Lab handbook (PI: Christopher Brown)

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# Welcome

Welcome to the lab! This handbook is work in progress and strongly influenced by other lab’s handbooks, mainly this one [here](https://github.com/alylab/labmanual). If you have any feedback such as ideas on things to add or clarify, please let me know.

# Who we are and how we are structured

The University of Liverpool consists of three Faculties: we are in the [Faculty of Health and Life Sciences](https://www.liverpool.ac.uk/health-and-life-sciences/)**.** Within this faculty are a number of institutes, within which sit a number of departments. We are based within the [Department of Psychological Sciences](https://www.liverpool.ac.uk/psychology-health-and-society/departments/psychological-sciences/about/), which is within the [Institute of Psychology Health and Society](https://www.liverpool.ac.uk/psychology-health-and-society/).

The department of Psychological Sciences consists of a number of [research groups](https://www.liverpool.ac.uk/psychology-health-and-society/departments/psychological-sciences/research/appetite-and-obesity/). Currently, pain research is conducted within the [Perception Group](https://www.liverpool.ac.uk/psychology-health-and-society/departments/psychological-sciences/research/perception/) and also links with two other groups: [Addiction](https://www.liverpool.ac.uk/psychology-health-and-society/departments/psychological-sciences/research/addiction/) and [Appetite and Obesity](https://www.liverpool.ac.uk/psychology-health-and-society/departments/psychological-sciences/research/appetite-and-obesity/).

Aside from [myself](https://www.liverpool.ac.uk/psychology-health-and-society/staff/chris-brown/), other Principle Investigators (PIs) conducting pain research and supervising PGRs within the department are [Dr Andrej Stancak](https://www.liverpool.ac.uk/psychology-health-and-society/staff/andrej-stancak/) and [Dr Nick Fallon](https://www.liverpool.ac.uk/psychology-health-and-society/staff/case-studies/nick-fallon/), who I would closely with on some projects. See [my website](http://christopherbrownresearch.com) for links to the profiles of other key collaborators locally and nationally, who I encourage you to work with as part of your research.

In academia, PIs are often said to run their own “labs”, although this may not necessary refer to a physical space for research, but more importantly the *team of people who are working under the primary supervision or mentorship of the PI*. In terms of physical space and equipment, there are shared facilities used by the three PIs conducting pain research in Psychological Sciences, and these three “labs” (teams) therefore work closely together.

# Aims of this lab

The broad aims of this lab are detailed [here](http://christopherbrownresearch.com/research/background.html). See further links on that website in the “research” menu for information about the specific research topics covered.

# Expectations and Responsibilities

## Everyone

* Make sure the research topic you are working on is what you’re passionate about. Only that way will you work hard and make it a success.
* Stay up to date on the latest research, e.g. by getting journal table of contents by email. Also consider following scientists in the field on Twitter.
* Work carefully and without rushing the process. Ask me or others to check your work regularly (e.g. code or data). It’s ok to make mistakes but this needn’t be because of carelessness or rushed work.
* When you make mistakes, recognize that it is a normal part of the learning process. You will be making mistakes throughout your whole career, so learn early on to make mistakes gracefully. This mean owning, and owning up to, mistakes. It is never too late to admit errors, even if the paper is already written, submitted, or even accepted for publication. We admit our mistakes, we correct them and move on.
* We all want to get papers published and do great things. But we do this *honestly*. It is never ok to plagiarise, tamper with data, make up data, omit data, or fudge results in any way. Science is about finding out the truth, and null results and unexpected results are still important.
* Support your fellow lab-mates. Help them out if they need help (even if you aren’t on the project) and you can expect others to help you when you need it.
* If you’re struggling, tell someone. Your health and happiness come first. We are here to help.
* If you’re sick, stay home and take care of yourself. Because you need it, and also because others don’t need to get sick. If you’re sick, reschedule your meetings and participants as soon as you can.
* You aren’t expected to come into work on weekends and holidays, and you aren’t expected to stay late at night. You *are* expected to get your work done (whatever time of day you like to do it).
* Show up to your meetings, show up to run your participants, show up to your classes, and show up to lab meetings. You do not have to be in at 9am every day – just show up for your commitments, and work the hours you need to work to get stuff done. If you need to work different hours from what you feel is expected of you, discuss it with me so that we can better understand your needs and limitations.
* Be on time. Especially when you are running participants – in fact, show up sufficiently early to set everything up without being rushed. Be on time for your meetings: respect that others have packed days and everyone’s time is valuable.

