy
Data Controllers	Trinity College Dublin
Data Protection Officer	Data Protection Officer Secretary's Office Trinity College Dublin Dublin 2 Email: dataprotection@tcd.ie Web: www.tcd.ie/privacy

Dear Participant,

Thank you for considering participation in our study. My name is Jade Duffy, and I am a PhD student in Prof. O’Connell’s Lab. Before you decide whether or not you wish to take part, please read this information sheet carefully. Please feel free to ask the experimenter any questions you may have. Don’t feel rushed or under pressure to make a quick decision. You should understand the risks and benefits of taking part in this study so that you can make a decision that is right for you.

1. The Study

We are conducting this study in order to investigate the neural mechanisms underlying perceptual decision-making and short-term memory in humans. These are fundamental cognitive processes that people carry out all the time in daily life, involving the processing of sensory information, the maintenance of that information over time, and its utilization when executing actions. For example, seeing a traffic light, deciding that it is green, and then deciding to drive forward on this basis; or briefly seeing a sign warning of ice on the road, and remembering to drive more slowly while on that stretch of road. With this study, we hope to gain insight into the strategies at work in the brain when people are remembering and making decisions about sensory information.

Criteria for Participation

For research and safety reasons, candidates must meet certain requirements to be eligible to participate. There are no risks associated with any of the procedures in neurologically healthy individuals. However, in order to participate, you must satisfy the following criteria. If you cannot confirm any of the conditions listed below, please inform the researcher.

I am 65-85 years old	<input type="checkbox"/>
I have normal or corrected-to-normal vision	<input type="checkbox"/>
I do not suffer from migraines or bad headaches	<input type="checkbox"/>
I have never suffered from epilepsy and I am not sensitive to flashing stimuli	<input type="checkbox"/>
I have no personal or family history of unexplained fainting	<input type="checkbox"/>
I have no personal history of neurological or psychiatric illness or brain injury	<input type="checkbox"/>
I am not currently taking medication that primarily acts on brain chemistry (e.g., anti-depressants)	<input type="checkbox"/> <input type="checkbox"/>
I have received a COVID-19 booster vaccination	<input type="checkbox"/>

Am I allowed to withdraw?

As participation is completely voluntary, you are free to withdraw from the study at any time. The decision not to consent to the participation in this experimental session will have no adverse consequences. You are free to withdraw and request that your data be irretrievably deleted at any point up to the end of the final testing session. If you wish to opt out, please contact study researcher Jade Duffy (jduffy9@tcd.ie), who will be able to organise this for you.

What happens if I change my mind about participating?

If you choose to withdraw during the course of the experimental session, you will be paid/offered the amount of monetary remuneration (or research credits for Psychology students) commensurate with the total proportion of the study you have participated in. If you decide to withdraw your consent and your data from the study immediately after the completion of an experimental session, all of your data will be permanently deleted. However, it will not be possible to delete your data after all experimental sessions are completed, as all data will be irreversibly anonymised and pooled with other participants' data at this point, so it would be impossible to identify which data are yours.

How will the study be carried out?

The study involves completing three EEG testing sessions that will last approximately 3 to 3.5 hours each, one of which will also include a short battery of standardized neuropsychological and/or questionnaires tests. It is anticipated that a total of 34 participants will take part in this study.

The testing sessions will be arranged at a time of your preference during the week working hours (9 am – 6 pm). These sessions will take place in the EEG testing room located in the Lloyd Institute, Trinity College Dublin. During each testing session you will be asked to perform versions of a computerised task that require simple forms of memory and decision-making about items presented on the computer screen. In one version of the task you will briefly be shown a small dot with a black and white checkerboard pattern and will need to remember the location of the dot during a subsequent delay. In other versions, you will be shown brief sequences of dots and will need to make a decision about the average location across all dots in a sequence. While you are performing these tasks, electrical changes in your brain will be recorded non-invasively using electroencephalography (EEG), muscle movements around your eyes will be recorded with small electrodes placed on your skin with stickers, and the position of your eyes and size of your pupil will be monitored using a camera located on the table in front of you.

One short neuropsychological test will be conducted over the phone prior to the first session. This test takes approximately ten minutes and ensures participant eligibility. The remaining neuropsychological tests will be completed during the first testing session. The purpose of these is to provide standardised measures of general

cognitive function (e.g. memory) that can then be related to your performance during the computerized tasks. Completion of these tests will take approximately 30 minutes.

What will happen if I decide to take part?

If you agree to take part, the experimenter will contact you over email or phone to arrange suitable dates for the three testing sessions. One week before your first session the over the phone neuropsychological test will take place. Should you feel unwell prior to your testing session, please contact the experimenter to reschedule your session.

