Cognition & Brain Dynamics lab

This document is an internal lab manual of the Cognition and Brain Dynamics Team,

CEA, DRF/Joliot, NeuroSpin
INSERM, Cognitive Neuroimaging Unit
Bât 145 PC 156
Gif s/ Yvette, F-91190 FRANCE

written by Virginie van Wassenhove and Sophie Herbst in September 2020.
Last updated: [VvW] July 6th 2022

(1) Welcome to the Cognition & Brain Dynamics lab!

If you are reading this lab manual, you have likely just joined the lab recently so welcome!
If you are a current member, please, frequently refer to it for updated contents. If you have suggestions for improvements , please let the PIs know or bring it up during our next meeting!

Team

Joining a research team means contributing your critical thinking, your skills, and your diligence to the team, and the team helping you sharpen your thinking, acquire new skills and techniques, and advance your work much further than you could have done on your own.

Every lab member plays a vital role in the functioning from undergraduate students to early career researchers, support staff, and principal investigators (PIs)!

Providing you with rules and procedures is to ensure that current efforts build on past successes and failures. 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.

Who's who?

Please check the lab's website for an up-to-date list of lab members! Should you not find yourself there, or want to update your profile, please send a text snippet and photo to the PIs.

Permanent lab members are:

Virginie van Wassenhove, Research Director (DR), CEA
Sophie Herbst, Researcher (CR), CEA
Leila Azizi, Research Engineer (IR), Inserm

Ready for some science?

(2) Core Values

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 nature! The hardship in understanding the (human) brain is quite likely as great as its complexity. Cognitive neurosciences do not just rely on common intuition (often highly misconstrued) but on hard thought, theoretical foundations and empirically tested frameworks. Some theories perish, some survive, and all benefit from the highest standard 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 egoes.

Scientific vision

The lab thrives to gain deeper mechanistic insights on how the human mind conceives time. The dynamic scales at which neural computations operate can be conceived as a chronoarchitecture: the notion of chronoarchitecture emphasizes that dynamic properties of neural activity do not solely reflect adaptive changes, but also dynamic constraints that provide stability for a thinking and a feeling mind to emerge.

Our theoretical and empirical approach considers factors that are endogenous (oscillatory regimes, prediction, culture) and exogenous (temporal statistics of sensory inputs, body movements) factors to be essential for temporal cognition.

Our scientific work uses tools from traditional experimental psychology (psychophysics, questionnaires) combined with state-of-the-art neuroimaging techniques (MEG, EEG, fMRI), signal processing methods (spectral and time-frequency analyses, source estimation, cross-frequency coupling, functional connectivity) and model-based neuroimaging (mTRF, decoding).

We try to foster collaborative opportunities that can be fundamental, multidisciplinary, or applied.

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!

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.

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.

(3) Getting Started

Who we are

Official affiliation (to use for all publications):
CEA, NeuroSpin, INSERM, Cognitive Neuroimaging Unit, CNRS, Université Paris-Saclay, Gif/Yvette, 91191 France

What it means:
The Cognitive Neuroimaging Unit or UNICOG is a research unit affiliated to:

1) the "Institut National de la Santé et de la Recherche Médicale" (INSERM for short)
2) the "Commissariat à l'Energie Atomique et aux Energies Alternatives" (CEA for short)
3) the “Centre National de la recherche Scientifique” (CNRS for short)
4) the Université Paris-Saclay

UNICOG is hosted by NeuroSpin, which refers to the physical building and institute, located at Gif s/ Yvette where our lab is. The director of NeuroSpin and of UNICOG is Prof. Stanislas Dehaene (College de France). Cognition & Brain Dynamics is one of the five labs within UNICOG.

Quick who’s who:
For general administrative guidance and human resources help, please be in touch with Vanna Santoro, the lab manager. The contact information of everyone at NeuroSpin can be found here.

Newcomers checklist:
We compiled a **Newcomers checklist** (*see our shared gdrive or ask us)* for all administrative procedures.

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 us for the password*). Please, check it often – 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!

Cognition & Brain Dynamics has a website (http://brainthemind.com/) where we would like each member to be listed and briefly introduced. Please, send us a short snippet describing your interests and prior work, plus a picture (square format with good resolution) so we can add you.

Also, please visit the tips page of the website where VvW keeps 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 us 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.

Computers, IT infrastructure, materials

Every new PhD and postdoctoral fellow will be provided with a laptop, which can be windows or linux depending on your computational needs. Please let us know which you need

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-Wiki for all questions related to MEG-technicalities.

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 for instance. Hence, when you arrive, we do ask you to request a mobipass for access to the server from outside (early on when you meet with Vanna).