## Principal Investigator

All of the [above](#_Everyone), and I promise to also…

* Care for your well-being above all else.
* Give you feedback on a timely basis, including feedback on project ideas, conference posters, talks, manuscripts, figures, grants.
* Be available in person and via e-mail on a regular basis, including regular meetings to discuss your research (and anything else you’d like to discuss).
* Give my perspective on where our lab’s research is going, where the field is going, and tips about surviving and thriving in academia.
* Support your career development by introducing you to other researchers in the field, expanding your network, promoting your work at talks, writing recommendation letters for you, and letting you attend conferences as often as finances permit.
* Help you prepare for the next step of your career, whether it’s a post-doc, a faculty job, or a job outside of academia.

## Graduate Students (PGRs)

All of the [above](#_Everyone), and you will also be expected to…

* Develop your research. Your thesis should have at least 2 (maybe 3) substantial experiments that answer a big-picture question that you have. This work will need to substantiate at least 4 research papers/chapters in your thesis. The work from different experiments needs to hang together to form a cohesive story.
* In the beginning you will receive a lot of time and support from me as your PI (see [supervisory approaches](#_PGR_Supervisory_approaches)). As you progress, much more of your work has to be done independently. This is preparation for your future career. But remember that others (e.g. me) are always there to help you when you need it.
* Help mentor undergraduate students in the group when they need it – either because they ask, or because I ask you to. Undergrads can also help you collect data. This is a hugely valuable experience for you and will be an essential feature of your CV as you apply for jobs.
* Present your work at departmental events, at other labs (if invited), and at conferences. Make sure get all the presentation experience you can – to succeed in science you need to be part scientist, part salesman!
* Start writing grants as early as you can. It’s a valuable experience and takes many years to learn to succeed with it. It is a very different art from writing scientific reports and papers.
* Think about what you want for your career (academia – research or teaching, industry, science writing, something else), and talk to me or other mentors about it to make sure you’re getting the training you need for that career. Don’t get so absorbed in the science that your neglect you career development – easy to do when you are just passionate about the science, but ignoring this will impede your ability to continue science as a career.

## Post-Docs

All of the [above](#_Everyone), and you will also be expected to…

* Develop your own independent line of research.
* Help train and mentor students in the lab (both undergraduate and graduate) when they need it – either because they ask, or because I ask you to.
* Present your work at departmental events, at other labs (if invited), and at conferences
* Apply for grants to support yourself (and ideally others too) as early as you can. This is essential training for your future career as a PI and will set you up for many job opportunities if you succeed with it.
* Start to apply for jobs (academic or otherwise) when you’re ready, but no later than the beginning of your 4th year of post-doc. If you think you’d like to leave academia, that’s completely ok – but you should still treat your post-doc seriously, and talk to me about how to best train for a job outside academia.
* Challenge me when I’m wrong or when your opinion is different, and treat the rest of the lab to your unique expertise.

## Undergraduate Students

All of the [above](#_Everyone), and you will also be expected to…

* EITHER: Assist other lab members with data collection and analysis. OR: work on your own independent project under the mentorship of another lab member.
* Develop your weekly schedule by talking to your graduate student mentor or your post-doc mentor. You should be coming in almost every week, and scheduling enough time to get your work done.
* Attend lab and other supervision meetings and be actively involved in those meetings.

# Scientific Integrity

High quality research has been [described by UK researchers](http://nuffieldbioethics.org/project/research-culture/the-findings) as impactful, original/creative, rigorous, transparent/open, ethical and collaborative/multidisciplinary. Below are example research practices that support these values and that it is necessary to commit to when working in this lab.

