HOW TO PROSPER AND LIVE HAPPY IN CREPALDI'S LAB @ SISSA
A lab userguide

(Inspired by Jonathan Peelle's lab manual)

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Research is great fun; but it's also one of the most difficult job in the world. We're walking on the boundaries of the known, and often go out for explorations in totally dark regions. So, thing number one is, we need to withstand uncertainty—most often, there is no clear right or wrong. This doesn't mean, of course, that research is anarchy. Going out into the wild requires a method. This lab manual illustrates the method that we use in the lab, which of course is *one* method, not *the* method. So, lots to be improved (suggestions are always welcome!); but also some guarantee, coming from having served the purpose decently for a few years now.

1 Lab philosophy

There's so many things that would belong to this paragraph! But I feel that two are the most fundamental.

First, my goal is to "foster an environment of consistent scientific excellence and personal development that supports every lab member in reaching their full potential, and helps us have fun while doing great science. I want you to be happy and productive while you are here."[1]

Second, research is a good mix of planning and improvisation. The former without room for the latter is too exposed to the many failures and unforeseen events that research implies—you can plan sets of experiments years ahead, but then one experiment fails (or your colleague publish a paper that makes your story non–sense, or you get unpredicted results, or ...); and your plans are just gone. At the same time, one–shot experiments out of ramblings are unlikely to generate, alone, a solid body of evidence, or a coherent research path. So, we try to have plans, and set clear goals, deadlines and milestones along the way. But we're also prepared to be flexible, when flexibility is needed.

[1] From Jonathan Peele's lab manual. I strived to make my own formulation, but this one is just so perfect.

2 Being in the lab [2]

2.1 Everyone

We expect each other to:

- Push the envelope of scientific discovery and personal excellence.
- Double–check our work, and be at least a little obsessive.
- Be supportive—we're all in this together.
- Be independent when possible, ask for help when necessary.
- Communicate honestly, even when its difficult.
- Mentor those more junior.
- Work very hard towards proficiency in Unix, Matlab, and R (bonus points for Python and LaTeX).
- Be patient, including with your PI. He will forget things you just talked about, and repeat some stories over and over.
- Advocate for our own needs, including personal and career goals.
- Respect each others strengths, weaknesses, differences, and beliefs.
- Being proactive and have initiative. My lab is no one–man show, so never expect your time to be entirely filled up by my requests.
- Keep everything awesome!

2.2 The boss

You can expect me to:

- Have a vision of where the lab is going.
- Care about your happiness.
- Obtain the funding to support the science, and the people, in the lab.
- Support you in your career development, including writing letters of recommendation, introductions to other scientists, conference travel, and promoting your work as often as possible.
- Support you in your personal growth by giving you flexibility in working hours and environment, and encouraging you to do things other than science.
- Treat you to coffee.

[2] This is also taken rather literally from Peele's lab manual.

- Make the time to meet with you regularly,read through your manuscripts, and talk about science.
- Obsess over font choice, punctuation, and graphic design.

2.3 Postdocs

I expect postdocs to move towards being more PI–like, including giving talks, writing grants, and developing scientific independence. I also encourage them to cultivate an independent research program (while still supporting the labs research).

2.4 PhD students

I expect PhD students to:

- Know the literature related to their topic like the back of their hand (which means, much better than the PI).
- Seek out and apply for fellowships and awards (including travel awards, etc.).
- Realize there are times for pulling all nighters, and times for leaving early to go to the park and enjoy the sunshine.

By the time you're done, you will have to know how to do statistics and plots in R, use Matlab scripts for data analyses, know enough Python to navigate presentation in PsychoPy, and make figures and posters using a vector graphics program. The learning curve can be a little steep on these, but it's well worth it.

2.5 More junior students

Master Students and junior fellows are expected the same as PhD students, just all scaled down to them spending less time into the lab.

2.6 Non–academic employees

Project managers, techinicians, and other non–academic personnel are expected to:

- Support the lab activity in their own capacity with dedication.
- Remember the academic personnel about their administrative duties (e.g., timesheets on externally funded projects), and help them out with these.
- Assist the academic personnel on buying research equipment and, more in general, in everything that requires interaction with SISSA's administration.
- Specifically for the Project Managers: keep the lab life organized, particularly around external deadlines (e.g., research report).

