Institute of Cognitive Neuroscience
Director: Prof Sophie Scott
UCL Institute of Archaeology
Director: Prof Kevin MacDonald
Lead Researcher: David LG Miedzianogora
david.miedzianogora.23@ucl.ac.uk
Principal Investigator: Prof Antonia Hamilton
a.hamilton@ucl.ac.uk

Participant Information Sheet

UCL Research Ethics Committee Approval ID Number: 2307

YOU WILL BE GIVEN A COPY OF THIS INFORMATION SHEET

Title of Study: Knapping the Brain // The functional brain networks underlying late *Homo* stone tool technology: a neuroarchaeological approach

Department: UCL Institute of Archaeology, Faculty of Social and Historical Sciences & UCL Institute of Cognitive Neuroscience, Faculty of Brain Sciences

Name and Contact Details of the Researcher(s): David LG Miedzianogora (david.miedzianogora.23@ucl.ac.uk), supervised by Prof Antonia Hamilton (a.hamilton@ucl.ac.uk), Dr Matt Pope (m.pope@ucl.ac.uk), and Dr Ceri Shipton (c.shipton@ucl.ac.uk)

Name and Contact Details of the Lead Researcher: David LG Miedzianogora (david.miedzianogora.23@ucl.ac.uk)

Name and Contact Details of the Principal Investigator: Prof Antonia Hamilton (a.hamilton@ucl.ac.uk)

Invitation Paragraph

You are invited to take part in a PhD research project investigating which parts of the brain are associated with different Palaeolithic stone tool technologies. Before you agree to take part, it is important for you to understand why the research is being done and what it will involve for you. Please read the following information carefully. You can discuss it with a friend or family member if you wish. Please take your time and ask the lead researcher if you have any questions.

What is the project's purpose?

The purpose of this study is to understand the brain networks that allow people to make stone tools. This will help us better understand hominin evolutionary patterns and the difference in cognition between Neanderthals and *Homo sapiens*.

Why have I been chosen?

We have invited you to take part because you have a reputation as an expert flintknapper, with a proven or potential ability to manufacture Levallois and laminar blade technology. We are recruiting healthy adults to take part in the study. In the study, you will be given materials to replicate either a Levallois preferential flake or laminar blades whilst wearing brain and heart monitoring equipment, and being recorded by video capture equipment. This means you cannot take part if any of the following criteria apply:

- You are not proficient at replicating Levallois or laminar blade technology.

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- You do not speak English.
- You are currently undergoing treatment by a medical consultant for a psychiatric or neurological condition, or are on a waiting list for this treatment. Note that a well-managed condition (e.g., ADHD or depression where your medication and concerns have not changed in a year) does not impact on your participation in this study and does not need to be declared to the research team.
- Your hairstyle or head covering means that you cannot wear the brain monitoring equipment. This includes certain hairstyles which means that the optodes of the NIRS cap cannot reach the scalp. These could be fixed hairstyles such as dreadlocks, cornrows, or hair extensions – however, if you are willing to work with us to potentially make slight changes to your hairstyle on the day of recording to ensure proper fitting of the cap, you can still partake in the study.

We are recruiting up to 20 experts from across the UK and Europe.

Do I have to take part?
We would like to emphasise that participation in this research is voluntary. If you choose not to participate, you will not be penalised in any way or lose any benefits to which you are otherwise entitled. If you decide to take part, you will be given a copy of this information sheet to keep and be asked to sign a consent form. Even if you decide to take part, you can withdraw at any time, without giving a reason.

Information about your visit to the lab
What does this study involve?
This study is designed to explore neural correlates of prehistoric stone tool manufacture. To take part, you will need to visit the lab at the Institute of Cognitive Neuroscience in Queen Square, London. You will be asked to:

- Put on a monitor which track your breathing.
- Put on a near-infrared spectroscopy cap which records your brain activity patterns using infrared light.
- Replicate prehistoric stone tools, either Levallois or laminar blades. All necessary raw material and safety equipment will be provided for this, but you are free to use your own.
- Perform simple everyday tasks to act as a cognitive control. For example, you might be asked to read from a phone book, clap two stones together, or watch a documentary in your first language. You will be given specific instructions on these tasks on the day.
- Complete a questionnaire on paper or on a computer about your feelings or experiences. Please note that all these tasks use everyday items.

Each data collection session with the fNIRS cap includes 15 mins setup and 20-30 mins of data recording followed by a break when you can take the cap off and do other activities. There will be up to 8 data collection sessions per participant, none lasting more than an hour, spread over two days. The data recording will happen during normal working hours. Any necessary transportation and accommodation costs will be covered, and compensation will be provided.

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What kinds of recordings do we make? And what does this involve?
We use several different pieces of equipment to track your movements and brain activity while you do these tasks. You can choose which ones you will wear on your visit when you arrive at the lab and see the equipment. You can change your mind if you want and you do not have to wear all of them if you do not want to.