## Impact

I’ve [outlined the ways](http://christopherbrownresearch.com/research/background.html) in which neuroscience can have a positive impact on people living with chronic pain. This lab’s research is focused on developing practical and cost-effective clinical tools for the recognition of brain processes contributing to the persistence of chronic pain, which in the longer term will facilitate innovative treatment strategies to tackle the problem. We involve people living with chronic pain in our research by consulting with them on our aims and approach.

## Originality

As well as addressing areas of unmet need in society, scientific research needs to be driven by curiosity about the unknown in order to make new discoveries. On the one hand, clinical research requires a responsible approach that is rigorous and accurate when testing specific hypotheses (see below), relying on standardised and replicable research methods. On the other hand, research must also leave itself open to unexpected findings that can drive the field forward, often requiring an exploratory approach involving newer, more innovative methods which carrier a greater risk of failure. We therefore seek an appropriate balance of standardisation and innovation.

## Rigour

In practical terms, our approach to scientific rigour focusses on the two aspects of study design and statistical modelling. In both cases, a rigorous approach involves fully developing detailed plans, and obtaining feedback via peer review, prior to collecting data. Such plans include fully explicated hypotheses, thoroughly piloted experimental designs, sample size calculation based on a rough power analysis (to avoid conducting studies with low statistical power), a priori rules about the end of data collection, and consideration of time and cost implications. In the case of confirmatory (hypothesis-driven) research, these plans would be publicised, for example by [pre-registration](https://www.psychologicalscience.org/observer/seven-selfish-reasons-for-preregistration). However, when research is more exploratory, rigour can be maintained through a “[replicate and extend](http://journals.sagepub.com/doi/abs/10.1177/0963721412459512)” approach in which some aspects of the research design are replications of previous work – this provides confidence in novel findings from more exploratory aspects of the study. The reproducibility of research can also be enhanced by [analysing data using standardised software](http://christopherbrownresearch.com/methods.html) where possible (to ease comparison between studies), or when new approaches are needed, analyses should be conducted (and figures generated) using [computer code](https://github.com/cab79) that other researchers can use to replicate the findings.

## Collaboration

Increasingly, innovation in science requires teamwork across individuals with a range of disparate expertise. It is important to recognise that not every scientist is good at everything, and so group work makes up for individual shortcomings to protect against possible project failures. In addition, we must recognise that over-competitive research environments carry the risk of reducing collaboration. With the right incentives in place, we can work towards fostering a greater sense of a research community with common goals, and in doing so achieve far more than we can individually.

## Transparency

Scientific rigour is promoted by [transparent and open research practices](https://www.nature.com/articles/s41562-016-0021). An example already given is that of publicising research plans (study design and analysis methods) before data is collected. Other aspects of transparency include the sharing of data and analysis materials (computer code) once it has been collected. Publicised materials should include all relevant methods, including documented explanations of the decision-making that went into the study design and any changes that occurred during the study, as these can feasibly impact on the nature or interpretation of the results. Such information must be sufficiently detailed for the findings to be reproduced. Likewise, publicised results should be comprehensive, including all relevant results, and not selectively publishing certain results that have higher “impact”. For example, results must be reported in cases where their implications are inconsistent with a favoured theory. Still, publications can be organised in such a way as to make them as accessible and understandable as possible, for example by highlighting the most impactful findings, while at the same time making less impactful findings accessible. Accessibility is also promoted by open and early access policies, e.g. [publishing preprints](https://nikokriegeskorte.org/2016/03/13/the-selfish-scientists-guide-to-preprint-posting/) via to publication in a journal. Ethical journals should be favoured who have open science policies.

## Ethical research practice

Science must be conducted for the public good. As scientists it is our responsibility to highlight and promote ethical research practice. This means conducting research in a way that is collegial and kind (e.g. to research participants) as well as adhering to the highest standards of confidentially and security in handling participant data. But ethical practice also means conducting research with rigour and transparency. It is important to recognise that some incentives in academia have the potential to promote unethical behaviour (for example, selective reporting of results to enable publication in more prestigious, high impact-factor journals, for purposes of career progression). I therefore advocate putting systems in place that reward ethical and rigorous research practices. I have signed the [Declaration on Research Assessment (DORA),](https://sfdora.org/) which proposes that the content and quality of research outputs are more important than the venue they are published in. You may choose to sign this too.

