# Participant Information Sheet

**Date that data collection will start:**

October 2026

**Project Title: Neural Processing of Naturalistic Sounds: Ear-EEG Validation and Conversational Interaction**

Kia ora. You are invited to take part in a research study that uses electroencephalography (EEG) to measure brain responses during sound processing and conversation. This research programme is led by Professor Paul Sowman and Associate Professor Mangor Pedersen of the AUT School of Science, Auckland University of Technology (AUT), New Zealand. The research team also includes co-investigators Dr. Dion Henare and Dr. Rachael Sumner, and research assistants Bin Gou, Cornelius van den Berg, Stephen Willis and Xiaohan Mu, who carry out data collection under their supervision.

**What is the purpose of this research?**

This study aims to evaluate portable and comfortable techniques for measuring brain activity during sound processing. Specifically, we are comparing wearable sensors placed around the ears (ear-EEG) with traditional scalp-based methods. We want to verify whether these discreet devices can capture brain signals as effectively as standard laboratory equipment in various auditory and interactive contexts.

During the session, you will sit comfortably in a chair while wearing the non-invasive sensors. Depending on the specific session, your task may involve passive listening (for example, listening to sounds while watching a silent video, or listening to a recorded conversation) or taking part in a conversation yourself. You do not need any special skills; we simply want to record your brain's natural activity as you process different types of sound.

Approximately 250 healthy adults will take part in this research in New Zealand. There are no overseas participants.

The findings of this research may be used for academic publications and presentations.

**How was I identified and why am I being invited to participate in this research?**

You have received this information sheet because you responded to our recruitment advertisement. We are inviting healthy volunteers to participate who meet the following criteria:

- Age 18 years or older.
- Self-reported normal hearing (required for auditory processing tasks).
- Healthy volunteer with no self-reported history of significant neurological or psychiatric conditions.
- Ability to provide voluntary informed consent and to understand study procedures in English.
- Physically and cognitively capable of performing computer-based tasks and sitting comfortably for up to 2 hours.

The sessions that involve a conversation additionally require you to be a fluent English speaker, so that the conversation is natural. The listening sessions do not require conversational fluency.

To ensure the safety of our participants and the quality of the brain signal (EEG) recordings, you may not be eligible if any of the following apply:

- **Sensory:** Known hearing loss, severe tinnitus (ringing in the ears), or uncorrected visual impairments.
- **Neurological:** A history of epilepsy, seizures, recent stroke, or traumatic brain injury.

- **Implants:** Metallic implants in the head (e.g., cochlear implants) or active devices like pacemakers. (Note: Dental fillings are perfectly fine).
- **Skin & Allergies:** Active skin conditions (e.g., eczema, open wounds) on the scalp or around the ears, or allergies to medical adhesives/gels.
- **General Health:** Current acute infection (e.g., flu, fever) or taking medications that significantly alter brain activity.
- **Physical & Cultural:** Hairstyles (e.g., thick dreadlocks, cornrows) or cultural/religious observances that prevent the sensors from making direct contact with your scalp or ears.

**How do I agree to participate in this research?**

If you are interested in participating, please scan the QR code on the recruitment advertisement or click the link provided to complete a brief online screening questionnaire. This will help us confirm your eligibility. Alternatively, you can contact the research team by email at hms3061@autuni.ac.nz.

Before the experiment begins, you will be given time to read this information sheet again and ask any questions. If you are happy to proceed, you will be asked to sign a Consent Form.

Your participation in this research is voluntary (it is your choice) and whether you choose to participate will neither advantage nor disadvantage you. You can withdraw from the study at any time by informing the Researcher. If you choose to withdraw from the study, then you can ask for information collected up until your withdrawal from the study to be deleted unless you withdraw after the study analyses have been undertaken (typically within 2 weeks after your recording session).

**What will my participation involve?**

If you agree to take part, you will be invited to the Cognitive and Computational Laboratory (Room AB101) at the AUT North Campus. The entire session will take approximately up to 2 hours in total.