1) Near-infrared spectroscopy brain imaging
Near-infrared spectroscopy (NIRS) is a new technology that measures your brain activity using an optical cap. The sensors that are placed on your head will shine light into your head. Some of the light passes though the skull to your brain and is scattered back to other sensors that can detect it. By measuring the light that is picked up by the sensors, we can measure brain activity. This technology is safe and is most commonly used to monitor new-born babies in hospitals. It is now also being used for adult neuroscience research.

For this study, we will place the NIRS cap on your head and secure it with a chin strap. We will then fix the light probes to the cap. You will need to stay sitting down while the cap is in place. When the cap is turned on, the computer will record your patterns of brain activity. The NIRS system is silent and painless.

If you wear the NIRS cap for a long time, it can become tight and uncomfortable. For this reason, we limit our NIRS testing sessions to 30 minutes with the cap on. If you find the cap is uncomfortable, you can remove it sooner if you like. Just tell the researcher and they will help you take the cap off.

2) The Physiological Monitoring Sensors
A breath belt is a sensor which monitors your breathing with a belt around your chest. The belt can be placed over your clothes but works best if it fits closely to your body. For example, the belt can go over a t-shirt but should be under a jumper or coat. The researchers will show you how to put the breath belt on and adjust it to be comfortable.

If you do not want to wear these sensors, you can still participate in the research study.

3) Audio and video recordings
Audio and video recordings will be made of all the experimental tasks. You can find out more about how we use these recordings and all your data below.

What are the possible benefits of taking part in this research?
There are no immediate benefits to you. In the long term the research will help researchers understand the evolution of cognition in humans, as well as the interplay between tool manufacture and cognition. You can learn more about these topics by participating and having the opportunity to ask questions. You can receive a copy of any research output once they have been published in a peer-reviewed journal, should you wish.

What are the possible disadvantages and risks of taking part?
Some of the recording equipment we use can be uncomfortable. In particular, the NIRS cap can feel tight if you wear it for a long time. If you find something uncomfortable, you can remove it as soon as you like. Just tell the researcher and they will help you take the cap off.

As you will be knapping flint, there are risks associated with cuts and potential respiratory diseases. A complete risk assessment has been carried out and necessary precautions to minimise these risks will be taken, including using safety equipment (gloves, goggles, collecting flakes on tarpaulin) and conducting the knapping outdoors. Whilst we will offer our own safety equipment, you are welcome to use your own if preferred.

What if something goes wrong?
In the first instance, you should contact the lead researcher or PI. If one of these people is the object of complaint, you may wish to contact the ICN or Psychology and Language Sciences Ethics Chair. Participation in this study is covered by the UCL Public Liability Policy for indemnity.

Lead researcher	**Principal investigator**	**ICN Ethics Chair**	**PaLS Ethics Chair**
David LG Miedzianogora	Prof Antonia Hamilton	Prof Patrick Haggard	Prof Adam Harris
david.miedzianogora.23@ucl.ac.uk	a.hamilton@ucl.ac.uk	p.haggard@ucl.ac.uk	adam.harris@ucl.ac.uk
07933 856552			Dr Fiona Kyle (Deputy)
			f.kyle@ucl.ac.uk

Information about how we use your data
Will my taking part in this project be kept confidential?
All the information that we collect about you during the research will be kept confidential. You will not be able to be identified in any ensuing reports or publications. Please note that confidentiality will be maintained as far as it is possible, unless during our conversation the researchers hear anything which indicates that someone might be in danger of harm; in such a case, we might have to inform relevant agencies of this.

What will happen to my data in this project?
When you take part, we collect different types of data and we use this data in different ways, as described here:

1) Contact details and health data
When you first complete our online form to join the study, we ask you for your name, contact details, and whether you are currently undergoing treatment by a medical consultant for a psychiatric or neurological condition, or are on a waiting list for such treatment. This data is stored in our high-security data system which has been certified to the ISO27001 information security standard. Information within this system is used to arrange your visit to the lab. Your health information will be anonymised and linked to the core scientific data.

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2) Core scientific data

The core scientific data in this study includes the patterns of brain activation and physiological responses, together with the things you do in the tasks and your responses on questionnaires. This data will be stored with a participant code (not your name) and will be kept on our secure servers at UCL. This data is pseudonymous because it is stored and processed with a participant code, but those codes could potentially be linked back to your name via the high-security data system by an authorised member of the research group. This data does not show your face or voice, so people who work with this data cannot identify who you are without accessing the secure database. It will be analysed by researchers linked to our group. Fully anonymised results based on this data will be reported in MSc or PhD theses, in professional scientific journals, and at scientific conferences.

