# Offer #2025-09078

# PhD Position F/M Neural Representations of Multilingual Language Processing

**Contract type :** Fixed-term contract

**Level of qualifications required :** Graduate degree or equivalent

**Fonction :** PhD Position

## Context

The PhD will be supervised by Benoît Sagot at Inria (Inria Paris centre) in the ALMAnaCH project-team (http://almanach.inria.fr/index-en.html) and within the PRAIRIE-PSAI institute. It will be co-supervised by Demian Wassermann (Inria Saclay center, project-team MIND), and will take place in close collaboration with Christophe Pallier (NeurSpin). It will be financed by Benoît Sagot's PRAIRIE-PSAI chair.

## Assignment

**PhD topic**

Understanding how the brain encodes language remains one of the core challenges in cognitive neuroscience. In recent years, advances in nat- ural language processing (NLP)—particularly with brain-inspired neural network architectures—have opened new perspectives to explore how linguistic information is represented. By bringing together tools from both neuroscience and NLP, researchers can now directly compare the represen- tations learned by computational models with patterns of brain activity. This cross-disciplinary approach enables the development of more grounded and data-driven hypotheses about how language is processed in the human brain.

Although some multilingual datasets include stimuli and recordings in multiple languages (Li et al., 2022), to our knowledge, there is no fMRI neuroimaging dataset in which bilingual individuals perform the same task in both of their languages. To address this, our plan is to collect fMRI data from bilingual participants who speak both their first language (L1) and second language (L2) at a native or near-native level. We will examine how their brains respond to each language and how those responses relate to representations generated by computational models.

Overall, this PhD project will use tools from NLP to better understand how the brain understands and organizes multiple languages. By comparing brain activity

recorded during natural listening with deep learning model embeddings, we hope to reveal where artificial and biological language systems might converge. Focusing on bilingual individuals will allow us to study how the brain responds to the same meaning expressed in different languages. With this project, our aim is to understand whether the brain uses a shared or language-specific system to represent meaning and how closely these systems resemble the ones used by modern language models, or vice versa.

## Main activities

Main activities

The candidate’s main activities will include:

- keeping up-to-date with related work on the topic with regular reading
- carrying out research on the topic outlined above, both in the development of new ideas, positioning with respect to related work and validation of the methodology via experiments and analysis
- presenting their work work both internally to colleagues and externally in the form of conference/journal/workshop papers and in the final PhD thesis
- interacting and exchanging with colleagues on related topics

The PhD position is a 3-year funded position to start from the 1st September 2025.

## Skills

They should have a good level in programming (python), experience with neural networks and neuroscience and an interest in natural language processing and neuroimagery. A good written and spoken level of English is required. Knowledge of French and/or other languages is a plus.

## Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

## General Information

- **Theme/Domain :** Language, Speech and Audio
- **Town/city :** Paris

- **Inria Center :** Centre Inria de Paris
- **Starting date :** 2025-09-01
- **Duration of contract :** 3 years
- **Deadline to apply :** 2025-07-31

## Contacts

- **Inria Team :** ALMANACH
- **PhD Supervisor :**
  Sagot Benoit / Benoit.Sagot@inria.fr

## About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

## The keys to success

The position is a 3-year funded PhD position of starting on the 1st September 2025 at the earliest. Candidates should have a Master 2 or equivalent (e.g. engineering school) in a (or several of the) relevant fields (neuroscience, artificial intelligence, machine learning, natural language processing).

Qualities sought:

We are looking for highly motivated candidates with a strong background in the above-listed relevant fields. Ideally, candidates should be able to show initiative, creativity and have a good eye for analysis of data and results.

To apply:
In your application (which can be in English or in French), please include:

- CV
- Letter of motivation
- Optionally an example of your previous written work (if possible related to NLP), for example a master's thesis, research paper, etc.
- Certificat of Master's/engineering degree and grade breakdown

**Warning** : you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

## Instruction to apply

**Defence Security :**
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST).Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

**Recruitment Policy :**
As part of its diversity policy, all Inria positions are accessible to people with disabilities.