1. **Arrival & Consent:** When you arrive, a member of the research team will welcome you and give you time to read this information sheet again. You will have the opportunity to ask any questions before deciding whether to take part and signing the consent form.
2. **Confirmation of Details:** After signing the consent form, we will briefly confirm the demographic details you provided during the online screening (such as ethnicity and handedness) to ensure our records are accurate.
3. **Equipment Setup:** During the session, non-invasive EEG recording equipment(s) will be used to measure brain activity. This may include wearable sensors placed around the ears, and where appropriate, additional sensors positioned on the scalp. You will be seated comfortably while the equipment is prepared. To ensure good signal quality, the skin around the ears and/or scalp may be gently cleaned using standard EEG preparation materials. This process is safe and may feel similar to light exfoliation or gentle rubbing. The EEG equipment is passive and does not deliver any electrical stimulation to the body.
4. **The Experimental Tasks:** Once the equipment is in place, you will begin the sound processing activities. Depending on the specific session you are assigned to, this will involve one of the following progressive stages:

- **Passive Auditory Stimulation:** Listening to simple tones and sequences while watching a silent video.
- **Passive Speech Listening:** Listening to continuous, one-sided speech (like a podcast recording).
- **Passive Conversation Listening:** Listening to a recording of a conversation between two other people. These recordings come from a published research dataset collected by another research group, whose participants agreed to their recordings being shared with other researchers. In

some of the recordings the sound is processed so that the words are no longer intelligible while the rhythm of the speech is preserved.

- **Structured Dialogue:** Having a structured conversation with an artificial intelligence (AI) conversation partner, similar to chatting with a computer assistant. This part of the session is divided into three blocks of about 15 minutes with a short break between them. The settings of the AI partner are varied between blocks. We do not tell you which setting applies to a given block, so that your impressions are not influenced by what you expect.
- **Free Conversation:** Having a naturalistic, topic-guided conversation with another volunteer taking part in the study. You will both be given neutral topic cards and asked to avoid personal health, politics, religion and identifiable personal history.

None of these activities require any specialist knowledge. The recording is divided into shorter blocks with regular rest breaks to ensure your comfort, and you may take additional breaks at any time if needed.

5. **Questionnaire about the Conversation:** If your session includes a conversation, you will also complete a short questionnaire about how you experienced it. In the sessions with an AI conversation partner this is completed after each of the three blocks; in the sessions with another volunteer it is completed once at the end. It asks only about your experience of the conversation, not about your personality, mental health or medical history. It is completed online, and a paper version is available if you would prefer not to use the online platform. The time for it is included within the two hours.
6. **Completion & Clean-up:** At the end of the session, the sensors will be removed. Facilities will be available for you to clean your skin or hair if needed, and you will be given time to prepare before leaving.

We will explain each step of the study in detail, and you can ask questions at any time.

**Study Equipment:** Below are images of the devices we use, so you know what to expect:



*Figure 1: Example of an ear-EEG sensor configuration. (Source: M. Knierim / openbci-ceegrids)*



*Figure 2: Example of a standard EEG cap. (Source: Compumedics Neuroscan)*

**What are the benefits?**

**To you as a participant:** You may not receive any direct personal benefit from taking part in this study. Some participants may find it interesting to learn about EEG research and to experience how non-invasive brain recording equipment is used in a research setting.

**To the wider community and society:** This research aims to contribute to the broader scientific understanding of brain activity measured using non-invasive EEG techniques. The findings may help inform future research into the development of wearable tools for monitoring brain health and activity in everyday settings.

**To the research team:** This study contributes to ongoing research into innovative neuro-technologies at Auckland University of Technology.

**What are the costs?**

The main cost to you is your time. Participation will typically involve a session of up to 2 hours. You will also need to cover your own travel and parking costs to attend the session at the AUT North Campus. To acknowledge your time and contribution, and to help offset any travel or parking expenses, you will receive a Koha in the form of a $30 supermarket voucher at the end of the session.

**Will the results of the study be published?**

Results may be published in peer-reviewed, academic journals. Results will also be presented during conferences or seminars to wider professional and academic communities. A plain-language summary of the results will be made available to participants on request. You will not be identifiable in any publication.