On the day of the testing, you will be greeted at the reception area of the Lloyd Institute of Trinity College by Jade Duffy or a Research Assistant working on the study. While mask wearing is no longer mandatory, all researchers are happy to wear one on request and FFP2 masks can be supplied to you if you wish. At the beginning of the experimental session, you will be given plain information about the experimental procedure and your right to withdraw at any point. You will also be verbally informed about the policies employed so that your data remain confidential throughout the study. You will be free to ask the experimenter any questions and clarify any concerns. In the case you verbally declare that you are happy to take part in the study, you will be asked to read and sign a consent form.

Following this, equipment preparation will take place, which will take roughly 30-40 minutes. EEG simply involves applying 128 electrodes to the scalp using an EEG cap. A small amount of conductive gel is placed in the



ports on the cap and the electrodes are clipped in to sit comfortably on top of the scalp (as shown in the picture). The gel is hypoallergenic, non-staining electrode gel. The experience is perfectly comfortable, but it does mean that you will have water soluble gel in your hair at the end of the experiment. This gel washes out easily. The gel can be washed out using the dedicated hair-washing facilities in TCIN or at home. Electrodes will be placed above and below your left eye and at the corners of both eyes to detect eye blinks and movements (blinks cause a lot of noise in the EEG signal). Finally, we will calibrate an eye-tracker that records you eye-movements around the computer screen. Please note that application of the EEG cap and electrodes will require close contact between you and the experimenter. However, FFP2-quality face masks are available to wear during this time (and indeed the entirety of the testing session), and social distancing between you will be maintained at all other times during the session.

During the equipment setup, you will be given detailed instructions about how to perform the computerized tasks and you will get the chance to practice before the experiment begins. You will use a computer mouse to indicate your responses within the tasks. After the practice trials, the main part of the experiment will take place, where you will be asked to complete a longer version of the task that you have just practiced. This procedure will take roughly 2 hours.

You will have the opportunity to take regular breaks during the testing session. After the conclusion of the experimental session, you can wash your hair using our dedicated hair washing facilities of the Lloyd building near the testing room where you will be offered toiletries and a towel or return home to wash the conductive gel from your hair.

Are there any benefits to taking part in this research?

Taking part in this study will not directly benefit you. However, research performed with your EEG and task response data may help us to better understand the underpinnings of perceptual decision-making in humans. This is a long-term research project, so the benefits of the research may not be seen for several years. By participating, you are helping to advance science for future generations.

Are there any risks to me to others if I take part?

The primary risk of participation at this time is the risk of exposure to COVID-19. It is important that you are aware that every effort has been made to minimise this risk and to protect the health and wellbeing of all participants and staff. A series of protocols have been designed to mitigate the risk of infection. The testing facility has been thoroughly cleaned before you arrive. Both you and the researcher can wear personal protective equipment at all times during testing, if desired (including FFP2-quality face masks, which are known to be more effective than standard surgical masks). The researcher will maintain social distancing at all times, except during equipment set up. Upon arrival, you will be asked to complete a symptom-screening questionnaire, and your temperature will be taken, to ensure you are not currently experiencing any COVID symptoms. For your safety as well as the safety of the research staff, we also impose the criterion that all participants and staff must have received a COVID-19 booster vaccination in order to take part in the study. If you are unhappy with any of these expectations, you should let the researcher know. Remember, you are entirely free to withdraw from the study at any time.

Despite these protocols, we cannot eliminate all risk of infection involved in your participation. For this reason, it is important that you understand that testing imposes risks that go beyond those encountered currently in daily living and it is critical that you are in good health and have no underlying conditions if you wish to participate.

EEG and eye-tracking procedures are not associated with any risks for healthy adult participants. On the day of the testing session, you will undergo a training block

before the main experimental block starts and you will not continue to the main experimental blocks if you experience any kind of discomfort.

Any identifying information from this study will be kept strictly confidential and will not be made available to any other people, except in circumstances that exceed the statutory limits to confidentiality. While there is no foreseeable reason for such a situation to arise in the context of this study, confidentiality may be breached if:

- a) The research team has a strong belief or evidence exists that there is a serious risk of harm or danger to either the participant or another individual.
- b) Disclosure is required as part of a legal process or Garda investigation. In such instances, information may be disclosed to significant others or appropriate third parties without permission being sought. Where possible, a full explanation will be given to the participant regarding the necessary procedures and the intended actions that may need to be taken.

