Cognition & Brain Dynamics

This document is the internal lab manual of Cognition and Brain Dynamics. If you are reading this manual, you likely joined the lab recently so welcome! If you are a current member, please, frequently refer to it for updated contents; better yet, make suggestions for improvements!

Location and mailing address

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Official affiliations (to use in all publications)

CEA/DRF/Inst. Joliot, NeuroSpin; INSERM, Cognitive Neuroimaging Unit; Université Paris-Saclay, Gif/Yvette, 91191 France

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What do those acronyms stand for?

We are hosted at NeuroSpin, which refers to the physical building located on the "plateau de Saclay) at Gif sur Yvette. The executive director of NeuroSpin is Cyril Poupon, assisted by Aurélie Valette and Stanislas Dehaene as scientific director. Stanislas Dehaene heads the Cognitive Neuroimaging Unit or UNICOG. UNICOG hosts five research teams and we, Cognition & Brain Dynamics (CBD), are one of them. The leader of the Cognition & Brain Dynamics team is Virginie van Wassenhove. The team is composed of three research groups, each led by a P.I.: Sophie Herbst, Virginie van Wassenhove and Simone Viganò.

Hence, UNICOG is a research unit affiliated to the:
1) Institut National de la Santé et de la Recherche Médicale (INSERM for short)
2) Commissariat à l'Energie Atomique et aux Energies Alternatives (CEA for short). The Direction de la Recherche Fondamentale (DRF) and Institut Joliot (Inst. Joliot). The institutional hierarchical structure is thus: CEA > DRF > Joliot (Institute) > Neurospin (Department) > UNICOG (Research Unit/Lab) > CBD (Team/Lab)
3) Université Paris-Saclay

CEA, INSERM, and Université Paris-Saclay are three independent institutions. We are affiliated to all three of them.

Some teams at UNICOG are also affiliated to the Centre National de la recherche Scientifique (CNRS) and to the Collège de France.

Wait, there's more!

Our team Cognition & Brain Dynamics is scientifically affiliated to one of the work package (WP5) of the IHU ReConnect, dedicated to audition. Inquire with Virginie for more information.

As of January 2025, Virginie van Wassenhove is also affiliated to ENS PSL and the Laboratoire of Cognitive and Computational Neurosciences (LNC^2) directed by Catherine Tallon-Baudry.

While complex, this landscape provides many scientific opportunities to all team members.

Welcome to Cognition & Brain Dynamics!

Scientific vision

The Brain - is wider than the Sky -
For - put them side by side -
The one the other will contain
With ease - and You - beside -

Emily Dickinson

The human brain has 100 billion neurons, each neuron connects to ten thousand other neurons. Sitting on your shoulders is the most complicated object in the known universe.

Michio Kaku

Cognitive neuroscientists have the privilege to study the most complex organ known in the universe. The hardship in understanding the (human) brain is quite likely as great as its complexity. Cognitive neurosciences do not rely on common intuition, which is often highly misconstrued but on hard thinking, theoretical foundations and empirically tested frameworks. Some theories perish, some survive, and all benefit from the highest standards of scientific method and integrity. Because good science is hard, it can feel personal at times due to how much intellectual investment you have to put in, but it is important to remain humble and realize that if scientists are after (not just reality but) truth itself, such endeavor necessarily stands far beyond personal achievements and egos.

The Cognition & Brain Dynamics team thrives to gain deeper mechanistic insights on the inner working of the human mind. Created in 2011 by Virginie van Wassenhove, we initially focused on implementing state-of-the-art MEG research, and investigated multisensory integration and temporal cognition. In 2017, the team welcomed Sophie Herbst as a CEA researcher, who brought her expertise and developed her research line on implicit timing. In 2025, we welcomed Simone Viganò as a CEA researcher, who brings his expertise in fMRI and develop his research line on conceptual spaces.

Temporal Cognition: We study **how the brain represents time**, including how it perceives durations, predicts future events, and constructs internal representations of temporal sequences. This work integrates behavioural experiments with neural recordings to address how timing shapes cognition, perception and action.

Cognitive Maps: We explore how the brain builds **cognitive maps** -structured internal representations that organize relational information (e.g., spatial, temporal, conceptual). These maps help explain how the mind navigates complex environments, memories, and abstract concepts.

Multisensory Integration & Abstraction: Understanding how multiple sensory inputs are combined into unified representations is another long-standing interest for building **abstraction** in the mind. For instance, how does the brain infer that the same sensory events originate from the same cause.

Team Culture

by Raphaël Bordas (June, 2023)

Diversity and multiculturalism are pillars of science. They are indispensable for the healthy functioning of any team. We are aware that the (academic) world is not free of discrimination, but we actively work towards awareness, and elimination, of sexism, racism, and any other aspect of discrimination in our interactions. You are here to join us in every aspect of the exciting endeavor to better understand the human brain and mind! We foster curiosity, enthusiasm, questioning, motivation, critically reading as much as one can, telling each other where we may be wrong, and learning what we do not know. Science thrives on lively discussions that constantly evolve, new insights, and constant adjustments in our thinking.

Core Values

We are not thinking machines that feel; rather, we are feeling machines that think.

Antonio Damasio

Collegiality

We strive to make the lab a give-give place in which we all learn from each other, irrespective of experience level. Science is hard enough, we foster being constructive and collaborative, not destructive and competitive!

Joining a research team means you contribute your critical thinking, your skills, and your diligence to the team. In turn, all of us help you sharpen your thinking, acquire new skills and techniques, and advance your work much further than you could do on your own. Newbies should not need to reinvent anything, you should not be starting your experiments from scratch, but build on what previous researchers have already achieved locally or worldly. For this, you are expected, like generations before you, to document clearly and thoroughly your research path to help future members of the team.

Diversity

Different cultural, social, and educational backgrounds define the scientific community. We try our best to reflect this diversity at the level of the team and constantly train ourselves to overcome existing structural and cognitive biases.

While the Implicit Association Test (IAT) is controversial, it remains a helpful diagnostic tool to see where you stand on social biases and whether you display some strong implicit biases. You can test yourself here: https://implicit.harvard.edu/implicit/selectatest.html.