## Ethical research culture

Ethical collaboration (and ethical support of junior colleagues and students) means paying attention to the whole person rather than just attending to their role in the project. A healthy research culture means avoiding overloaded working schedules and the lack of sense of control that fosters. It means providing time and support to junior staff to allow them to reflect on their own priorities, direction and career development needs beyond the immediate project. Importantly, there must be attention to work-life balance and not allowing the sacrificing of mental and physical health of researchers for the “greater good” of the project; aside from being unethical, it is also unsustainable. Good health promotes good research practice. Facilitating this requires acknowledgement and reflection on the impact of power structures on individuals across different stages of their career. It is important to enable a safe environment for honest communication of the impact of unethical actions/practices of those in power on more junior staff/students.

# Authorship

We will follow the APA guidelines with respect to authorship:

*"Authorship credit should reflect the individual's contribution to the study. An author is considered anyone involved with initial research design, data collection and analysis, manuscript drafting, and final approval. However, the following do not necessarily qualify for authorship: providing funding or resources, mentorship, or contributing research but not helping with the publication itself. The primary author assumes responsibility for the publication, making sure that the data are accurate, that all deserving authors have been credited, that all authors have given their approval to the final draft; and handles responses to inquiries after the manuscript is published."*

At the start of a new project, the student or post-doc taking on the lead role can expect to be first author. The PI will typically be the last author. Students and post-docs who help over the course of the project may be added to the author list depending on their contribution, and their placement will be discussed with all parties involved in the paper. If a student or post-doc takes on a project but subsequently hands it off to another student or post-doc, they will most likely lose first-authorship to that student or post-doc, unless co-first-authorship is appropriate. All of these issues will be discussed openly, and you should feel free to bring them up if you are not sure of your authorship status or want to challenge it.

# Lab Resources

## Sharepoint

Each project will have its own Sharepoint site for document storage, team sharing and synchronization with any PC running [OneDrive](https://onedrive.live.com/about/en-GB/download).

## GitHub

My GitHub ([https://github.com/cab79)](https://github.com/alylab)) is used to backup and share code with others. I would encourage you to open your own Github account and start to use it to share your own code. Perhaps the code is visible to the world, it would be good practice to clarify which code is “complete” (potentially useable by others) and which is work in progress.

## Outlook and Google Calendars

As well as your own Outlook calendar, you will have access to:

1. My meetings and appointment Outlook calendar: used to keep track of where I am likely to be and my availability when in office.
2. The lab Outlook calendar: used to keep track of lab meetings and other shared events; used to indicate when participants are booked into research studies.
3. EEG lab Google calendars: used to reserve time in the ERB EEG rooms.
4. PRF research room Google calendar: if running clinical research.

## E-mail

We have a shared email account for purposes of contacting research volunteers and use when advertising research studies ([pain@liverpool.ac.uk](mailto:pain@liverpool.ac.uk)).

# General Policies

## Hours

Being in present in the office is a good way of learning from others, helping others, building camaraderie, having fast and easy access to resources (and people) you need, and being relatively free from distractions at home. That said, hours in academia are more flexible than other jobs -- but you should still treat it as a real job (~37 hours/week) even as a graduate student. This does not preclude working from home on some days – if this supports your productivity and well-being. You are trusted to make your own judgements about how helpful this is. My primary concern is that you get your work done, so if you find that you are more productive at home (office-mates can be chatty sometimes), feel free to work at home occasionally (ideally no more than one day per week, possibly two days on rare occasions). If you have no meetings, no participants, and no other obligations that day, it might be a good day to work at home – but you can’t do this all the time, and I expect to see everyone on a regular basis.

To encourage lab interaction, try to be in most weekdays during ‘peak’ hours (assuming no other obligations) – e.g., between 10am and 4pm. This is not a hard rule though.

