Principal Investigator: Prof Tim Griffiths

Neural Entrainment for Speech and Sound Patterns
Volunteer Information Sheet

You are being invited to take part in a research study. Before you decide whether you wish to take part it is important that you understand why the research is being done and what it will involve. Please read this information carefully and discuss it with others if you wish. Please do not hesitate to contact us if anything is unclear, or if you require more information. Take time to decide whether you wish to take part. Details about the conduct of the study are also explained which will help you to decide whether you wish to take part.

This study was approved by the Faculty of Medical Sciences Research Ethics Committee, part of Newcastle University's Research Ethics Committee. This committee contains members who are internal to the faculty, as well as one external member. This study was reviewed by members of the committee, who must provide impartial advice and avoid significant conflicts of interests.

Frequently asked questions:

What is the purpose of the study?

The main aim of the study is to establish if the brain can track acoustic information extracted from naturalistic ongoing speech sentences when it's masked by noise or sound patterns that resemble speech. This will contribute to the effort of understanding how the human brain processes complex sounds as well as developing a hearing assessment tool for real-life listening ability that can be used in a wider population such as non-native speakers of the test language or infants. We expect to see neural entrainment to the acoustic features we're interested in and a similar pattern of brain activities for processing speech-in-noise and auditory figure-ground sounds.

What does taking part involve?

The study involves one visit to the Auditory Cognition Lab in Newcastle University Medical School. The visit will involve the following:

- Discussion of the study, and the signing of a consent form.
- A hearing test (pure tone audiogram).
- An electroencephalography (EEG) session. In this, a fabric cap is placed over your head, which is like a swimming cap with several holes on them. Conductive gel is placed in the holes (a similar consistency to hair gel, which will remain in your hair until washed out with water). This cap records the electrical signals that your brain naturally generates. This takes around 20

minutes to set up, and then runs for around 60 minutes. The most important things you need to do during the EEG session are to stay awake, keep your eyes open (constant blinking and closed eyes will severely impact the data quality), and keep your head, face, neck and body in a relaxed state. You will be asked to do a simple task of button pressing to keep your attention focused on the sounds. You will be given breaks during the 60 minutes of recording.

What would I gain by taking part in the study?

By taking part, you would be helping to better understand a common and unsolved hearing condition, in a way that might lead to improved treatments. Some volunteers find it an interesting experience to take part in this type of research. Volunteers also receive a participation fee of £20 for your time.

Where does the study take place?

The study takes place in the Auditory Cognition Lab at Newcastle University Medical School, Framlington Place, Newcastle upon Tyne, NE2 4HH. The meeting point is the Newcastle Medical School Main Reception, which is just inside the Medical School Main Entrance.

Are there any risks to taking part?

The study is rated as low risk. The sounds used are confined to safe levels tested by a pilot study of 150 participants, which cannot cause any damage to your hearing. However, if you suffer from hyperacusis or misophonia the metallic sounds used in this study might make you feel uncomfortable.

EEG does not have any associated risks. You could refer to the NHS webpage https://www.nhs.uk/conditions/electroencephalogram/ for more information on this method. Some people can get tension headaches due to the tight-fitting cap, but this can be somewhat prevented by using a slightly bigger cap.

The only substance applied to your skin is electrolyte gel (which looks, feels and washes out like ordinary hair gel), and allergic reactions to this are very rare (although if you do have skin conditions that make you allergic to skin products or hair gels you could be allergic to this as well). Very slight rubbing with a blunt plastic syringe is applied to various spots on your scalp to part your hair when applying the gel, but it is rare for this to be uncomfortable or cause any minor skin abrasion.

Am I eligible to take part?

The official inclusion and exclusion criteria are:

Inclusion criteria:

- Age 18 or over
- English native speaker (born in the UK)
- The ability to make and communicate an informed choice about whether to take part in the study

- The ability to sit still and comfortably in a chair for around 1 hour at a time. Please note that while you will have breaks during which you can stretch a little bit, you will not be able to leave the chair without stopping the recording completely.
- Normal vision or correct-to-normal vision. Please wear your glasses during the recording session as poor vision will affect EEG data quality.

Exclusion criteria:
- Hearing disorders (hearing impairment, tinnitus, Meniere's disease, misophonia, hyperacusis, auditory processing disorders, etc.) and speech and language disorders (dyslexia, aphasia)
- Mental health problems such as depression, anxiety disorders, neural diversity and developmental disorders such as ADHD, autism spectrum disorder, learning disabilities etc.
- Any abnormality of brain structure (e.g., traumatic brain injury, stroke, tumour), or other neurological disorder (e.g., migraine, multiple sclerosis or epilepsy)
- The ongoing use of psychotropic drugs, sedating medications, or other nerve-acting medications

If in any doubt about your eligibility, please contact a member of the research team.

Do I have to take part?

Participation in this study is voluntary and you are under no obligation to take part. You are free to withdraw at any point before or during the study and without giving a reason. If you do decide to take part, you will be asked to sign a consent form.

What information will I have to provide, and what will happen to it?

We obtain two types of information from you:
- **Personal information:** This is details such as name, age, sex, and contact details. This is stored securely and confidentially. In line with local policy, these data are held for 5 years after the end of the study. There is a chance that the study will be audited, in which case certain individuals from the regulatory authorities may need to look at these records.
- **Research data:** This is not identifiable to you as an individual, and contains the results of all the experiments you take part in. These data may be stored indefinitely, but you have the right to request that your data be deleted. This is possible up until the personal information for the study is deleted, after which point it may become impossible to identify which research data is yours.

Who is funding and running the study?

The study is funded by the Medical Research Council (MRC) and sponsored by Newcastle University. The Chief Investigator is Professor Tim Griffiths, Professor of Cognitive Neurology.

What if something goes wrong?

The study is essentially safe, but if you have a grievance with how you have been treated during the study, or feel you have suffered as a result of taking part then the following options are available:
- Raise this issue with the research team – Professor Tim Griffiths: tim.griffiths@newcastle.ac.uk
- Raise the issue in writing with the Newcastle University Central Executive Office:

(Care of the) Head of Executive Office
Newcastle University
King's Gate
Newcastle upon Tyne
NE1 7RU