Integrity

Everyone must follow strict institutional, scientific (see dedicated section on scientific integrity), and ethical guidelines. No exception, no discussion.

Excellence

We strive for the highest quality of scientific research from the theoretical formulation of a question to the minute experimental details.

Perseverance

Finish whatever you started, whether it leads to a failed experiment or to a new discovery. You need an end to begin again.

Open Science

Open science practices increase the replicability and objectivity of scientific work, which is great! It also requires careful attribution of credit and ownership.

Getting Started

Newcomers

Various information is documented in the NEWCOMERS folder of our shared gdrive. Please ask access to your PI. There, you will find a **Newcomers checklist** (*to do list*) for all administrative procedures. All info to complete the checklist is either in our CBD Welcome Manual or on the Neurospin Wiki.

Administrative guidance

For administrative and human resources guidance, please be in touch with Vanna Santoro, the UNICOG lab manager. The contact information of everyone at NeuroSpin can be found here.

Communication and sharing

Please ask your PI to be added to and request access to the Cognition & Brain Dynamics ("brainthemind"):

- **Gmailing lists:**
  act_brainthemind@googlegroups.com for current members
  brainthemind@googlegroups.com for all members including alumni

- **GDrive**: sharing documents, pre-registrations, project reports, slides, ... Note that these documents must not be official and for collaborative purposes on temporary files. All official datasets and records should be registered on our server.

- **Gcalendar to be used for:**
  - Recurrent team or grant meetings (unicog, neurospin, dedicated hackathons have their own accessible ones, please avoid duplications),
  - PI's (un)availabilities
  - Conferences, deadlines, and important events of interest to members of the team
  - CBD team zoom use and non-availability of the zoom,
  - Members away (e.g. conferences, experiments in the wild, vacations, etc.)
- **Discord:** moment-to-moment exchanges between team members

- **Zoom** for remote meetings. The team has a paid zoom account, which you can use to organize meetings without a time limit as long as you informed the gcalendar accordingly.
  **** We will soon discontinue ZOOM and use free options such as https://visio.numerique.gouv.fr/**

- **BraintheMind Github**: repository for sharing codes
- **Whatsapp**: when at conferences or social events

Resources

NeuroSpin is a neuroimaging center with great tools on site, and lots of technical and methodological knowledge available. NeuroSpin has a wiki, where you can find a lot of practical information (*ask for the password*). Please, do check it often as it will answer many practical questions you may have, from how to pay for a conference to who is in charge of the IT, how to use triggers with MEG or how to analyze DTI. Also, please update information if it is outdated to keep it alive and helpful! Visit the tips website page of our site where we also keep a list of reliable and relevant info from funding sources to how to make nice figures.

Access to Journals & Library

We have books onsite and in electronic format in our shared google drive (*ask for the password*). If you think that we need a book, please bring it up during our lab meeting. Please ask **Vanna Santoro** for electronic journal access.

Basic office supplies

All office supplies (pens, envelopes, paper, external hard disks, memory sticks) can be found in the room opposite of the copy machine, in front of Laurence and Stan's offices. The key is in Laurence's office (room 2023).

Computers and IT infrastructure

Every incoming **PhD and postdoctoral fellow** will be provided with a laptop, which can be windows or linux depending on your computational needs. **Please let Sophie know which you need as soon as possible during the hiring process**. Master students can be provided with a laptop if needed. **It can take up to 3 months to get a new computer ordered and installed.**

Check the NeuroSpin wiki for ample information about IT infrastructure and contacts. For any IT issues, check the Wiki. If you have technical issues with your machine you or your peers can't solve, call the **+33** from any landline phone at NeuroSpin. Also, check out the MEG section of Neurospin Wiki for some questions related to MEG-technicalities (this site may need updates).

Because the NeuroSpin server is highly secured, you need an electronic password generator device ("mobipass") that is yours only to access the server from outside the CEA. This is essential if you want to do data analysis on the local clusters. When you arrive and meet with Vanna, we do ask you to request a mobipass for access to the server from outside.

We now mostly perform our analyses on the dedicated MEG cluster Narval but others are available (Nautilus, … and the Alambic cluster, which is under-used!). See here

Software and Computing Environments

Typical tools we have been using are listed in the table. For specific needs, build on the

expertise of the lab and ask for existing code, examples, or stimuli! Also visit the tips page for more info.

	For what?	Pros	Cons	How to	Toolboxes
Python	Psychophysics (stimuli, experiments) Data Analysis Statistics M/EEG Analysis	Free, open source Tool of choice for M/EEG analysis in the team	Dependencies can be difficult to navigate	Use the mne-python installer unless you are an advanced user Find your preferred editor: Spyder VSCode	PsychoPy ExPyriment Psignifit SciPy MNE Python
Matlab	Psychophysics Data Analysis Statistics M/EEG analysis	Commercial software Many existing psychophysics scripts in the team	Expensive	Install Matlab Ask your PI for a license or use trial version; Octave can be used as a replacement	Psychtoolbox Psignifit Fieldtrip
JASP & Jamovi	Statistics	Free, open source Beginner oriented May provide a good kickstart towards R	Limited No coding flexibility	Install code Gui interface	https://jasp-stats.org/ https://www.jamovi.org/
R	Data Analysis Statistics	Free, open source Advanced data visualization and statistics	Many packages evolved in parallel	Install R Editor: R studio	Ggplot2 LME4
Affinity	Figure formatting	Free		https://www.affinity.studio/	

How to do science at Neurospin

Ethics

If you have never taken a formal training course in ethics and research integrity, please, follow this course https://researchethics.od.nih.gov/Introduction1.aspx to learn about the responsibilities we have as researchers working with human participants.

Every experimental study needs approval by an ethics committee before participants can be tested (it can be a CPP or a CER): the differences between those protocols is explained in the NeuroSpin Wiki. In short, CPP is a more restrictive protocol covering mainly Neuroimaging experiments, and CER is used for other types of experiment (behavioral, EEG, ..).