2.7 Working hours

Research is the farthest one can think of a 9–17 job—our work is arranged around deliverables, not around fixed times. However, we need interaction in order to do good science, and be well and happy. So, everyone is required to live the lab factually, being there most of the time, going to lunch together, having walks in SISSA's park, helping out labmates who needs help, etc.. If you're planning to be away from SISSA for more than one working day (either for working at home or for holiday), please let everyone know via Basecamp (see Section 3.1).

3 Tools in the lab

3.1 Basecamp

Basecamp is a project management/social software that we use as the virtual home for the lab. You can find it at https://basecamp.com. The lab pays a subscription, so that individual sign–up is free for all lab members. This tool is really easy to use (taking a look at this 2–min video should be more than enogh to start using it proficiently); and is available as a mobile app for Apple and Android devices.

This is our bible: If something isn't on Basecamp, it didn't happen. To you, it will be a useful tool to stay connected with lab mates, and clarify ideas, decisions, and steps forward in your project (e.g., transform meetings into new to–dos). To me, it wil be an invaluable help for getting oriented quickly into the many many MANY projects going on into the lab. I will work a lot on Basecamp myself; but please be aware that it is your responsibility to keep it updated for what concerns your own project (e.g., upload a brief summary for meetings, keep all relevant literature into the 'Docs and Files' section).

3.2 GitHub

You'll have figured out already by reading through to here—I deem coding absolutely fundamental for cognitive neuroscience research. Essentially, every step in research is a form of coding, from preparing the experiment display, to analysing the data, to even writing the manuscript. GitHub provides file sharing, similar to Dropbox or Google Drive. However, critically better than these more popular tools, GitHub also delivers co–editing of the same files, with version control and branching (the development of independent streams of work, such as, e.g., data analyses with different statistical techniques, or different framings of a paper). The final critical features of GitHub is that you can make your directories public whenever you want to do so (e.g., you can make your data publicly available with one click when your paper gets accepted; see Section 4).

GitHub may be slightly less intuitive than Basecamp in the first place; but you'll see you'll get there with a rather short learning curve. There's plenty of videos on YouTube and tutorials on the Internet, so just search for 'git tutorial' and your operating system, and you're done (this is a great 20–min introduction video). As for Basecamp, the lab pays a fee so that everyone can get their own GitHub account for free.

3.3 The experimental labs

At SISSA, Human Cognitive Neuroscience experimental labs are shared across research groups—please, always be aware of this. Domenica Bueti is the experimental lab coordinator, so please refer to her for any related issue (e.g., how to book the labs). Alessio Isaja is the Techinician for the Cognitive Neuroscience PhD[3], so please refer to him for any techinical issue.

3.4 Software

There is no such thing as 'official' software of the lab—everyone is generally free to use the software s/he likes the most. There is, however, a lab policy on software, which aims at (i) helping collaboration, (ii) encouraging the use of the most appropriate software for each specific goal, and (iii) keeping everyone really free to decide for their own software. This seems all very banal, I know; but not if you really consider day–to–day practice. For example, if you draft a poster with Powerpoint, Linux users won't be able to work on it (non–commercial Office will screw up any graphical aspect that you may have carefully crafted). This may be fine with me, as the senior author isn't supposed to put his hands on the poster (so, a PDF will be ok, as long as you're prepared to received text comments). But perhaps this may cause lots of inconvenience to collaborators in your project, if you have some. The same for a manuscript: if you use Word and EndNote, poeple who don't want to buy a costly Microsoft license will go crazy just for posting a couple of comments in the right place. Please always be aware of this kind of issues. There is no easy golden rule; but we do have a few guidelines:

- Whenever lab members disagree, non–commercial software wins over the commercial equivalent (e.g., JabRef wins over EndNote; LaTeX and OpenOffice wins over Microsoft Word; InkScape wins over Adobe Illustrator).
- You youngsters have time and energy to learn new things, you should take advantage of this!
- Anyone in the lab can use any software s/he likes, as long as it doesn't force anyone else to bid to any commercial license.