## PI Office Hours

In addition to weekly meetings (see below), you can find me in my office. My door is almost always open; if it is, feel free to ask for a chat. If her door is locked, check my calendar as I may be away or in a meeting (either in my office, not wanting to be disturbed, or elsewhere) – but please send a message (SMS or e-mail) if urgent. In my calendar, ‘office hours’ refers to time prioritized to students, but free to anyone, for example to work through specific problems one-to-one or in a small working group that is not suitable for weekly lab meetings (see below).

# Meetings

In general, lab members are expected to attend every meeting (obviously, illnesses, doctor appointments, family issues, etc. are a valid reason for missing a meeting). Undergraduate students are encouraged to attend as often as possible (assuming it fits in their course schedule).

## Weekly Meetings

Weekly meetings aim to be brief and are focussed on immediate project activities. People who cannot attend in person can contribute via Slack before the meeting starts.

### Monday: Goal-setting (30 mins)

Everyone will prepare a brief list of (realistic and achievable) goals for the week to be shared before the meeting and discussed during the meeting. This is an opportunity to identify activities to be prioritised that week, to request the help of other people in the team if needed, and to ensure others are aware of your schedule.

### Wednesday: update meeting (10 mins)

An opportunity to check progress against that week’s goals.

### Friday: Review meetings (30 mins)

Review progress against the week’s goals and identify problems/barriers and solutions. This is a forum for and your suggestions for solutions to those problems and to get feedback from the rest of the group on these. It is also an opportunity to reflect on the working process itself, i.e. what worked well and no so well that week, and how this can be improved.

## 4-weekly meetings

### Project development meetings (60 mins)

These meetings are 4-weekly *per project*. They are to provide an overview on the direction and progress of projects, such as how work is progressing in relation to the long-term goals of the project. The meetings are also an opportunity for trainees to present data and key stages during a project. The meetings can also be used to present ideas for new projects.

### Analysis development meetings (120 mins)

These meetings will involve focussing on one specific analysis method, for example a commonly needed statistical analysis or aspect of a data processing pipeline. They may take the form of a tutorial from one of the team on methods they have developed or want to develop but are not in general use in the team, or could involve a discussion about the details of method that most people already use.

### Journal club meetings

We will have larger meetings with other PIs and their students for paper discussions. Everyone must come to the meeting having read the paper and prepared with comments and questions to contribute. Some weeks we may explore a particular issue and have people read different papers – in that case, come to lab meeting having read your paper and be prepared to summarize it for the group.

## Annual meetings (PDR)

Everyone who is a member of staff will have a Professional Development Review (PDR) meeting once per year (normally September) to talk about progress over the whole year and also long-term goals such as career development and training needs. These topics can also be discussed on a more regular basis according to the needs of staff.

## Joint meetings with other groups

We may have joint meetings with other research groups/labs in the department, for example with the Appetite and Addiction groups or with the Perception group. Attend these only insofar as they are relevant to your project work. These may be a useful forum to present your project ideas and work to a broader audience and obtain richer feedback, as well as to learn from the broad range of research methods used in the department.

## Formal PGR meetings in year 1

PGRs have formal meeting requirements in their first year. The expectations for these are partly in your PGR handbook and are summarised below with some additional details regarding my expectations from these meetings:

*First formal meeting (within 1 month): allow 2 hours.*

* Before the meeting I will ask the student to:
  + Register for their degree!
  + Complete the [managing expectations](https://github.com/cab79/postgrad_training/blob/master/Managing%20expectations%20questionnaire.docx) questionnaire for discussion
* During the meeting I will ask the student to:
  + Create notes to go into a summary document, briefly detailing their understanding of how the supervision will be conducted (based on discussion detailed below).
* During the meeting we will discuss:
  + Their completed expectations questionnaire. It’s not that one side or the other is right/wrong, but worth highlighting discrepancies. We will also consider where the Uni has specific expectations/policies that we must adhere to.
  + Respective roles of the primary and second supervisor
  + Supervision style
  + Future supervisory meetings (format, scope, location, length and frequency – see notes below)
  + How supervisor(s) wish to review work: regular updates, or finished drafts?
  + Student involvement with the School/ Department/Institute, e.g. departmental research activity, seminars and conferences
  + What to do if Primary Supervisor is away, e.g. at a conference or on research leave
  + Any ethical or intellectual property issues if you are working as part of a research team or researching humans
  + Introductions to other colleagues/students.
* After the meeting I will ask the student to:
  + Write down a brief summary of expectations on both sides, especially where there are discrepancies.
  + Create a rough plan and timescales for the research project
  + Identify development and training needs (complete a Development Needs Analysis).