If a new protocol or an amendment has to be submitted, approval can take several months. Make sure you read the chosen protocol and comply with it. In particular, make sure you know the rules for recruiting and including participants, protect participants' personal rights, never share non-anonymized data, always check your ethics protocol and confirm with the responsible researcher before making data public. If in doubt, ask your PIs and/or the nurses for advice. The Neurospin's ethics officer, Bernadette Martins, can also be consulted for advice.

We have several running **CER** protocols, notably for behavioral, EEG, mobile EEG, virtual reality, and online experiments (all on the google drive, including consent forms). If your experiment is run under a CER, please consult this page for instructions on how to organize the testing:
https://www.neurospin-wiki.org/pmwiki/Main/RunningExperimentsUnderCERAtNeuroSpin

Well before recruiting any participants, and as you are in the planning stage of your study, you need to think about which CPP or CER you will be using as they entail distinct procedures. Please, consult the general rules of thumbs explained here and check with your PI about whether you can use any of the existing protocols. In your publications, always mention the ethical protocol in the 'participants' section.

Data saving, documenting and sharing

All collected data, acquisition scripts and data analyses scripts should be placed on the Neurospin server. This will ensure daily backup and secured access to all collaborators on the project.

Your data folder should be accompanied by an easy README.txt file explaining what the folder contains, who are the researchers involved in the project, the naming convention of the files, where things are and what they mean. **Documenting your experimental work is a must**.

Imagine that a new collaborator or a new incoming student has to replicate your work or join the project in mid-course. Someone who knows nothing about the project should be able to understand the database and the code even if you are not there to explain it.

Sharing data outside Neurospin
If you are being solicited by an external collaborator to share data or if you project requires to do so, please discuss with your PI and the funder of your study. For all data owned by CEA a legal Data Transfer Agreement between the parties will have to be set into place. Please, discuss the matter with your PI.

Lab life

Happenings & Calendars

NeuroSpin calendar — Weekly NEUROSPIN invited conferences are held on Monday, 11 am, in the amphitheater Bloch.

UNICOG calendar — Weekly UNICOG meetings are Friday 3pm, room 183. This is the place to exchange with other members of the lab. We highly encourage your presence and active participation. You will be asked to present your project there, too.

Brainthemind calendar
Every other week, Cognition & Brain Dynamics holds a team meeting on Tuesday 1:30 pm, room 2033 (Claude Bernard). Each member presents their project at different stages of completion for brainstorming and help. We also do journal clubs and round tables to which everyone contributes. **This meeting is for you**, and an opportunity to ask questions, express doubts, learn from feedback, and interact on important questions to prepare you for presenting your work to the outside academic world. Contribute actively!

For 2020, the organizer is Harish Gunasekaran
For 2021, the organizers are Anna Wagelmans & Valentine Mandin
For 2022, the organizer are Yunyun Shen & Anna Wagelmans
For 2023, the organizer is Raphaël Bordas
For 2024, the organizer is Camille Grasso (Matthew Loggie as substitute)
For 2025, the organizer is Marianna Lamprou-Kokolaki
For 2025-26, the organizers are Nathalie Pavailler and Johannes Wetekam

Working Hours

NeuroSpin is open from 7 am to 8:30 pm on weekdays (closed on weekends), and has some fixed closing dates (usually on bank holidays, marked in the Unicog calendar).

We do not enforce rigid working hours as long as you attend scheduled meetings (weekly lab meetings, project meetings...), either live or via zoom or hybrid. Nevertheless, it is preferred that meetings be attended on site by all. We will determine scientific objectives for each project on an individual basis with a clear and tenable schedule. From there, you are free to adapt your schedule to your own needs, work from home or a library if needed (e.g.: literature review, writing, etc), but you have to stay reachable on slack, emails, zoom ... **What matters is that milestones are reached, not the accumulation of hours worked.**

Also… while everyone has their own chronobiology, it is still fun to interact at lunch time or share coffee breaks and other random thoughts “en présentiel”... Since we encourage flexible working schedules, it can result in late or weekend emails from PIs. Please do not feel obliged to answer outside of your working hours. Do inform sigma (CEA employees) or Sirene (INSERM employees) of your teleworking days and holidays.

Holidays must be taken and communicated to your hierarchy and the HR

Depending on the duration of your contract, a certain number of holidays is given to you as per the French legal system. **You must take yearly holidays in due time for your own health and well-being.** Please notify human resource and your supervisor about the dates of your vacation, or diverse absence. You must inform officially your contractual institution (sigma for CEA contracts, sirene/gaia for INSERM or your University).

Please, also indicate your absence in the google team calendar for organizational purposes.

If you have health concerns and are on an extended sick leave, please let us know and inform the lab’s human resource manager **Vanna Santoro.**

Psycho-social Support

If you have any personal or interpersonal issues that you would prefer not to directly discuss with your PI at work, you can in all confidentiality approach Vanna to discuss any problems, or **Isabelle Denghien** (official referent person for personal safety including issues related to harassment), as well as the student representatives at the Unicog level. Also see the wiki for more resources.
Science accueil can also provide help for health related and other practical questions. For more info, also see this booklet. Contact: contact@science-accueil.org, +33(0)7 49 32 14 18

Emergencies

When at CEA, in an emergency situation, type 18 on any stationary phone or 01 69 08 22 24 on your cell.

Outside the lab

For orientation/ living in France/ language classes: https://www.science-accueil.org/
Social events: check the NeuroSpin wiki and ask other students about the monthly lab picnics, after-work beers, post-lab meeting drinks, neurobreakfast (unfortunately all compromised by the pandemic), … We also go on lab outings occasionally, feel free to organize an opportunity!