**What are the discomforts and risks?**

**Physical Discomfort and Skin Preparation:** Applying the sensors involves the researcher touching your head and the area around your ears. Some sensors are placed behind or around the ears, and additional sensors may be positioned on the scalp where appropriate. To ensure good signal quality, the skin around the sensors may be gently cleaned using standard EEG preparation materials. This process is safe and may feel similar to light exfoliation or gentle rubbing. Removing the sensors may feel like removing a sticking plaster (Band-Aid). Temporary redness or mild irritation of the skin may occur, but this usually resolves quickly.

**Boredom or Mild Discomfort:** The study requires you to sit for extended periods while focusing on your assigned tasks, with the entire session lasting up to 2 hours. This may cause temporary mental fatigue, boredom, or mild postural discomfort. To minimise this, regular rest breaks are included, and you may take additional breaks at any time if needed.

**Safety:** All EEG equipment used in this study is safe, non-invasive, and passive. The sensors only record brain activity and do not deliver any electrical stimulation to the body. This technology is safe and has been widely used in research for many years.

**Cultural Sensitivity:** We acknowledge that in Māori culture, the head (upoko) is considered tapu (sacred). We will treat this with the utmost respect and seek your permission before applying any sensors. You are welcome to have a whānau member or support person present, or to decline participation if you feel uncomfortable.

**General:** Your comfort is our priority. You may stop or withdraw from the study at any time if you feel uncomfortable or unwell.

**How will these discomforts and risks be alleviated?**

To minimise any discomfort, the following measures are in place:

**Skin Care and Hygiene:** The researcher is trained in the correct application and removal of EEG sensors to reduce the risk of skin irritation. Tissues, mirrors, and access to washing facilities (including a shower room and shampoo) are provided so that you can clean your hair and skin thoroughly before leaving the laboratory.

**Managing Comfort and Boredom:** The session includes regular rest breaks. You are encouraged to use these breaks to stretch, rest your eyes, or move around. The session is designed to be flexible, so additional breaks can be taken at any time upon your request to ensure you remain comfortable throughout.

**Cultural Support:** We respect your cultural values. You are welcome to have a whānau member or support person present during the session. The researcher will always seek your permission before touching your head or ears.

**Right to Stop:** You are in control of your participation. If the equipment feels uncomfortable or you feel tired, please let the researcher know immediately. The session can be paused, additional breaks can be taken, or the experiment can be stopped completely if you wish.

**What compensation is available for injury?**

In the unlikely event of a physical injury as a result of your participation in this study, rehabilitation and compensation for injury by accident may be available from the Accident Compensation Corporation, providing the incident details satisfy the requirements of the law and the Corporation's regulations.

It is not anticipated that this research would cause any discomfort beyond those described above; however, should you sustain an injury because of the research, you should contact the primary researcher (Professor Paul Sowman). Your injury will be assessed, and you will be referred for relevant medical assessment and, if needed, treatment.

**What will happen to information about me?**

1. **Confidentiality:** All information collected in this study will be kept strictly confidential and stored securely in accordance with Auckland University of Technology (AUT) research data management policies. Contact details (such as your name and email) will be stored separately from your research data. We will assign you a unique code (e.g., "P001") to replace your name on all research data. Only the named research team will have access to the secure "Master List" linking your name to your code.
2. **Audio Recordings:** Audio recorded during the dialogue stages will be used solely to align your neural signals with specific speech events. These recordings are a methodological tool and are not the primary data. Any incidentally disclosed personal information will be redacted before transcripts or annotations are shared. The recordings themselves are not included in any publicly shared dataset.
3. **Transcription:** To identify when words and speaker turns occur, the recordings are first transcribed automatically by a speech recognition program running on a computer in the laboratory. No audio or transcript is sent to any external or cloud-based service at any point. A member of the research team then checks and corrects the automatic transcript before it is used.
4. **If Your Session Involves Another Volunteer:** In the free conversation sessions, the other volunteer will hear what you say during the conversation. Both of you are asked on the Consent Form to keep the content of the conversation confidential, and the topic cards are chosen to keep the conversation away from personal or sensitive subjects.
5. **Storage and Retention:** The neurophysiological and behavioural data collected in this study do not constitute health data. Your de-identified research data (which cannot identify you) will be retained indefinitely to support future re-analysis and replication. Paper Consent Forms, which are the only documents containing identifying information, will be stored in a locked cabinet for a minimum of 6 years following the study completion before secure destruction.
6. **Open Science and Data Sharing:** Following the publication of the primary research, and only if you agree to this on the Consent Form, your de-identified data (including EEG recordings, behavioural data, and redacted speech annotations) will be deposited in the Open Science Framework, a publicly accessible scientific data repository. This is in accordance with open science and FAIR data principles (Findable, Accessible, Interoperable, and Reusable). Taking part in the study does not depend on your answer to that question.
7. **Your Rights:** You have the right to access and correct any personal information held about you. If you wish to do this, please contact the research team. By signing the Consent Form, you are confirming that you understand how your information will be used and stored.