*Second formal meeting (within 2 months): allow 1 hour*

* Before the meeting the student needs to have completed the tasks laid out from the first meeting (see above)
* During this meeting we will discuss:
  + The student’s rough draft of a project plan that defines the scope of the research project and outlines the objectives to be achieved in the first year.
  + The completed Development Needs Analysis (DNA).
* Both the above documents should be signed and dated by the Supervisors and the student. The documents should be submitted to the SDPR/IDPR no more than three months after initial registration.

*Formal meetings thereafter: allow 1 hour*

* Before each meeting, the student is expected to:
  + Set an agenda.
  + Produce a brief progress report since the previous meeting, set against the targets set at the last meeting. Highlight problems or areas for specific advice.
  + Prepare any work that needs discussing, e.g.
    - Results of an experiment such as data analysis
    - Draft of paper or section/chapter of thesis
    - Draft presentation for a conference
  + Set targets for future research.
* During the meeting, the student is expected to:
  + Take minutes
  + Summarise their progress report and targets
* During the meeting, we will discuss:
  + Any work that needs discussing
  + Changes to plans as necessary
  + The student’s understanding of what was discussed
  + The student’s view on whether feedback during this meeting has been sufficient or needs more input (if so, arrange another informal meeting)
* After the meeting, the student is expected to:
  + Create a summary of action points and dates for completion (in the meeting minutes)
  + Record the meeting minutes in the Record of Supervisory Meetings in Liverpool PGR toolbox in Liverpool Life.
* The record is complete when the supervisor signs this off. Supervisor sign-off instructions: <https://www.liverpool.ac.uk/pgr-development/supervisors-and-staff/supervisor-records/>
* All records for a reporting year, 1st June to 31st May, should be entered into the PGR toolbox by the 31st May each year for input into the Annual Progress Reports.

# PGR Supervisory approaches in summary

As supervision progresses over the years of a PGR degree, I will move from a more Directive to a more Supportive approach:

* Directive (year 1): Structured; defining responsibilities; planning and allocating work; setting goals; priorities and standards; monitoring performance
* Supportive (years 2 and 3): training and development; coaching and counselling; recognition and praise; listening and encouraging; affirmation

# Deadlines

One way of maintaining sanity in the academic work is to be as organized as possible. This is essential because disorganization doesn’t just hurt you, it hurts your collaborators and people whose help you need. When it comes to deadlines, tell your collaborators as soon as possible when you know when a deadline is, and make sure they are aware of it the closer it gets. Don’t be afraid to bug them about it – we all need bugging!

Give me at least one week’s notice to do something with a hard deadline that doesn’t require a lot of time (e.g., reading/commenting on conference abstracts, filling out paperwork, etc). Give me *at least* two weeks’ notice to do something with a hard deadline that requires a lot of time (e.g., a letter of recommendation). For manuscript revisions and invited paper submissions (which have hard-ish deadlines), give me as much time as you can, because these will require multiple back-and-forths.

For manuscript submissions (i.e., no hard deadline), you can still bug me to give you feedback if I haven’t responded in a week or two – papers are important!

# Presentations

Learning to present your research is important. Very few people will read your papers carefully (sad, but true) but you can reach a lot of people at conference talks and posters. Also, if you plan on staying in academia, getting a post-doc position and getting a faculty position both significantly depend on your ability to present your data. Even if you want to leave academia, presentations are likely to be an important part of your job. Additionally, every time you present your work, you are representing not just yourself but the entire lab.