Expectations and Responsibilities

What you can expect from the team director

- Hidden and visible administrative duties to ease the team's scientific productivity
- Availability for meetings regarding the advancement and orientation of scientific projects in the team
- Advice on the advancement of your career, whatever your level
- Help with grant writing and scientific strategizing
- Improving working rules to suit evolving needs while maintaining scientific productivity in the team
- Dissemination of our work in the bigger picture
- Keep any promise I made to finish a scientific project with you (even if the intended deadline has expired and you have joined another lab or left academia). However, projects are designed to be finished in the time of your lab stay! ;-)

What you can expect from PIs in the team

- Insuring available funding for research projects and/or helping you jumpstart your own skills to get funding
- Guidance at all stages of your research project: from the initial question, to the paradigmatic approach, relevant literature, etc.
- Help you reach reasonably working code, help with debugging, tips for sanity checks
- Feedback on your analyses and display of results
- Discussions, brainstorming, and interpretations of your results
- Feedback on your presentations (slides), training in front of the group and general communication skills
- Thorough rounds of revision on written work (reports, and especially papers)
- Weekly one-to-one meetings (more if needed, less if needed)
- Weekly group meetings to gather more team level feedback and insure we are all on the same page
- A scientific work environment where you will hear and learn about various topics and questions

- Discussions and guidance about your career wishes, and how we can best help you achieve it

What PIs expect from every team member

- All **administrative requirements including deadlines** (signatures, conventions, etc.) necessary to join the team, university programs or doctoral schools (report deadlines, committee meetings) are your responsibility.

  Please be aware that the administrative procedures at the CEA take 1 to 3 months, so be swift with handing in your paperwork. Not having a badge will prevent you from testing participants and makes it difficult to buy lunch on site.

- **Critical thinking and knowledge:** you are responsible for the critical mastery of the literature relevant to *your* project, and for seeking information and tools that will help *you* achieve it!

- **Documentation and transparency:** your data and code must be organized and documented so that anyone entering the project would understand what is going on without having to ask you. You will see how useful it can be to start your own study building on the work others did before you (experiment code, analysis scripts). Please, carry on with that effort!

- **Acknowledgements:** systematically and generously acknowledge everyone who contributed to your work (including supervisors, engineers, post docs) on slides and reports.

  Please, keep in mind that acknowledging someone is not about being kind but about being able to objectively assess and recognize the contribution of each person in a working team. Please, use the CRediT to help you achieve this goal. For instance, you can start listing what you expect or envision collaborators' implication to be in the project. Then, you can revise these expectations upon completion of the project (adding or removing the contributors based on factual contribution to the project). These should be openly discussed: be generous but fair. Most projects are the result of teamwork. Consistently prefer "we" to "I" when presenting outcomes, except on the day of your PhD defense.

- **Authorship:** see dedicated the dedicated section below "Authorship, Intellectual ownership & Scientific Integrity".

What PIs expect from...

Post-Doctoral Fellows

You are considered a junior colleague and collaborator, who has already acquired full intellectual autonomy, both theoretically and empirically. The definition of your scientific project depends on the funding source (a grant held by one of the PIs, or your own), and will be discussed and adapted continuously between you and one or several PIs.

You are a pillar of the team in that you can help mentor students, provide reliable expertise in your field of research and preferred methods. We also expect you to know the limits of your own expertise and knowledge and seek senior expertise on ongoing projects.

We expect you to take initiatives: for instance, organize journal clubs, lead discussion sessions, eventually organize hackathons or work sessions that you see fit for projects you take part in. You are welcome to invite colleagues to give talks, you should give talks to the lab, to Neurospin, as well as national and international crowds, and advance your career by exploring new horizons at the frontier of your current knowledge.

PhD students (senior graduate students)

You will conduct all stages of the scientific project, including narrowing down the initial question and building up on it, preparing the experimental protocols, data acquisitions and analyses. Hence, as a PhD student, you become the major driving force of scientific work, which means you are responsible for the mastery of the literature, all technical details of your studies, the testing of participants, the analysis of the data, their interpretation, communication, etc...

The direction of your work will be initially defined with your director/mentor and possible advisor(s), but you are progressively expected to rise to intellectual autonomy, both theoretically and empirically. In fact, you should become the best expert in the team on your own topic! If all goes well, you will get to start working in collaboration with the master students and start learning how to transmit the how to, work solo but also in a team.

> **Comité de Suivi Individuel (CSI) or *"Individual Follow-up Comittee"*:**
>
> You are fully responsible for planning and scheduling yearly CSI. You are expected to ask your PhD mentor to establish the committee during the first 6 months of the start of your PhD. You are then expected to contact your PhD mentor and committee members at least 3 months ahead of the expected date of your CSI to schedule the meting. The general definition of CSI below is helpful to communicate to international committee members.
>
> A CSI is made compulsory by Article 13 of the Minister Decree (May 25th 2016): "An individual PhD student follow-up committee shall ensure the smooth running of the programme on the basis of the doctoral charter ("charte du doctorat") and the training agreement ("convention de

formation"). In an interview with the doctoral student, it evaluates the conditions of his training and the progress of his research. It makes recommendations and sends a report of the interview to the director of the Doctoral School, to the PhD student and to the PhD supervisor. In particular, it shall ensure that all forms of conflict, discrimination or harassment are prevented. The composition, organization and functioning of this committee are determined by the doctoral school council. The members of this committee do not participate in the direction of the PhD student's work."

Exemple taken for Biosigne Doctoral School of Université Paris-Saclay

The progress of a doctoral project is annually followed by an individual "thesis committee", composed of an expert (HDR) external to the doctoral school and Paris-Saclay University and a tutor (HDR) chosen outside the host laboratory, but who may belong to University Paris-Saclay.

The tutor and the external expert are appointed by the thesis director and the doctoral student during the first 6 months of the thesis. The doctoral school is informed of the choice for approval. Expert and tutor may also become part of the thesis defense jury, provided that the rules for its composition are respected, and that they have not co-authored the thesis work.

At the end of each academic year, the doctoral student presents his research work before the thesis committee, in the presence of the thesis director. The doctoral student prepares in advance an annual report, which he sends to the committee to prepare the interview. The aim is to help the doctoral student to consolidate his research work with possible instructions for the continuation of the thesis, to prepare his thesis defense and to define his professional project. The Committee will report at the end of the interview. This report is requested at the beginning of the academic year and is included in the re-enrollment file. In the absence of this document, the re-enrollment of the doctoral student for the following year may not be granted.

Master 2 students (junior graduate students)

You will go through all stages of a scientific project, including narrowing down the question, preparing the experimental protocol, data acquisition and analysis. Depending on the project, this might include several behavioral pilot experiments and/or data M/EEG acquisition and/or analysis.