**Use of New Technologies**

Two of the computer programs used in this study are based on artificial intelligence (AI). Both are open-source programs installed on computers in the laboratory. Neither is a commercial online assistant, and neither connects to the internet.

- The conversation partner. In the sessions that involve a conversation with an AI partner, the partner is a speech program running on a laboratory computer. Talking with it is a necessary part of those sessions; taking part in the study is voluntary, and you may decline or withdraw at any time.
- Automatic transcription. Recordings of conversations are transcribed automatically by a speech recognition program, also running on a laboratory computer, and the transcript is then checked and corrected by a member of the research team.

**What these programs receive:** the audio of the conversation, which includes your voice. Nothing else about you is given to them. Your name and contact details are never entered into either program.

**How your information is protected:** neither program sends anything over the internet, and no external company or third-party service is involved. There is no account to create and no advertising. Your audio and the transcripts are held on the password-protected AUT network drive in Aotearoa New Zealand, accessible only to the named research team. Any personal details you happen to mention are removed from the transcripts by a member of the research team before any data is shared or published.

**What it costs you:** nothing. You do not need a device, an account, or a payment method of any kind.

**Māori data sovereignty**

Māori data sovereignty is about protecting information or knowledge that is about (or comes from) Māori people. We recognise the taonga (treasure/value) of the data collected for this study.

- The information from all participants will be treated with the utmost respect and cultural safety.
- To uphold the principles of Māori data sovereignty, data collected from Māori participants will remain strictly on local, secure AUT network servers within Aotearoa New Zealand. It will not be stored on commercial offshore cloud platforms (such as OneDrive), nor will it be uploaded to public Open Science repositories under any circumstance.
- We acknowledge the rights of Māori to exercise guardianship (Kaitiakitanga) over their data. If you identify as Māori, we are open to discussing any specific cultural preferences you may have regarding the storage or disposal of your data.

**What opportunity do I have to consider this invitation?**

We recommend taking up to 2 weeks to consider this invitation and ask any questions you may have.

**Will I receive feedback on the results of this research?**

Yes. Once the study is completed and the results have been analysed, a plain-language summary of the findings will be available to all participants who wish to receive it. This summary will explain the overall outcomes of the research but will generally not include individual EEG results. This is because research EEG data is typically most meaningful when looked at as a group to reveal patterns, and individual recordings can be difficult to interpret on their own.

If you would like to receive this summary, you can indicate this on your Consent Form. The summary will be emailed to you once the project is finished.

**What do I do if I have concerns about this research?**

Any concerns regarding the nature of this project should be notified in the first instance to the Primary Researcher: Professor Paul Sowman, paul.sowman@aut.ac.nz

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEC, ethics@aut.ac.nz, (+649) 921 9999 ext 6038.

**Who do I contact for further information about this research?**

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

**Primary Researcher Contact Details:**

Professor Paul Sowman, paul.sowman@aut.ac.nz

Associate Professor Mangor Pedersen, mangor.pedersen@aut.ac.nz

**Researcher Contact Details:**

Bin Gou, Research Assistant, hms3061@autuni.ac.nz

***Approved by the Auckland University of Technology Ethics Committee on 21 September 2026, AUTEC Reference number 26/266.***