It is therefore highly encouraged that you seek out opportunities to present your research, whether it is at departmental talk series and events, to other labs, at conferences, or to the general public. If you are going to give a presentation (a poster or a talk), be prepared to give a practice presentation to others at least one week ahead of time (two weeks or more are advisable for conference presentations). Practice talks will help you feel comfortable with your presentation, and will also allow you to get feedback from the lab and implement those changes well in advance of your real presentation.

Templates for posters will be available, and you can use those as much or as little as you’d like. Some general rules for posters should be followed: minimize text as much as possible (if you wrote a paragraph, you’re doing it wrong), make figures and text large and easy to see at a distance, label your axes, and make sure different colors are easily discriminable. Other than that, go with your own style.

I’m happy to share slides from my talks if you would like to use a similar style. You’ll get a lot of feedback on your talks in any case, but other people’s slides might be helpful to you as you are setting up your talk. As with posters, feel free to go with your own style as long as it is polished and clear.

# Recommendation letters

Letters of recommendation are extremely important for getting new positions and grants. You can count on me to write you a letter if you have been working with me for at least 6 months. If you need a letter, notify me as soon as possible with the deadline (see [Deadlines](#_Deadlines) for guidance), your CV, and any relevant instructions for the content of the letter. If the letter is for a grant, also include your specific aims. In some cases (especially if short notice is given), you may also be asked to submit a draft of a letter, which will be modified based on my experience with you and anything else that has to be added. This will ensure that the letter contains all the information you need, and that it is submitted on time.

# Document and Data Management

## Documents/code (not research data)

C drive

* Only use for temporary files (dispensable) unless they are backed-up (see “backup” section below)

M drive (provided by UoL)

* 20Gb
* Backed up by UoL
* Can sometimes be slow, or can (rarely) lose access. Maybe best to use for backing up docs/code from specific folder on C drive (e.g. automatically using software such as AOMEI Backupper) rather than as main store.
* Docs accessible from elsewhere via AppsAnywhere

Cloud (e.g. personal Dropbox, Google Drive, Github)

* Backed up by 3rd party
* Not secure enough for research data
* Can be more convenient than using AppsAnywhere when accessing from elsewhere

Project-specific Sharepoint site

* 5Gb per site
* For study documents
* Shared with other investigators
* Backed up on cloud, can recover old/deleted versions
* Sync to local PC via OneDrive
* Secure

## Research Data

C drive

* Normally 400Gb free
* For Secondary data (analyses in progress). No need to store Primary (raw) data here (can use NAS – see below).
* Not directly shareable (until copies are placed on NAS).
* Best to have daily auto-backup of “Data” folder on C drive to an external hard drive, e.g. using Windows backup utility, while analyses specifically for sharing can go on the NAS.

Network-attached storage (NAS)

* 5.5TB (automatically backed up to secondary drive within NAS)
* For:
  + primary (raw) research data
  + analyses (for sharing and backup)
  + code (for sharing) – although better to use Github instead.
* Shared with other investigators (who have permission)
* Secure (encrypted) folders for each project
* Use:
  + Each project has a unique folder containing the following sub-folders: “Primary”, “Secondary” and “Completed” folders, for raw data, analysed data (for sharing and backup) and completed analyses respectively.
  + “Primary” data should be placed here immediately after data collection. Record of data stored here should be kept. Data is further backed up (Active DataStore – see below)
  + “Secondary” folder should contain a comprehensive copy of all analyses to date that are complete enough to be shared. Likely these will be updated prior to project meetings (e.g. monthly). Secondary data is normally a copy of data already on PC, either for sharing or to temporarily store if PC capacity is limited.
  + “Completed” analyses are those that are ready to be written up for publication. These will be backed up to Active DataStore (below) during the project, and later backed-up to online repositories.
  + Deletion of data should not be permanent until the administrator empties the recycle bin.