The direction of your work will be pre-defined by your advisors, but you are expected to contribute also to the theoretical aspects and to the implementation. We expect you to take over responsibility for your study as early as possible, to master the relevant literature, and be the expert concerning all technical details, as well as for the documentation of your work. You will likely be responsible for testing participants, and you will definitely analyze data and interpret the results. We do not expect you to be fully fluent in programming, but you will have to learn efficiently to eventually write your own.

Master 1 and Licence students (undergraduate students)

This is likely your first hands-on encounter with the scientific method. You will go through all stages of a project, and take more autonomy throughout the process. You will test participants, analyze the data, interpret and present the results. We encourage you to take over all those aspects as early as possible. We expect you to master the related literature and contribute to the improvement of the experimental design.

We do not expect you to be fluent in programming, but you will have to learn to understand and modify code, and eventually write your own. You are in charge of documenting your work.

Scientific Communication

Uncommunicated science is not science. A scientist finishes the work by reporting and communicating it. Academic reports teach you the basics, but it takes a lot more efforts to publish your work in international peer-reviewed journals (basically, our gold standard). Most members of the team will have to bear with the consequences of being non-native speakers of English but we can hope for the collegiality of native speakers to help us revise. AI can also be of assistance too if used wisely (e.g. https://www.deepl.com/write/ or https://www.grammarly.com/)!

Main rules

Anything that leaves the lab (written reports, presentations, abstracts, articles) has to be shown to the supervisors and co-authors beforehand. You are responsible for leaving enough time for at least one round of revisions before the deadline on any work (see below for more specifics).

Submission to a journal implies some minimal information to convey to the senior author:
- Reasons for choosing the journal (adequacy of the research with the theme of the journal)
- Impact Factor *(is your work objectively extremely novel and impactful in many ways (large audience) or a very good incremental science for an expert audience?)*
- Cost: what budget is needed to publish in this journal Open Access or not
- […] Please discuss with the senior author

Absolutely no work must be submitted to a journal without prior consent of the senior author. Failing this rule, the senior author may contact the editor and retract the submission.

Specifics

Academic reports (midterm, final written theses) have to be approved by your supervisor before submission. If your supervisor does not get to read and approve before submission, the university program will anyway require her evaluation of your work. Ideally, we wish to continuously discuss your advances and the write up of your reports. Minimally, we wish to receive your **Master thesis or reports 2 weeks before the deadline**, and your **PhD thesis, at least one month before the submission to your doctoral jury**.

Regarding the oral presentations, you are expected to rehearse in front of the team at least one week before the defense (you should rehearse a few times before your PhD defense really ;-)).

Conference abstracts (posters, talks) and proceedings: feel free to bring it up when you think that a conference would be appropriate for you to present your work. Before submission, you have to explain to your advisor which data you want to submit, why you chose this conference

and establish the budget that would be needed. The lab may cover the costs (registration fees and travel). Approval from all co-authors before submission will be needed. See Conferences section.

Peer-reviewed articles in scientific journals: this is the natural outcome of an effortful work and it may feel like less fun than the actual hands on work. Nevertheless, it is essential to situate your work in a bigger theoretical context and take the distance on how an experiment has achieved or not what it was intended to. We will iterate many times on this, and seek external advice too. If you are a master student, you are expected to minimally produce the Figures, the Materials & Methods and the Results section. As a PhD, you are expected to write a full initial draft version of your work. As a postdoctoral fellow, you are expected to provide a very elaborated first version of your work. **Be a finisher. If you don't communicate the work you did, it simply does not exist.**

Authorship, Intellectual Ownership & Scientific Integrity

We will systematically discuss authorship: who did what, who contributed to what in a project, etc. At all times, we will discuss openly and ethically the contribution of everyone. While we may agree initially on a particular order of authorship, the realized contribution will be taken into account in a final version. For this discussion to be objective and fair, I encourage you (the lead researcher) to fill out and update a CRediT author statement as a project unfolds: https://www.elsevier.com/authors/policies-and-guidelines/credit-author-statement.

To objectively assess your contribution or someone else's to a scientific work and classify it as co-authorship or acknowledgment, please refer to this very clear academic guidelines provided by Yale Univ.: https://provost.yale.edu/policies/academic-integrity/guidance-authorship-scholarly-or-scientific-publications. The rule of thumb part is written below:

Standards of Authorship: Authorship should be limited to those individuals who have contributed in a meaningful and substantive way to its intellectual content. All authors are responsible for fairly evaluating their roles in the project as well as the roles of their co-authors to ensure that authorship is attributed according to these standards in all publications for which they will be listed as an author.

Requirement for Attribution of Authorship: Each author should have participated sufficiently in the work to take public responsibility for its content. All co-authors should have been directly involved in all three of the following:

- planning and contribution to some component (conception, design, conduct, analysis, or interpretation) of the work, which led to the paper or interpreting at least a portion of the results;
- writing a draft of the article or revising it for intellectual content; and

- final approval of the version to be published. All authors should review and approve the manuscript before it is submitted for publication, at least as it pertains to their roles in the project.

If all three requirements are fulfill, there should be authorship; if none, and unless exception, no authorship. If in between, discussion with the corresponding and the senior author should be realised.

Irrespective of authorship or not, systematically acknowledge those who contributed to the work (including supervisors, engineers, post-docs, undergrads) on slides and reports. It is always nice to know that one's contribution has been taken notice of.

Good scientific practice

Generally, we expect every member of the team, no matter the level of training or duration of stay in the lab to respect the following guidelines:

Scientific integrity

We strive to improve our scientific methods and practice every day and never stop learning. An important criterion for scientific quality is the **replicability** and **objectivity** of results, across studies and labs.
To assure that we only publish high quality work, we ask you to do your best to prevent errors, double check your code and results, and avoid common statistical fallacies (see below). You have to take responsibility for your work, towards your collaborators as well as towards the scientific community.

- **Check your experimental protocols**: timing or randomization errors cannot be corrected once the data is recorded, and might result in a huge waste of your time and the team's money (**an MEG experiment costs ~30.000€**). This includes making sure the experiment runs without errors and checking the output of 1 or 2 pilot participants for timing, randomization, and task-related aspects. Consult with your advisor if you make changes to the planned experimental protocol.