4 Open–everything policy

Research is a community enterprise—none of us will ever go far without the help of others. This is true for us in the lab; but even more for our lab in relationship to the other labs in the world. In additiont to that, we know that experimental psychology (and neuroscience too, to some extent) is rather weak on replicability; so, we need to provide our contribution to promote more solid science.

[3]We call departments 'PhDs' at SISSA, because the two things pretty much overlap—several research labs working on related issues form the Faculty for a PhD program. We are part of the Cognitive Neuroscience PhD. Above PhDs are what we call 'Areas' at SISSA. We have three of them, Neuroscience (where we belong), Mathematics and Physics.

This translates into our 'open–everything' policy. Basically, whatever we produce is shared freely; primarily within the lab, and then outside in the world. Of course, we ask for acknowledgment of our work (e.g., we thank lab mates in papers where we've used their code, we ask to be cited when colleagues from other labs use our data or GitHub code); but always make our material freely available to others. This policy applies to all research material: the stimilus set, the script for the delivery of the experiment, the raw data, the code for the analysis, and the paper of course. This is the only way to really guarantee replicability; and to allow re–analysis and re–use of our work, so that we really make its best possible use as a community. This policy has consequences on how we treat and store our research material *well before* publication (see Section 7)—we're too busy and too lazy to do things twice, so better running the business as we were public all the time, even if of course we're not during the development of the project.

Importantly, this policy obviously needs to be discussed with collaborators from outside our lab, when we run joint experiments—there's still a hot debate going on, and not everyone is convinced that full openness is the way to a better science (different honest opinions need respect).

5 Meeting me

As you grow older, you'll surely come to agree with me that time is by far the most precious of our resources. Without an efficient allocation of my time, I wouldn't be able to offer you any appropriate tutoring. So please always (i) be considerate with knocking on my door, calling me over the phone, or more in general taking up my time unscheduled; and (ii) consider this fact when you don't get as much time as you'd like from me. On the other hand though, constant interaction (including face–to–face) is key for a productive and enjoyable working environment. So please don't be afraid to ask for my time when you feel you need it. You see it's a delicate balance, and I'm afraid there's no golden rule here—we'll have to rely on common sense, patience, understanding from everyone, and a few guidelines:

- try to anticipate issues that you'll need to discuss with me, and plan meetings ahead (e.g., it's not a good idea to knock on my door to discuss how to analyze the data for a poster that you'll have to send out tomorrow);
- call me/knock on my door only for really urgent issues, particularly if they likely require more than 5 minutes;
- when in doubt about the real urgency of things, ask your labmates—they're likely to agree if the issue is really urgent, or otherwise calm down your anxiety a little bit;
- everyone (and myself particularly!) need breaks, so take advantage of this to chat with me unscheduled—I'm always happy to have a coffee halfway through the morning or the afternoon[4], or to discuss urgent things or new ideas for experiment over lunch.

Planning meetings is on a completely different track (i.e., it can be scheduled ahead of time, and be prioritised appropriately against my other duties). So, you should absolutely NEVER restrain yourself from asking to meet me.

[4]For the late nighters, halfway through the morning is NOT 12.30pm. ;-)

Again in an attempt to keep my time appropriately organized, I try to do mail and read through the Basecamp only once a day, typically early in the morning. So, I will typicaly respond to your messages within one business day[5]; please consider that when deciding whether you need to give me a call or pass by my office.

More in general, for what concerns communicating with me:[6]

- be proactive, and tell me what you need. I think I'm pretty good at understanding people; but never assume I read through your words or interpreted correctly that little shaking of your head...
- Write things down and remind me what we've talked about. I would love to remember everything we decided when we met last week, but this doesn't always happen. Don't hesitate to bring me up to speed when we meet. Even if I already remember what we are talking about, a couple of introductory topic sentences will help get me in the right frame of mind. Be sure to write down everything in Basecamp!
- Read all of the lab documentation (essentially, this lab manual and Basecamp). You are responsible for knowing what is in each of these places, following the rules and guidelines we have set up, and notifying someone if you find incorrect information (or if you have questions).