Active DataStore (UoL facility)

* 1TB (expandable) per project
* For medium-term backup during project:
  + primary research data
  + completed analyses
  + NOT for intermediate analyses (due to lack of capacity)

## Regular backup and long-term storage

1. C drive:
   1. Secondary (anonymised) research data (analyses in progress: Daily automatic backup to external HD (attached to PC)
   2. Other docs/code (not research data): on a day-to-day basis, backup to M drive and/or sync to cloud storage (for code, recommend Github).
   3. At the publication stage, final versions of code (i.e. contributing to the paper) can be organised into a separate Github folder/repository for sharing purposes.
2. NAS:
   1. Primary data and Completed analyses: auto-backup daily to Active DataStore
   2. Secondary data: Backed up (instantly) within NAS only (second NAS drive). Normally this data will already be on PC (and therefore has another copy anyway) but may sometimes contain data not in PC due to C drive capacity limitations. This is acceptable as long as the secondary analysis is easily recoverable from a combination from Primary data and analysis code (both backed up).
   3. When the project ends, secondary analyses (if not part of the final “completed” analysis – see below) either be deleted or, if there is a possibility of future need, stored elsewhere (e.g. on an external HD) without further backup.
3. Active Datastore:
   1. Active DataStore copies (of primary and completed analyses) will eventually be deleted as this storage only lasts for as long as the project (current end date is March 2022).
   2. Before project ends, primary data, completed analyses and code will be shared publically via online repositories to ensure their longevity.

# Data Organisation

For each project, create the following directories (on C drive and on NAS)

* projectname\participants (participant information, normally in spreadsheets)
* projectname\behaviour (if needed)
* projectname\eeg (if needed)
* projectname\mri (if needed)
* projectname\temp (temporary storage for deletion later)

For EEG analyses and equivalent directories for MRI analyses:

* projectname\eeg\raw
* projectname\eeg\bids
* projectname\eeg\ana
* projectname\eeg\scripts

The "raw" directory contains the raw EEG or MRI data without any conversions on file names and/or file formats. In the BIDS documentation this is referred to as the "source" directory. You should copy any experiment log files and notes to this directory, to complement the scanner files.

The "bids" directory contains the minimally processed data after conversion to BIDS format. For MRI data this is NIfTI, while EEG datasets are renamed to match the BIDS requirements, and sidecar files have been added. Preferably this is the representation on the basis of which you implement your subsequent analysis, but also the representation for sharing.

The "ana" directory contains the result from processing and analysis and will mainly contain MATLAB \*.mat files or EEGLAB \*.set files for EEG and NIfTI \*.nii files for fMRI. This folder will contain a number of subfolders for different stages of the analysis (which may be automatically or manually created from analysis software).

The "scripts" directory corresponds to all scripts and functions that you use for your analysis, including copies of the relevant versions of any standard toolboxes (for version control).

# Writing manuscripts and submission cover letters

Until the time you feel you are an expert at writing and publishing papers, I strongly advise you to use the templates and detailed advice available here: <https://github.com/cab79/postgrad_training>

# Learning resources

You will find a list of learning resources useful for graduate students and post-docs [here](https://github.com/cab79/postgrad_training/blob/master/Resources.docx). This will provide you will background knowledge, training and educational resources that you will need to conduct your own research in a way that is consistent with the aims and expertise in this lab.

# Open Science

We’re all for open science, so lab members are encouraged (well, required) to share their code and data with others, whether they are in the lab or outside of it. Within lab, you can share your code and data whenever you like. But do not share your code or data with the outside world until you think that the lab has finished working with it. This gives us an opportunity to work with the data to meet our needs (including grant needs!) before releasing it for other people to use. Generally, we will try to make our data and code publicly available within one year of publishing the results (longer if work on the dataset is ongoing). Currently, the best option for sharing smaller datasets might be the [Open Science Framework](https://osf.io/), and the best option for sharing MRI datasets is [OpenNeuro](https://openneuro.org) (let the lab know if you find others).

We will also share our work with the world as soon as we ready, which means preprints! The lab policy is to upload a preprint of a manuscript simultaneously with initial submission to a journal. The preferred preprint servers are [bioRxiv](http://biorxiv.org/) and [PsyArXiv](https://osf.io/preprints/psyarxiv/). We will also put PDFs of all our papers on the Uni website, and you should share PDFs of your paper with whoever asks.