- **Write clean and commented analysis code**, check it for errors, and include sanity checks in your analysis. Think carefully about your choices of analysis parameters and test several options.

- **Report results as they are, including null-findings**. If we always knew the results of our experiments, there would be no point in doing them.

- **Be aware of biases and common statistical fallacies** (just to name a few important ones, also see References below):
    - selective exclusion of participants
    - Double-dipping (identifying a region where an effect occurs before selectively running statistics; Vul et al. 2009)
    - p-hacking (tweaking parameters until you get a significant result; Head et al 2015; Ioannidis, 2019)
    - confirmation and publication bias
    - high variability in results due to low power (small samples; Button et al. 2013)

- **Errors happen,** even to the best and to all of us, over and over again. The first step is of course to try and prevent them, but when you come across one, act on it: check its impact, make sure appropriate corrections are applied, and **report it to the collaborators**. Only those who do not do anything, make no mistake.

Plagiarism, Not

Cite all references you used and *never* copy sentences or passages from other people's work, without explicitly acknowledging the original source. Plagiarism will be sanctioned by your committee (worsening your grade up to leading to rejection of your work in bad cases) and the scientific community (rejection of your work with legal consequences in very bad cases). Plagiarism and intellectual dishonesty are a sure way to lose the trust and respect of your colleagues.

Team culture & Open Science

We work in a collegial, collaborative, and friendly atmosphere. Asking others for support, providing support, caring about our colleagues' matters, and behaving respectfully to everyone within and around the team at any time is key. Every team member, no matter the level of expertise is encouraged to speak up, ask questions, interact and contribute to the life of the team.

To increase replicability of cognitive neuroscience studies, and allow for large-scale approaches, the community currently shifts towards a more open data and open source oriented culture. Sharing data and code simply becomes a requirement from journals and grant agencies, but it should also become a goal to increase your visibility in the community, and allow you to get feedback from researchers outside the lab.

Open science requires very clearly documented data and code, which will enable any external peer to replicate your findings from A to Z, eventually catch mistakes or even improve and extend your work well beyond its original intent. You can start some training with the exact instructions challenge.

Of course, open science practices are still fairly new and the system is not quite yet fully adapted to them. It makes it all the more important to be very careful in crediting contributions and attributing ownership. For instance, designing a good experimental paradigm and solid analyses is hard work that goes far beyond efficient coding. Make sure that all the sweat and thought you and your collaborators put into a study are well credited for, and do not share any work without the agreement of everyone involved. Also think carefully about the time point to share, for instance you might not want to publicly post an experimental paradigm before you finished data collection… and in all cases, not without approval of your collaborators. Like it or not, authorship feeds metrics that count in a highly competitive (academic) job market.

References

- Button, K. S., Ioannidis, J. P., Mokrysz, C., Nosek, B. A., Flint, J., Robinson, E. S., & Munafò, M. R. (2013). Power failure: why small sample size undermines the reliability of neuroscience. Nature reviews neuroscience, 14(5), 365-376.
- Head, M. L., Holman, L., Lanfear, R., Kahn, A. T., & Jennions, M. D. (2015). The extent and consequences of p-hacking in science. PLoS Biol, 13(3), e1002106.
- Ioannidis, J. P. (2019). What have we (not) learnt from millions of scientific papers with P values?. The American Statistician, 73(sup1), 20-25.
- Vul, E., Harris, C., Winkielman, P., & Pashler, H. (2009). Voodoo correlations in social neuroscience. Perspectives on psychological Science, 4(3), 274-290.

Responsible Use of AI in Cognitive Neuroscience

AI is useful; it is also risky. Use it to accelerate your work, not to replace your thinking!

This document defines how AI tools are to be used in the Cognition & Brain Dynamics lab. It applies to all members. The objective is straightforward: **use AI where it improves rigor and efficiency, and prohibit it where it compromises scientific integrity, validity or interpretability of the analyses, or compliance to scientific standards** (see Appendix A).

Regulatory context

All work must comply with (see Appendix B):

- European Research Area guidelines on generative AI in research
- European Commission standards for research integrity
- General Data Protection Regulation
- EU Artificial Intelligence Act
- The European Code of Conduct for Research Integrity

Cognitive neuroscience introduces **heightened sensitivity** due to:

- Human participant data
- Neuroimaging and behavioral datasets
- In some cases, clinical datasets

Non-negotiable principle: you are accountable

AI is a tool. It cannot be held legally accountable or responsible.

- You sign your name to the work; therefore, you defend every claim, analysis, and line of code
- AI outputs are untrusted until verified
- AI cannot be listed as an author under any circumstances

If you cannot explain or reproduce something without the AI, you should not include it.

Allowed uses (default-acceptable with oversight)

Experimental

- Drafting participant instructions (must be reviewed for clarity and bias)
- Generating stimuli
- Pre-registering structure

- Summarizing protocols for internal use

Computational

- Code scaffolding (Python, MATLAB, R)
- Debugging assistance
- Pipeline translation (e.g., MATLAB → Python)
- Documentation and commenting
- Optimization

Writing

- Language editing
- Structural suggestions
- Formatting assistance
- AI must not be used to generate **novel scientific claims** even within writing assistance

Condition: these uses must not replace intellectual contribution or interpretation.

Restricted uses (require justification and PI awareness)

These are allowed only with explicit rationale and documentation:

Data analysis and modeling

- AI-assisted statistical modeling
- Parameter tuning suggestions
- Machine learning pipeline design

All outputs must be:

- Re-derived independently
- Benchmarked against standard methods
- Fully understood
- Fully explainable
- Fully interpretable

Literature synthesis

- Sources are independently verified
- You read the paper/book and you are capable of explaining it
- No citations are accepted without manual checking

Prohibited uses

Data and privacy violations

Uploading any data into external AI systems without institutional approval is prohibited.

