

PARTICIPANT INFORMATION SHEET FOR BRAIN STIMULATION AND EEG STUDIES

Title of Project: Neural substrates of depth perception

Principle Investigator: Dr Andrew Welchman

Experimenter: Dr Elizabeth Michael (Postdoc Fellow), Lukas Schaeffner (PhD student)

Dear Participant,

You are invited to take part in a research study. Before you decide whether or not you wish to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Feel free to contact us if there is anything that is not clear or if you would like more information.

What is the purpose of the study?

This study will examine the brain's mechanisms for perceiving 3D shape. We are particularly interested in how the brain uses different depth cues to help us perceive their 3D structure. We combine behavioural measurements with brain stimulations techniques: Transcranial Magnetic Stimulation (TMS) and Electroencephalographic (EEG) measurements of brain activity. These help us identify the link between human depth perception and human brain function.

Who can participate?

We are recruiting healthy adults with normal or corrected-to-normal vision. If you require glasses or contact lenses then you must wear them. If you have or have had a squint in one eye, amblyopia, strabismus, blindness or uncorrected vision in either eye then you will not be able to participate. If you have photosensitive epilepsy or suffer from visual stress then you cannot participate. We will use a short questionnaire to assess your eligibility for inclusion in the study. The questions are designed to ensure that (i) it is safe for you to participate and (ii) that your data is representative of the sample of healthy adults. We respect your privacy and only ask questions that are likely to have a bearing on the interpretation of the results from this study. Participants must be free of any serious medical condition or past history of neurological or mental illness and not currently taking any prescription drugs. If you are unhappy about answering a particular question, or are not clear why the questions are being asked, please ask us.

Do I have to take part?

Your participation is voluntary. You are free to withdraw from the study at any time without giving a reason and you will be entitled to any agreed payment up to the point when you withdraw. Your withdrawal will not affect your medical care, academic standing, or career now or in the future.

What will happen to me if I take part?

It is expected that you will take part in 2-4 behavioural only sessions and 3-6 stimulation sessions. The number of sessions can vary due to the nature of the study and is at the discretion of the experimenter. Sessions will take place over separate days. Experiments will take place at the Department of Psychology (Downing Site). The experiments will be conducted in dimly-lit room. During the experiment, you will be presented with a series of images on the screen and will be asked to make judgments about their visual appearance, responding using response buttons. We will also use an eye tracker to monitor the position of your eyes during the study.

Behavioural sessions and brain stimulation sessions will last 1-2 hours. You will be paid £7.00 per hour for each behavioural session, £7.50 for each stimulation session and £8.00 for each EEG session. The total amount that you will be paid depends on the number of sessions which are attended. The number of sessions which you may need to attend can vary due to the nature of the study and is at the discretion of the experimenter. We will do everything we can to ensure that you are comfortable and relaxed during the experiment. Don't hesitate to tell us if you have any questions or are unhappy with anything about the experiment.

What is TMS?

TMS is a widely used, non-invasive neurophysiologic technique that allows the induction of a current in the brain using a magnetic field to pass the scalp and the skull safely and painlessly. In TMS, a current passes through a coil of copper wire that is encased in plastic and held over the participant's head. This coil resembles a paddle or a large spoon and is held in place either by the investigator or by a mechanical fixation device similar to a microphone pole. As the current passes through the coil it generates a magnetic field that can penetrate the scalp and skull and in turn induce a current in the participant's brain. TMS has been used safely in thousands of individuals around the world for more than 25 years. It does not involve ionizing radiation, intravenous injections or any unpleasant or invasive procedures.

In the present study we will use TMS to assess how it affects your performance on a particular task. These techniques produce slight changes in brain activity, meaning that we can temporarily and reversibly disrupt function in a cortical area of interest, so that we learn about the functional role of that region for perception.

What is the EEG Study?

Electroencephalography (EEG) is a well-developed imaging technique to record electrical activity along the scalp. It measures voltage fluctuations resulting from ionic current flows within the neurons of the brain. This technique is a widely used, fully non-invasive method for measuring the brain responses during different psychological tasks.

At the start of the EEG session, we will attach some recording electrodes to your scalp. These electrodes are safe and comfortable to wear, and we will take time to familiarise you with the equipment. This will include measuring your head size, using alcohol swabs to clear four small patches of your skin near ears and eyes, wearing the cap, injecting the conductive gel into the electrode holders of the cap, placing electrodes onto the cap and finally arranging the cable and connecting it to the signal amplifier. The cap and electrodes only sit on top of your scalp. After fitting the electrode cap you will be guided to a nearby recording cubicle, where a camera is set up to assist the recording. During the EEG test, you will be asked to perform a task similar as you do in the behaviour tests. We will record your responses, brain activity and track your eye positions using a response pad, a signal amplifier and a camera. The whole procedure is likely to take 2-3 hours of which 1.5 hours maximum will involve EEG recording.