2. Data Protection

We aim to publish our results in scientific journals, but any published information will be non-identifiable. Only basic personal data (e.g. your age), physiological measures (EEG, and eye tracking), measures of your behaviour on the computerized tasks, and answers to neuropsychological tests will be collected. These data will be anonymised, meaning that they are identified by a code and not including any personal information. Any basic personal information will be used solely to provide demographic information about the participants (e.g. the average age of a participant) and to rule out the possibility that such factors influence our observed results. No identifiable personal information will be shared with other researchers under any circumstances. Under the Freedom of Information Act you can have access to any information we store about you, if requested.

What will happen to my data?

Your personal information will be assigned a unique code number at the beginning of the testing session. This code will be communicated to you at the end of the testing session. This code will subsequently be stored by the research team in a single password-protected, encrypted Excel file. The encrypted file will be deleted on completion of the project. At this point all data will be irreversibly anonymised.

Your EEG, eye-tracking, task response, neuropsychological data and questionnaire will be anonymised, encrypted, and securely stored both in a TCIN computer accessible only to the research team, and on a secure Microsoft OneDrive account accessible only to the main experimenters (Professor Redmond O'Connell, Dr Peter Murphy, Jade Duffy and the Research Assistants). The data will be maintained by

the O'Connell Lab indefinitely for the purposes of audit and reinvestigation. The data will be anonymised and by no means identifiable or accessible by individuals beyond the jurisdiction of GDPR, before being made available on online open science platforms (for example Github) for allowing the replication of the findings by reviewers and other researchers, open scientific dialogue, and planning of further research.

The symptom screening questionnaire and contact tracing information will only be used for the purposes of minimising the risk of exposure and alerting any participant should we find out they may have been exposed to an individual who subsequently tested positive for COVID. These data will be processed and stored entirely separately from the experimental data.

How will my data be secured?

Your privacy is important to us. We take many steps to make sure that we protect your confidentiality and keep your data safe. In compliance with the 2018 Health Research Regulations, in particular with the regulations 3(1)(a) – I, your data will be made completely anonymous before being shared to the approved researchers or to any online research platform, ensuring that no damage or distress will be caused to you as a result of the processing of your personal data. Furthermore, your consent form will be stored in a locked cabinet to which only the research team will have access. Your identity will not be revealed in any scientific meetings or through any other means of public, scientific communication. Your data will be treated in full compliance with the General Data Protection Regulation (GDPR) and Freedom of Information Act. Trinity College Dublin has appointed a Data Protection Officer and their contact details can be found on the front page.

The symptom screening questionnaire and contact tracing information will be securely stored in a locked filing cabinet for a period of 6 weeks and then it will be destroyed.

What is the legal basis of the use of my data?

By law¹, we can use your personal information for scientific research² (in the public interest³). We will also ask for your explicit consent to use your data as a requirement of the Irish Health Research Regulations. You are entitled to:

- The right to access to your data and receive a copy of it
- The right to restrict or object to processing of your data
- The right to object to any further processing of the information we hold about you (except where it is de-identified)
- The right to have inaccurate information about you corrected or deleted

¹ The European General Data Protection Regulation (GDPR)

² Article 9(2)(j)

³ Article 6(1)(e)

- The right to receive your data in a portable format and to have it transferred to another data controller
- The right to request deletion of your data

By law you can exercise the following rights in relation to your personal data. You can exercise these rights by contacting Jade Duffy, Redmond O'Connell or the Trinity College Data Protection Officer (all contact details can be found on the front page). Note, however, that retrieval and/or deletion of your data will not be possible once data collection for the study has finished and data are irreversibly anonymised. For this reason, if you wish to access your data or for it to be deleted, you must indicate this before completion of the project.

3. Costs, Funding, and Approval

Has the study been approved by the Research Ethics Committee?

Yes, this study has been approved by the School of Psychology Trinity College Dublin Research Ethics Committee.

Who is funding the research?

This research is being funded by a European Research Council grant awarded to Professor O'Connell.

Will I be paid for taking part?

If you are a TCD Psychology student, you will be given one research credit per half hour of participation as part of the School's Research Credit Scheme, or offered €10 per hour of participation plus a study completion bonus of €20. If you are not a TCD Psychology student, you will be offered €10 per hour of participation plus the €20 completion bonus, as compensation for your time and travel expenses. You will sign a receipt to indicate your receipt of this payment. No expenses are required on your part if you agree to take part.

4. Further Information

Who should I contact if I have a question or complaint?

If you have any further concerns or questions about this study, please do not hesitate to contact a member of the research team or the Data Protection Officer.

Additionally, under GDPR, if you are not satisfied with how your data are being processed, you have the right to lodge a complaint with the Office of the Data Protection Commission, 21 Fitzwilliam Square South, Dublin 2, Ireland.

Website: www.dataprotection.ie