These include:

- Raw, preprocessed or processed neuroimaging data (fMRI, EEG, MEG, …)
- Behavioral datasets with identifiable structure
- Participant-level data of any kind

Scientific misconduct risks

- Generating or modifying results using AI
- Fabricating citations or references
- Using AI to produce “interpretations” of results that are not analytically grounded

Evaluation contexts

- Peer review
- Grant evaluation

Else, follow the AI guidelines communicated by the journal or grant agencies.

Data protection

Under General Data Protection Regulation:

- Assume all participant data is sensitive
- External AI tools are **not secure environments by default**
- Anonymization is not sufficient if re-identification risk exists

When in doubt: do not upload.

Methodological integrity

AI must not compromise:

- **Causal inference** (especially in experimental design)
- **Model interpretability** (critical in computational neuroscience)
- **Reproducibility**

Specific expectations:

- No “black-box acceptance” of model outputs
- Full understanding of:
    - Model assumptions
    - Optimization behavior
    - Failure modes

If AI introduces opacity, it is methodologically inappropriate.

Validation standards (mandatory)

Before any AI-assisted output is used:

For experimental work, check for:

- Bias in stimuli
- Confounds introduced by wording or structure
- Ecological validity

For computational work, verify:

- Code correctness
- Numerical stability
- Reproducibility across runs

For writing, validate:

- All citations
- All claims
- Logical coherence

Transparency and disclosure

All AI use must be documented.

Minimum requirement:

- Tool name and version
- What it was used for
- What was retained vs modified
- How it was validated

In publications:

- Include a statement in Methods or Acknowledgments

No disclosure = policy violation. See Appendix C for samples of disclaimers.

Reproducibility and record-keeping

You must retain:

- Prompts (for non-trivial use)
- Generated outputs that influenced results
- Tool versions

This is part of ensuring **computational reproducibility**, especially for code-assisted workflows.

Intellectual contribution threshold

AI may assist execution, but not replace:

- Hypothesis generation (beyond brainstorming)
- Experimental design decisions
- Interpretation of results
- Theoretical framing

If AI meaningfully shapes conclusions, this must be explicitly disclosed and justified.

Training expectations

All lab members are expected to develop working competence in:

- AI limitations (hallucinations, bias, non-determinism)
- Data protection risks
- Tool-specific failure modes

Ignorance of these issues is not an acceptable defense.

Enforcement and escalation

- Violations will be treated under research integrity procedures
- High-risk uses must be discussed before implementation
- When uncertain, consult before acting—not after

Appendix A — Practical decision rule

Use AI **only if all** are true:

1. It improves efficiency without reducing rigor
2. You can independently verify the output
3. You can explain and reproduce the result
4. It does not expose sensitive data
5. You are willing to disclose its use

If any condition fails, do not use it.

Appendix B — Some key references

- European Research Area: https://research-and-innovation.ec.europa.eu
- European Commission AI policy overview: https://digital-strategy.ec.europa.eu
- General Data Protection Regulation: https://gdpr.eu
- EU Artificial Intelligence Act: https://artificialintelligenceact.eu
- European Code of Conduct for Research Integrity
- Guidelines
- Factsheet (2025)
- Some institutional resources: INSERM CNRS

Appendix C — Example of AI disclaimer use

During the preparation of this work, the authors used DeepL to help with the language as non-native speakers of English. After using this tool/service, all authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Communication
(to scientists and to the general public)

Email etiquette

A scientist's guid to email etiquette
A primer on email etiquette

Online presence and communication

Professional Websites

Cognition & Brain Dynamics has a website (http://brainthemind.com/) where each member should be listed and briefly introduced. Please, send us a short snippet describing your interests and prior work, a picture (square format with good resolution) to keep our online list of lab members to date. Provide your wish to have your email and social media handles made public or not.

UNICOG has a website (https://www.unicog.org/) that should also be kept to date. Marianna Lamprou-Kokolaki is currently helping Vanna on this.

As a young scientist, it is important to have an easy to find profile to help colleagues find you for many reasons. For instance, a fellow scientist may want to contact you to ask access to your dataset or ask a specific question about an analysis you published. An editor may want to ask you to review a submission to their journals, etc… Having an online presence with your contact information and your current affiliation is important.

Bluesky

You should decide whether you will publish only professional or personal or a mix of both and provide a disclaimer in your profile accordingly.

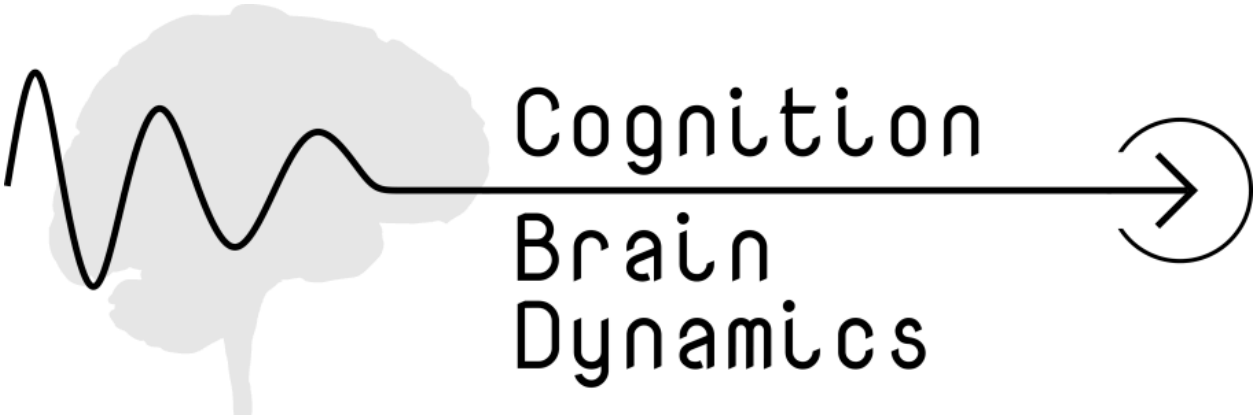
Team: @brainthemind.bsky.social
@virginievanw.bsky.social
@herbstso.bsky.social
@vigano.bsky.social

Graphic identity

All institutional logos and CEA template PPT are available here. Please, do update when logos change. Use them sparingly.