All office materials (pens, envelopes, paper, external hard disks, memory sticks) can be found in the room opposite of the copy machine.

Tools / Computing Environments

People in the team use different computing environments depending on their background and project needs:

	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	Install anaconda distribution: https://docs.anaconda.com/anaconda/install/index.html Get your preferred editor: Spyder VSCode	PsychoPy ExPyriment Psignifit SciPy MNE Python

				More on IDE	
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
R	Data Analysis Statistics	Free, open source Advanced data visualization and statistics	Many packages evolved in parallel	Install R Editor: R studio	Ggplot2 LME4
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/

For specific needs, build on the expertise of the lab and ask for existing code, examples, or stimuli. Visit the tips page for more info.

To communicate and share

Please ask a PI to be added to these channels:

- **Cognition & Brain Dynamics Google Drive**: sharing documents, pre-registrations, project reports, slides, ..

- **Cognition & Brain Dynamics Slack**[1]: exchange with your project collaborators (dedicated channels), communicate organisational matters (#general channel – especially important in pandemic times), get help with technical problems (#psychtoolbox, #meeg) share papers (#papers) and discoveries, be social (#fun)

  Note that our Slack account does not include a lot of memory so do not expect any preservation of messages or documents there! If you want to keep track use the google drive or dropbox or a shared cloud of your choice...

- We use **Zoom** for remote meetings[2]

- **Brainthemind Google calendar (ask us to be added) is to be used for:**

  - recurrent team or grant meetings (unicog, neurospin, dedicated hackathons have their own accessible ones, please avoid duplications),

[1] When joining the #general channel, you should be automatically added also to the channels #papers #fun #psychtoolbox and #meeg. Please ask Sophie Herbst to add you if it did not work.
[2] The team has a paid zoom account, which you can use to organize meetings without a time limit. Please ask your colleagues for the login.

- conferences and events of interest to many in the team,
- CBD-zoom use and availability,
- members away (e.g. experiments in the wild, vacations, etc)
- generally important events
- Team leader's recurrent meeting slots

To open science

- BraintheMind Github
- OSF
- contribute to MNE python
- academic twitter (@virginie_vw, @herbstso)

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, currently Alexis Thual (PhDs) and Alexander Paunov (Post-Docs). 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

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
Weekly Cognition & Brain Dynamics lab meetings are held on Tue 1:30 pm, room 2033 (Claude Bernard). Each member will present 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 world.

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

Working Hours / Holidays

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 ("*Covid Times oblige*"). 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 if needed (e.g.: literature review, writing, etc), but try to stay reachable on slack, emails... 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.

Depending on the duration of your contract, you can take a certain number of holidays. Please check with your supervisors about the dates, put them in the google team calendar, and notify human resources.

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

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 evoke/ organise an opportunity.

(4) Expectations and Responsibilities

What you can expect from your PIs

- 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/ deadlines** (signatures, conventions, etc) needed to join the team, as well as regarding your university program or doctoral schools (report deadlines, committee meetings) are your own responsibility.

  Please be aware that the administrative procedures at the CEA take 1-3 months, so be swift with handing in your paperwork. Not having a badge will prevent you from testing participants and even 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.

Team Culture

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 far from free of discrimination, but we actively work towards awareness to, 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, 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.

What we 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

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 construed with your 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 tos, 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. 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 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 ParisSaclay.

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

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

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 Outcomes

Academic work (from midterm reports to 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 our 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 reports 2 weeks before the deadline**, and your **PhD thesis, at least one month before the submission to your doctoral committee**.

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 ;-))

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 what budget 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 version. As a postdoctoral fellow, you are expected to provide a very elaborated draft version. Be a finisher. If you don't communicate the work you did, it simply does not exist.

Intellectual ownership & Authorship

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 to fill out a CRediT author statement as the project unfold: https://www.elsevier.com/authors/policies-and-guidelines/credit-author-statement

Systematically acknowledge those who contributed to the work (including supervisors, engineers, post docs) on slides and reports.

Anything that leaves the lab (written reports, presentations, abstracts) 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 above for more specifics).

(5) 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 between 20.000-30.000€). This includes making sure the experiment runs without errors and checking the output of 1–2 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.

Ethics

In dealing 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): see the section about ethics on the NeuroSpin Wiki and please, have a look at the content of the ethical protocols providing the ethical limitations of the studies. A CPP or a CER has a permanent researcher made legally responsible for any misuse of ethical rules. Over the years, PIs at UNICOG have shared this responsibility.