What are the possible risks of this research study?

TMS is a safe a, non-invasive technique, which has no known medium or long term risk, although such risk cannot be completely ruled out. Occasionally, TMS may be associated with minor discomfort or mild headache, which invariably settle with time or with simple analgesics (common pain medication). Nevertheless experimenters will observe you and question you to check that you are comfortable during the experiment. Because TMS uses magnetic fields and tES produces electrical stimulation, it can be harmful in people who have a pacemaker or metal implants in the body. Please inform the investigators if you might have any metal in your body.

In rare instances, TMS has been reported to induce seizures in individuals already susceptible to seizures with a family history of epilepsy and, in extremely rare cases, in otherwise healthy individuals. Please inform the investigators if there are cases of epilepsy in your family. As TMS

uses magnetic fields, it has the potential to project small metal objects with force, potentially injuring any nearby personnel. For these reasons, you must complete the screening form provided to you by the experimenter before you can be invited to participate in this or any other TMS study. These details will be double checked upon your arrival and you must check that there are no metal objects on your person. Since the effects of magnetic or electrical stimulation on the foetus are unknown, you are advised not to take part if you might be pregnant.

We do not anticipate any particular physical discomfort, stress or effects on your well-being. You will be asked to keep your head still, and we ask you to maintain concentration during the experiment. There will be regular opportunities for a brief break, and the images you view are not likely to cause distress.

What are the possible benefits from taking part in this research study?

You will receive no direct benefit from taking part in this study. However, your participation may provide information about the neural mechanisms underlying depth and 3D shape perception, but this benefit is not assured.

Withdrawal of participant by principal investigator

The study Director may decide to withdraw you from this study if

- i) you do not meet the safety criteria for TMS
- ii) you are unable to perform the tasks requested.

Withdrawal by the participant

You are free to withdraw from the study at any time without giving a reason. You can ask for your data to be withdrawn from the study after collection up to the point that it is aggregated with the data obtained from other participants (typically within a week of collection).

Will my taking part in this project be kept confidential?

All information that is collected about you during the research will be kept confidential, and your contact details (i.e., name and address) are stored separately from other identifying data. To ensure that you cannot be recognised from the data, we assign each participant with a coded number for identification purposes. The information which you supply and that which may be collected as part of the research project will be entered into a filing system or database and will only be accessed by authorized personnel involved in the project. By supplying this information you are consenting to the University storing your information for the purposes stated above. The information will be processed by the University of Cambridge in accordance with the Data Protection Act 1998.

What will happen to the study results?

The responses we collect during the experiment will be used to advance understanding of the brain mechanisms of perception. We will present the results at conferences and publish it in appropriate outlets (e.g., academic journals). When we do this, we typically present the average result from a group of participants. When the data you provide is presented, it is done so anonymously so that no one would be able to identify you from the data. If you would like to receive a copy of any papers that are published as a result of this study, please let the experimenter know.

To maximise the value of this study for brain research, and ensure an open scientific process, it is our duty to share the results from this study with other researchers. Typically this happens when the findings are published, and the raw results are made freely available. When this happens, no personal information about you is provided to other researchers. We will provide simple summary information about our participants (e.g., "12 women and 8 men participated; their average age was 24 years"), and anonymous computer files that record the responses you make about 3D shapes as part of the study. Your eye movements are recorded as a series of positions over time; we do

not store pictures of your eyes. Your responses to the screening questionnaire are used only for the purpose of assessing your eligibility to participate, and will not be shared with others.

Who is organising and funding the research?

Wellcome Trust, EU FP7.

Ethical review of the study

The project has received ethical approval from the Psychology Research Ethics Committee of the University of Cambridge. The study is insured by the University of Cambridge.

Further information

If you have any questions or concerns about the study, please contact the Principal Investigator:

Dr Andrew Welchman, Department of Psychology, University of Cambridge, Downing Street, Cambridge, CB2 3EB, UK
Email: aew69@cam.ac.uk

If any matters cannot be satisfactorily resolved with the Principal Investigator, you may contact:

The Administrator of the Cambridge Psychology Research Ethics Committee,
School of the Biological Sciences, 17 Mill Lane, Cambridge, CB2 1RX, UK

STATEMENT OF CONSENT FOR BRAIN STIMULATION STUDIES

Title of Project: Neural substrates of depth perception

Please tick the boxes if you agree.

- I confirm that I have read and understand the Participant Information Sheet
- I have had the opportunity to ask questions and had them answered to my satisfaction
- I agree that data gathered in this study may be stored anonymously and securely, and may be used for future research
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason
- I am an adult (over 17 years old) and agree to take part in this study

Name of Participant	Date	Signature

Name of Experimenter	Date	Signature