CEA:
https://portail.intra.cea.fr/multimedia/Pages/Charte%20graphique/Charte%202023/2023-02-07-Note-Lettres.aspx

The CBD team logo is available in .SVG format is here and you can adapt the color as you wish. A template figure for slides is also available.



Solicitation to speak or communicate to the public (“vulgarization”)

Only peer-reviewed work (i.e. work that has been reviewed by scientific peers) is eligible to public communication. If this is not the case, please consult with your supervisor to discuss the matter.

Conferences

In all cases, please discuss with your PI. Rules for attending conferences are flexible but here are some general guidelines:

- **Postdocs**: you will typically have at least 1 international conference per year funded by the team. If you request more, we will discuss it on a per case basis.
- **PhD students**: if your project provided reliable and novel results, you should ask your PI to submit to an international conference.
- **Master students**: unless you have novel data to submit or you will pursue as a PhD student in the team, you are not *a priori* eligible for international conferences.

How to attend a conference? A chronology…

1) As early as possible: approval by the PI and team leader

Once you identified a conference you deem relevant for your project, send an email to your PI and ask for their ok. They need to know:

- Which conference (Name, Topic, When, Where)
- An approximate budget (including registration fees, travel and accomodations)
  Please, be considerate of expenses at all times
- Which results you would like to present
  Ask your PI which budget will fund your trip and whether the budget line is administered by CEA or INSERM.
  If the budget is administered by CEA, you main contact point is Maryline Hevin <marylin.hevin@cea.fr>
  If the budget is administered by INSERM, you main contact point is Laurence Labruna <laurence.labruna@cea.fr>

2) At least 2 weeks before the submission deadline:

- Prepare an abstract for the submission deadline, and submit it to your co-authors for approval at least 2 weeks before the deadline.
- Your PI will discuss with you which type of presentation is appropriate for the state of your project (poster / talk).
- Once the conference approaches, prepare the poster or talk.

! See previous sections about deadlines and acknowledgments for submissions.

3) At least 2 months before the conference if your submission has been approved

Travel plans (travels, hotels**)**

- Register for the conference before the early registration deadline to save the team money. You can either advance the registration fee and get reimbursed, or ask your contact point (Maryline / Laurence) whether they can help you do it.

- You may request an advanced payment but only for hotel nights (100% of the planned cost).Please, ask your contact point (Maryline / Laurence) on how to proceed.

- Fill in a **'Demande d'Ordre de Mission**' (OM) form and send it to your admin contact**:**

  If your conference travels are funded by CEA, send your CEA OM specifying all necessary travel arrangements to Maryline Hevin. If you are an INSERM employee, you need to also send an INSERM OM "sans frais" specifying travel dates and "sans frais" to Laurence Labruna. Please, do add your date of birth on the INSERM OM!!

  If your conference travels are funded by INSERM, send your INSERM OM specifying all necessary travel arrangements to Laurence Labruna. If you are a CEA employee, you need to also send a CEA OM "sans frais" specifying travel dates and "no cost" to Maryline Hevin.

  The appropriate forms can be found in the team's gdrive folder 'CONFERENCES'.

  - Find appropriate travel (flight, train) needs but do not book them. Instead, report the travel information (company, flight number, train number) on the OM form (print a screenshot of it to be safe). Your contact point will book it for you so you don't have to advance the money.

  - Book your accommodation: be considerate of expenses. By sharing a room with your colleagues if possible (expected for PhD students and PostDocs). Specific rules may apply for INSERM / CEA (maximal allowance, CEA does not allow booking through AirBnB). You will be reimbursed after the conference.

Importantly, whether through CEA or INSERM, you can benefit from an advance payment on your registration fees and your hotel and your travels will be booked for you. Hence, you may only have to cover your own food and local transportations (buses, metro).

- Last, please mark your absence in your employer's system (e.g. sigma for CEA).

4) During the conference

Keep **all** receipts and bills incurred by your professional activity (food, necessary transports, etc.)

For each day there is a set amount that can be effectively reimbursable for food + accommodation. Inquire with Marylin or Laurence.

5) After the conference

You are expected to report the interesting scientific work you learned about to the team.

Reimbursement and finalizing paperwork:

- ***via CEA***:
  - Complete page 2 of the OM sent to you by Maryline (dates and times must be filled in)
  - Glue all your receipts on blank sheets (no staples) sorted in chronological order
  - send them all to Marylin by e-mail before depositing the originals in her mailbox

- ***via INSERM***:
  - Make an excel table indicating all of your expenses (food, transportation, etc)
    Please indicate your mean food expenses per day.
  - Glue all your receipts on blank sheets (no staples) sorted in chronological order
  - Send them all to Laurence by e-mail before depositing the originals in her mailbox

  Amounts spent in another currency should NOT be converted into € (unless you produce a bank statement showing the expenses concerned); the rate used by the financial department will be the one in effect on the day your file is processed by the Financial Department.

Generalist conferences

	when	where	Society Journals
SFN	Yearly; Oct-Nov	USA	Journal of Neuroscience eNeuro
CNS	Yearly; April-March	USA	Journal of Cognitive Neuroscience
Cognitive Science Society	Yearly	International	Cognitive Science
ICON	Every other year	Europe	

Specialized conferences

	Conference	Country	Expertise
Biomag	Every 3 or 4 years		MEG, EEG
CuttingEEG	Every other year	Europe	MEG, EEG methods

TRF	Every other year	International	Time and timing
IMRF	Yearly	international	Multisensory perception
HBM	yearly		Human neuroimaging, fMRI HBM journal
VSS	Yearly	USA	Vision sciences
ARO	Yearly		Auditory sciences
COSYNE	yearly		Computational neuroscience
BryCoCo	Yearly	international	Brain oscillations
CCN	Yearly	international	Neural computations, behavior
APAN Hearing	Yearly, 1 day, Satellite to SfN	USA	Auditory cognition
RPPW	Yearly		Rhythms
NeuroMatch	TBD	Fully online	

Professional email lists that are useful for scientific consulting and networking

You can sign up to the following mailing lists to hear about smaller workshops and other announcements: Vision List Auditory List Systems Neurosciences List FieldTrip List MNE Python List MEG Community