We typically use a CPP 100 049 (Legal responsible: Florent Meyniel) for all neuroimaging and behavioral studies ran at Neurospin. The document is available on the NeuroSpin wiki: *"Exploration des fonctions cognitives chez l'Homme par magneto- et electroencephalography (CEA 100 049 / ID RCB: 2018-A02586-49)"* .

We use CER for online and behavioral experiments run outside of Neurospin. For instance:

- the *CER-Paris-Saclay-2018–034* (Legally responsible: Virginie van Wassenhove) has been used for the ANR Wildtimes project.
- the CER

Please also make sure to strictly apply the hygiene and disinfection protocols, especially during Covid Times. Protect participants' personal rights, never share non-anonymized data, and always check your ethics protocol before making data public. GDRP

Failure to comply with the ethical protocol can have consequences for the whole institute (temporary interruption of testing in bad cases). If in doubt, ask your PIs and/or the nurses for advice.

In dealing with intellectual property:

Systematically acknowledge those who contributed to the work (including supervisors, engineers, post docs) on slides and reports. Authorship on papers will be discussed to make sure everyone who contributed to the final outcome is credited fairly.

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.

(6) 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?

1) **<u>As early as possible</u>: 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) **<u>At least 2 weeks before the submission deadline</u>:**

- 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) **<u>At least 2 months before the conference</u> 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 <u>CEA</u> OM specifying all necessary travel arrangements to Maryline Hevin. If you are an INSERM employee, you need to also send an <u>INSERM</u> OM "<u>sans frais</u>" 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 <u>INSERM</u> OM specifying all necessary travel arrangements to Laurence Labruna. If you are a CEA employee, you need to also send a <u>CEA</u> OM "sans frais" specifying travel dates and "no cost" to Maryline Hevin.

<u>The appropriate forms can be found in the team's gdrive folder 'CONFERENCES'.</u>

- ☐ <u>Find appropriate travel</u> (flight, train) needs but <u>do not book</u> 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.

- ☐ <u>Book your accommodation</u>: 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

	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

	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	

List of Lists

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

(7) Journals

List of Selected and Recommended Journals

General audience science + high impact factor (IF)

Science

Nature [and Nat Neurosci; Nat Comm; Nat Hum Behav]
PNAS
eLife
PLOS [Plos Biol; Plos Comp Biol]

Very good resources for reviews + high impact factor (IF)

Nature Review Neuroscience
Trends in Cognitive Science (Reviews / Opinions)
Annals of the New York Academy of Sciences
Philosophical Transactions of the Royal Society of London-B

Specialized audience science + high IF

Neuron
Cerebral Cortex
Journal of Neuroscience
Journal of Cognitive Neuroscience

NeuroImage
Human Brain Mapping
Scientific Reports
eNeuro
Cortex
European Journal of Cognitive Neuroscience
PsychScience

PrePrint Servers:

- BioRxiv
- PsyArxiv
- Arxiv

Tips for keeping up to date with your bibliography:

- Sign up for Table-of-Content Emails for journals
- Pubmed Email Alerts for your keywords of interest
- Science Twitter (learn about Preprints for Example)

(8) Reading List

Nobel Prizes in Neuroscience
Check the lab's library and the google drive folder LIBRARY/ for available copies.
The team's publications: https://brainthemind.com/publications/ !

Historical and theoretical context

- Dennett, D. C., & Kinsbourne, M. (1997). Time and the observer: The where and when of consciousness in the brain. The nature of consciousness: Philosophical debates, 141-174.
- **[tripartite hypothesis]** David Marr (1982), Vision: A Computational Investigation into the Human Representation and Processing of Visual Information.
- Wiliam James, The Principles of Psychology (1890) [Chapters 11, 15]

Cognition

- Fodor, J. A. (1983). The modularity of mind. MIT press.
- Chomsky, N. (1959). A review of BF Skinner's Verbal Behavior. Language, 35(1), 26-58.(http://cogprints.org/1148/1/chomsky.htm)
- Short introduction to philosophy of mind: Westphal, J. (2016). The mind–body problem. MIT Press.

Cognitive Neuroscience

- The Cognitive Neurosciences, currently sixth edition edited by David Poeppel, George R. Mangun and Michael S. Gazzaniga
- Ward, J. (2016). The student's guide to social neuroscience. Psychology Press.
- Gallistel, C. R. (1990). The organization of learning. The MIT Press.
- Krakauer, J. W., Ghazanfar, A. A., Gomez-Marin, A., MacIver, M. A., & Poeppel, D. (2017). Neuroscience needs behavior: correcting a reductionist bias. Neuron, 93(3), 480-490.
- **Auditory:** Schnupp, J., Nelken, I., & King, A. (2011). Auditory neuroscience: Making sense of sound. MIT press.