6 The lab meeting

The Lab Meeting happens every other week, normally at 10am on Wednesday. It is the only 'official' lab gathering, so please make your best effort not to miss it. The Lab Meeting is the venue for:

- stay connected with everyone's work, and feelings;
- celebrate successes, and help everyone's resilience on failures;
- share and/or discuss news in the lab practices/guidelines;
- share problems that may have emerged in everyone's project, and come up with solutions through a collective effort;
- update the lab on projects' milestones, and gather feedback on what's currently on the table;
- practice upcoming talks;
- ...

I take up the responsibility of preparing LMs agenda, which I will try to do (and share) on the Friday before each meeting. However, your input on this is absolutely fundamental, so please let me know of any need/desire/problem/request (e.g., you want to practice a talk, you've been running around one given issue for days and want to ask for others' advice, you've just finished analysing your data and want to have feedback). I'll try to keep everyone involved, so please expect to have something to contribute to LM on a regular basis.

[5]Sometimes I take a break from e–mails/Basecamp on evenings and weekends.

[6]This Section also comes quite literally from Peele's lab manual.

7 Running experiments

The life cycle of an experiment always include the following steps/milestones: (i) the definition of the experimental design; (ii) the ethics clearance; (iii) the creation of the stimuli; (iv) the creation of the script to deliver the experiment to the participants; (v) the collection of the data; (vi) the analysis of the data; and (vii) the write up of the paper. To help collaboration within and outside the lab, and to make our open–everything policy most effective, we will keep track of these milestones via archiving the corresponding files or folders in their final version. This will be done initially within the relevant Basecamp, which will always have a folder called 'archive' in the 'Docs & Files' section; and, as the project progresses, on a medium that will eventually allow the publication of the folder (e.g., GitHub, see Section 3.2). More specifically:

- Research design: we store a brief document where we have a brief description of the experiment, its rationale, its dependent and independent variables, the trial timeline, the task required to the participants, and so on. Occasionally (e.g., for more complex experiments), this file may become a first draft of the Materials and Methods section of the eventual paper.

- Ethics clearance: we store our application to the Ethics Committee and its attachments (e.g., the Informed Consent Form), and the approval document from the same body.

- Stimuli: we store a text file with all the stimuli and their features (e.g., frequency, length). This folder should also include any additional material used in the experiment (e.g., a questionnaire to collect subject–specific features).

- Script: we just store the script for displaying the experiment here.

- Data: we store the data files, normally as they went out of the testing computers[7].

- Data analysis: we store the script for the data analysis here.

- Paper: we store the paper.

A few practical notes:

- I'm always sbj0—once everything is ready to start data collection, I come into the lab and take the experiment myself. I find this very useful to spot eventual problems or improving on those little things that, in the end, can make a difference (e.g., clarity of the Instructions, appropriateness of the practice trials). After running me, you should always check the output file very carefully, so as to make sure that it contains all the relevant information.

- If you have no experience with testing, make sure that either me or one of the postdocs is with you while taking care of the first few participants—here again, small details can make the difference (e.g., adapting your attitude to that of the participant is critical to have her/him producing good–quality data).

[7]This obviously depends on the nature of the experiment—this determines the size of the data files, which may be too large for storing the raw file in a general–purpose tool such as GitHub

- Always get to the lab well ahead of the participants' arrival. If something unexpectedly goes wrong (it will happen), you need to have some time to fix it.
- Take care appropriately of the informed consent form(s). Most of our experiments have nothing particularly worrying for the participants, but it's important they are fully aware of what their participation implies (e.g., they can withdraw at any time; their data will be anonymised, but then stored for some time). I've also found out over the years that the informed consent procedures can be a very good way of setting the participants into the right mood, and make them understand that testing is serious business.

8 Public engagement

I consider engaging with a non–specialistic audience an essential part of science and, more specifically, of our mission as a lab. Linking with the public forces us to keep contact with real life (not always easy in research). Moreover, it's a way to give back to the taxpayers what we've receveived from them in the first place—never forget we live on their money, and our research does too. In addition, this often becomes an essential requirement for the research to be carried out, e.g., engaging with schools and family on projects with kids learning to read. So, expect to be involved in this kind of activity; and please engage in this actively and enthusiastically.

Thanks for getting to the bottom of this. And now... have fun and make great science!