3) Video and audio data

Video and audio data cannot be anonymised because a person who knows you can recognise your face and voice. We store our video and audio data on a separate secure server for processing. The files will be analysed by the lead researcher in the first instance but might be seen by other researchers linked to the project (for example, thesis supervisors). Data will not leave the UK/EU and will not be used for any purposes outside this research project. The original video and audio files will be archived on a secure server and will not be shared outside the group of researchers working on this project unless you give explicit permission.

4) Possible sharing of video outside the research group (with additional consent)

Within the scope of this research project, we may ask a group of other researchers not formally associated with the project to note down what they observe in the videos to get a more objective understanding of the knapping process. Where possible, we will blur faces in these videos and remove voices, but this process is not always possible. Although your personal information (name, contact information) will not be available in the videos, your face and voice could be identified, so these videos are not anonymous. You can choose on the consent form if you want to allow video clips to be used in this way. You can also choose to allow short video clips to be shown in academic talks and teaching. You do not have to agree to this video sharing to take part in the study, and your choice will not affect your participation in the study in any other way.

5) Personal data

When you sign the consent forms and complete the project paperwork, your name and signature are stored for auditing purposes at the secure UCL servers. This personal data is kept entirely separately to your research data and will not be linked back to your research data.

What happens to my data after the study is complete?

Many researchers find data from studies like this very valuable in future research. When the study is complete, we will fully anonymise the core scientific data by removing all participant codes so that the data can never be linked back to an individual. We will then share the anonymised core scientific data with other researchers via the UCL data repository. There it can be accessed by all UCL researchers and by researchers from other universities with suitable

academic credentials, including researchers from outside Europe. This data is fully anonymised such that it is not possible for anyone to link the data back to your name, face, or voice.

Will my video/audio data ever be shared?
Sometimes, it is useful to use short video clips showing these tasks in scientific talks, presentations, and lectures. If you wish, you can give permission for the researchers to use your data in this way. Note that this data is NOT anonymous because your face and voice can be recognised but your name will not be used.

You can choose on the consent form if you want to allow video clips to be used in this way. If you select NO, your video/audio data will remain securely stored within UCL and researchers outside the research group will not have access. Your choice on video sharing will not affect your participation in the study in any other way.

What will happen to the results of the research project?
The summary results of this study will be published in scientific journals and will be available on the lead researcher's website, www.davidmiedzianogora.com. These results include data from several participants and you will never be identified in any report or publication.

What if I want to withdraw from the study after my visit to ICN?
If you want to withdraw from this project at any time, just tell David LG Miedzianogora. We will delete all your video and audio data and any other information linked to your name. It will not be possible to remove anonymised data from research analyses which have been completed and submitted for academic publication (e.g. PhD theses or research papers). Analyses are typically completed 2 or 3 months after a testing session.

General information
What should I do now?
• If you want to take part, please complete the consent form on the following page. You will then see our short background screening questionnaire. When you have completed this, a researcher will contact you to schedule a visit to the lab / a zoom call.
• If you do not want to take part, you do not need to do anything. We will not contact you about this study again.
• If you have any questions about the study, please contact David LG Miedzianogora.

We hope that you feel able to help us with this study. If at any time you decide that you do not want to continue to take part in the study, you are free to withdraw. Please simply inform the researcher about your decision.

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Data Protection Privacy Notice

Notice:

The data controller for this project will be University College London (UCL). The UCL Data Protection Office provides oversight of UCL activities involving the processing of personal data, and can be contacted at data-protection@ucl.ac.uk. UCL's Data Protection Officer can also be contacted at data-protection@ucl.ac.uk

Your personal data will be processed for the purposes outlined in this notice.

The legal basis that would be used to process your personal data will be public task. The legal basis used to process special category personal data will be for research purposes.

Your personal data will be processed so long as it is required for the research project. If we are able to anonymise or pseudonymise the personal data you provide, we will undertake this, and will endeavour to minimise the processing of personal data wherever possible.

If you are concerned about how your personal data is being processed, please contact UCL in the first instance at data-protection@ucl.ac.uk. If you remain unsatisfied, you may wish to contact the Information Commissioner's Office (ICO). Contact details, and details of data subject rights, are available on the ICO website at: https://ico.org.uk/for-organisations/data-protection-reform/overview-of-the-gdpr/individuals-rights/

UCL's full privacy notice is at https://www.ucl.ac.uk/legal-services/privacy/participants-health-and-care-research-privacy-notice

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Further project information

This study is part of the "The functional brain networks underlying late *Homo* technology: a neuroarchaeological approach" PhD project conducted by David LG Miedzianogora at the IoA and ICN. This project is funded by the Arts and Humanities Research Council and by research grants awarded to lead researcher.

This proposal was reviewed by the Institute of Cognitive Neuroscience ethics board. If you have any comments or concerns about this study, you should discuss these with the project leader (David LG Miedzianogora: david.miedzianogora.23@ucl.ac.uk) or the ICN ethics chair (v.walsh@ucl.ac.uk)

Thank you for reading this information sheet and for considering taking part in this research study.