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Neural Basis of Memory

PARTICIPANT INFORMATION SHEET

You are invited to take part in a research project investigating how the brain uses information from memory in order to remember past events and/or imagine possible past and/or future events. This project is being carried out by Prof. Donna Rose Addis, Dr. Reece Roberts, Ms. Thanha Ibrahim and Ms. Brittany Cook (School of Psychology, The University of Auckland). Thank you for taking the time to read this information sheet.

It is important to read this document carefully so that you can make an informed decision about whether you would like to participate.

1. Purpose of the research: Although our memories play like movies in our minds, they are stored very differently in our brains. The various details for memories are stored as fragments in different brain areas and then reconstructed when we remember. Previous neuroimaging research has shown that remembering past events and imagining future events recruits the same network of brain regions. Interestingly, imagining future events activates certain regions in this network more so than remembering past events. Using behavioural methods, MRI (magnetic resonance imaging) scanning, and electroencephalography (EEG), we aim to better understand the cognitive processes that underlie the ability to remember past experiences and to imagine future events. We will examine the ability to remember and imagine scenarios by asking you to think about and describe events.

2. Your rights as a participant: Participation in this study is entirely voluntary. If you choose to participate, you can change your mind at any time without giving a reason and without any negative consequences. If you are a student of the researchers we give our assurance that your participation or non-participation in this study will have no effect on your grades or relationship with the University and that you may contact the Head of the School of Psychology should you feel that this assurance has not been met.

After your participation is completed you may request access to your data. You will then have up to three months to request that your data be withdrawn from the study. You will be given a copy of this document to keep.

3. About MRI and EEG: MRI and EEG are routinely used for clinical purposes and has no known harmful effects on the human body. For an MRI scan you lie in a short tunnel inside a scanner machine, which produces a strong magnetic field. This is used to take images of the brain anatomy and to detect increased blood flow to active areas of the brain. During EEG, a cap of recording electrodes is placed on your scalp. The electrodes and the device used to record brain waves are electrically isolated so there is no possibility of shock in the unlikely event of an electrical fault in the equipment. The electrode cap is disinfected after each use to prevent the possibility of biological contamination.

4. Procedure: If you would like to volunteer, you will first be asked to answer some questions via phone or email (5 minutes, with your verbal or written consent) to check that you are eligible for the study and (if relevant) that it is okay for you to have an MRI scan. If you are eligible for the study, you will be invited to complete either some or all of the sessions described below. The scheduling of these sessions will normally be within days to weeks of each other. All sessions are between 2-3 hours.

If you decide to participate, at the beginning of your first session you will be asked to fill in a short questionnaire including demographic questions (e.g., handedness, age, education history) and questions about medical conditions that may affect the ability to complete the tasks (e.g., vision or hearing problems, any history of neurological or psychiatric conditions, or hypertension). This will take around 5 minutes to complete. You will also be asked to complete a short questionnaire about handedness (i.e. which hand is you dominant hand).

You are invited to participate in (researcher to tick):

☐ **Session 1** (Behavioural)

☐ **Session 2**
- ☐ Behavioural
- ☐ Behavioural (Audio-recorded)
- ☐ MRI
- ☐ EEG

☐ **Session 3**
- ☐ Behavioural
- ☐ MRI
- ☐ EEG

If you are invited to take part in **Session 1**, you will be asked to recall memories of events which have happened to you in the past. This session will take 2-3 hours to complete, depending on how easily you recall memories or how many breaks you need.

If you are invited to take part in **Session 2**, you will be asked to recall memories of events which have happened to you in the past, as well as imagine events such as past events that never actually happened or future events that could occur. You may also be asked to complete other comparison tasks, including sentence construction, object memory, odd-even digit decisions, perceptual decisions, generating uses for objects, and/or rating personality traits in reference to the self or another person. This session may be audio-recorded and later transcribed. No identifying information (e.g., names) will be included in the transcription. This session will take 2-3 hours to complete, depending on how easily you generate events or how many breaks you need.

If you are invited to take part in **Session 3**, you will be asked to make memory decisions about information previously presented or imagined in Session 1 or 2. You will also be asked to complete other comparison tasks (sentence construction, object memory, odd-even digit decisions, perceptual decisions, generating uses for objects, and/or rating personality traits). This session will take approximately 2-3 hours to complete.

All behavioural sessions will take place in the School of Psychology, The University of Auckland, with the tasks being presented on a computer screen in the lab.

All MRI sessions will take place at the Centre for Advanced MRI (CAMRI), located in the Faculty of Medical and Health Sciences, Park Road, Grafton. For the first 20 minutes, we will give you instructions and a practice task. The MRI scan will follow for 50-75 minutes. For this scan, you will change into a gown, removing all metallic objects and jewellery. You will then be asked to lie on your back on a bed, and lightweight equipment will be placed around your head. Because the scanning is noisy you will be given protective headphones to wear. You will then be slid into the scanner tunnel on the bed. You will be asked to remain as still as possible so that the images are movement free. You will be able to make contact with the MRI operator via voice or the emergency buzzer at all times, and can request to be slid out of the scanner at any time. In the first part of the scan you will listen to music for eight minutes while we image your brain anatomy. In the next part we will be taking images of your brain activity while you do thinking tasks such as those described above. Task information will be projected to a small screen above your head, and you will respond by pressing buttons.