Computational Neuroscience

- Bastos, A. M., Usrey, W. M., Adams, R. A., Mangun, G. R., Fries, P., & Friston, K. J. (2012). Canonical microcircuits for predictive coding. Neuron, 76(4), 695-711.
- Carandini: cases of addition, subtraction, multiplication etc… (Nat Neurosci?)
- Petzschner, F. H., Glasauer, S., & Stephan, K. E. (2015). A Bayesian perspective on magnitude estimation. Trends in cognitive sciences, 19(5), 285-293.

Neuroscience: arguments for neural oscillations

- Buzsaki, G. (2006). Rhythms of the Brain. Oxford University Press.
- Buzsáki, G. (2010). Neural syntax: cell assemblies, synapsembles, and readers. Neuron, 68(3), 362-385.

- Fries, P. (2015). Rhythms for cognition: communication through coherence. Neuron, 88(1), 220-235.
- Schroeder, C. E., & Lakatos, P. (2009). Low-frequency neuronal oscillations as instruments of sensory selection. Trends in neurosciences, 32(1), 9-18.
- Lakatos, P., Gross, J., & Thut, G. (2019). A new unifying account of the roles of neuronal entrainment. Current Biology, 29(18), R890-R905.
- Wang, X. J. (2010). Neurophysiological and computational principles of cortical rhythms in cognition. Physiological reviews, 90(3), 1195-1268.

Neuroscience: arguments against neural oscillations

Timing

Selection of resources, networking, paper database: http://timingforum.org/

Overview

- van Wassenhove, V., Herbst, S. K., & Kononowicz, T. W. (2019). Timing the Brain to Time the Mind: Critical Contributions of Time-Resolved Neuroimaging for Temporal Cognition. Magnetoencephalography: From Signals to Dynamic Cortical Networks, 855-905.
- Buonomano, D. (2017). Your brain is a time machine: The neuroscience and physics of time. WW Norton & Company.
- Grondin, S. (2010). Timing and time perception: a review of recent behavioral and neuroscience findings and theoretical directions. Attention, Perception, & Psychophysics, 72(3), 561-582.
- Michon, J. A. (1998). On the modularity of time. Teorie e Modelli, 3, 7-32.
- Large, E. W., & Jones, M. R. (1999). The dynamics of attending: How people track time-varying events. Psychological review, 106(1), 119.
- Nobre, A. C., Correa, A., & Coull, J. T. (2007). The hazards of time. Current opinion in neurobiology, 17(4), 465-470.

Seminal papers on timing

[What is the internal clock?]

- Treisman, M. (1963). Temporal discrimination and the indifference interval: Implications for a model of the" internal clock". Psychological Monographs: General and Applied, 77(13), 1.
- Allman, M. J., Teki, S., Griffiths, T. D., & Meck, W. H. (2014). Properties of the internal clock: first-and second-order principles of subjective time. Annual review of psychology, 65, 743-771.

[What are proposed implementations of internal clocks?]

- Buhusi, C. V., & Meck, W. H. (2005). What makes us tick? Functional and neural mechanisms of interval timing. Nature reviews neuroscience, 6(10), 755.
- Large, E. W., & Jones, M. R. (1999). The dynamics of attending: How people track time-varying events. Psychological review, 106(1), 119.

[Against oscillators]

- Miall, C. (1989). The storage of time intervals using oscillating neurons. Neural Computation, 1(3), 359-371.

Methods

Psychophysics

- Prins, N. (2016). Psychophysics: a practical introduction. Academic Press.
- Moore, B. C. (2012). An introduction to the psychology of hearing. Brill.
- Macmillan, N. A. (2002). Signal detection theory. Stevens' handbook of experimental psychology.

M/EEG

- Hansen, P., Kringelbach, M., & Salmelin, R. (Eds.). (2010). MEG: an introduction to methods. Oxford university press.
- Cohen, M. X. (2014). Analyzing neural time series data: theory and practice. MIT press.
- Luck, Steven J. "Event-related potentials." (2012).

Statistics

- Foxe, J., & Weisberg, S. (2011). An R companion to applied regression.
- Field, A., Miles, J., & Field, Z. (2012). Discovering statistics using R. Sage publications.

Methods/ Critics

- 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.
- Vul, E., Harris, C., Winkielman, P., & Pashler, H. (2009). Voodoo correlations in social neuroscience. Perspectives on psychological Science, 4(3), 274-290.
- Ioannidis, J. P. (2019). What have we (not) learnt from millions of scientific papers with P values?. The American Statistician, 73(sup1), 20-25.

- 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.