5. Risks and discomforts. There are no known side effects or risks associated with either EEG or MRI scanning. They are painless, and involve no radiation exposure, needles, or injections. However, MRI is unsafe for people who have magnetic metal implants in their body (e.g. pacemaker, hearing aid, screws/plates from an operation, etc.). At the MRI centre, you will be asked to fill out a safety checklist to make sure that this is not the case for you. People who are prone to claustrophobia can find lying in the narrow tunnel of the MRI scanner difficult. Therefore we do not recommend that they participate. Very rarely people can find the scanner makes them feel warm or can feel a tickling or twitching sensation. These are harmless. However, if you feel uncomfortable for this or any reason whilst in the scanner you should let the MRI operator know via the communication system or the emergency buzzer. It is always your right to request that scanning be discontinued and that you be removed from the scanner. Finally, completing the tasks may be a little tiring. During the testing sessions, you will be able to stop and have a break at any time. During the MRI scan, you will have a short break between each 10 minute scan.

6. Detection of Abnormalities: Your MRI scan is for research and is not a medical examination; therefore images are not routinely reviewed by a radiologist. It is possible (although unlikely) that we may incidentally find an abnormality in your brain that is clinically significant. In this event, it is CAMRI policy that you must be informed. You should be aware that such knowledge would have consequences for you. For instance it could affect your ability to obtain insurance (whether or not you take the matter further), or your ability to work in certain professions. <u>If you would not want to know, you should not participate.</u>

7. Benefits. Your participation will contribute towards our understanding of memory and imagination. As compensation for your time you will receive $25 for each session you participate in. You can also request a copy of the final published report of the study. If you complete an MRI session, you will also receive an electronic copy of the anatomical image of your brain.

8. Confidentiality and data storage. Yes/No responses to the pre-screening questions will be stored in a password-protected email account or a locked filing cabinet and will be

deleted/destroyed once we have determined your eligibility. Your name will only appear on the attached Consent Form, which will be coded with an identification number. This identification number is used to de-identify all other data, so that your identity is kept confidential. Your data (i.e. questionnaires, tests) will only be referred to or labelled using this identification number. The Consent Form will only be seen by you and the researchers, and will be kept in a secure filing cabinet for six years, after which time it will be securely and confidentially disposed of. Audio recordings will be transcribed either by a trained research assistant or professional transcriber who has signed a confidentiality agreement; all identifying information (e.g., names) will be removed from transcriptions. After completion of the study, data in written form will be kept securely for a minimum of six years, after which time it will be securely and confidentially disposed of. Computerized data will be stored indefinitely on password-protected University of Auckland computers, to allow for publication and future re-analysis.

Data sharing encourages transparency in science and allows other researchers to make use of collected data. It is possible that other researchers may request the use of these data. If such a request is received, your de-identified data will be shared in accordance with the Privacy Act 1993: only with the permission of the researchers (Prof Addis, A/Prof Tippett and/or Dr Roberts), solely for the purpose of research, and only once it is ensured that none of the data can identify you (for instance, we will take additional steps to remove any potentially identifying information from transcripts such as names, and to remove any external physical features captured by the MRI images in case these could be potentially identifying).

Any publications or presentations arising from this research will not contain any information that could personally identify you. Any publications arising from the work will be made available on online, and where possible we will alert you to this.

9. Cultural Considerations. We recognise tikanga or cultural protocols surrounding tapu of the head and hair and how these interplay with neuroimaging research, and have culturally-relevant protocols available for Māori and Pacific participants. We appreciate the significance of the head and brain connection, as well as how this links to a person's cultural identity, mana, hapū and iwi. The application of an EEG cap or placement of the head in an MRI scanner shifts the state of tapu of the head and hair. Moreover, as both methods digitally acquire signals from the brain, the material is no longer located solely with the sovereign person which could potentially compromise the mana of the individual, depending on how this material is utilised or reported. If the tapu of the head and hair is shifted by engagement with these methods, this could potentially impact the applicability of research outcomes to Māori and Pacific people. In order to acknowledge this process and respect mana of the individual, and to safely guide the process of shifting the tapu of the head and hair back, a karakia, prayer or practice is welcomed before EEG net application or being placed in the MRI scanner. You may also opt to have a Kaumātua or elder present during the EEG and/or MRI. You are encouraged to consult with your whānau, or extended family ('ānau/ʻaiga/kāinga/magafaoa), or hapū or iwi, or with cultural experts/elders your regarding your participation in this project.

10. Contact Details and Approval.

We appreciate the time you have taken to read this invitation.

If you have any queries, please contact:

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For any concerns regarding ethical issues you may contact the Chair, The University of Auckland Human Participants Ethics Committee,
University of Auckland Research Office,
Private Bag 92019, Auckland 1142,
Ph.: (09) 373-7599 Ext. 83711
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APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE
on 23/02/2021 for a period of 3 years. Reference number 020728