Tips for the Comprehensive Examination
at the Department of Cognitive Science, CEU

The main task during the first year of the PhD is to identify a research question and to devise a plan of action for addressing it within the confines of the PhD. The Comprehensive Exam aims to assess whether this task has been satisfactorily completed, and whether the doctoral student is set on a course of successful doctoral research. The Exam involves the submission of a written document called "Research Proposal" and its oral defense. Submitting the research proposal and defending it constitutes a major milestone in the pursuit of the PhD.

The Comprehensive Exam is conducted by the Doctoral Committee, which currently includes all faculty members at the department. The members of the committee read the research proposal, attend its oral presentation, and raise questions about its content during the Q&A session. Based on this, they assess whether probationary PhD candidates can pursue their doctoral studies and become PhD Candidates. The decision is a collective one, taken after the careful deliberation of the members of the committee. It can be either 'pass' or 'fail'. If the decision is 'fail', the Director of the Doctoral Studies writes a letter justifying the decision. The doctoral regulation states that "*In case of Comprehensive Examination fail, students can retake the exam by submitting a revised research proposal within 4 months. The Comprehensive Examination can be retaken only once. Failing the repeated Comprehensive Examination leads to immediate termination of student status.*"

The research proposal is a document that should not exceed 6000 words (excluding references, but including footnotes, abstract, and figure captions). The oral examination consists of a 15-minute presentation followed by a 30-minute question and answer session. The oral comprehensive exam takes place in the beginning of June, and the research proposal is due for submission in May. Check the Departmental Academic Calendar for the precise dates for your academic year.

The current document explains what the doctoral committee members are expecting from the research proposal and the oral exam. However, it does not include a list of specific criteria that are necessary and sufficient for passing the exam. There are two reasons for that:

1. Research is by nature open-ended. Students need to pick the best tools, conceptual and methodological, to design their research project in view of the questions they raise. We cannot tell in advance which tools should be used in a given research project.
2. Cognitive science is an interdisciplinary field. We therefore want to remain open to a diversity of projects: they can be more theoretical or more empirical, more incremental or more exploratory. They can satisfy the criteria of linguistics, neuroscience, experimental psychology, philosophy, or other fields.

In addition to reading the tips below, we recommend that you take a look at previous research proposals, submitted in the years before you. Several students and alumni have accepted to make their proposal available. You can consult them here:

https://drive.google.com/drive/folders/1ODXmuVc3T4bq7lHuYYg1hwwABTL2CYl

The aim of the research proposal

In their research proposal, students need to state how they intend to contribute to cognitive science via their doctoral research and with the support provided by the department (specifically, the possibilities for data collection provided and the supervision). The proposal will be assessed in view of

1. the expected **contribution to cognitive science**
2. the **feasibility** of the research program

In order to convince the committee that your contribution will be important, you need to clearly **identify what phenomenon you want to explain** (the explanandum). You also need to describe what interesting questions it raises, why it is important to find an answer to these questions and what non-trivial explanations can be envisaged.

The research question should be clearly stated. Remember that, even though faculty members at the department do share a lot of background knowledge, cognitive science remains a very diverse field spanning many topics, theoretical frameworks and paradigms. Therefore, the research question needs to be formulated to be accessible to this audience.

In order to convince the committee that your projected research is feasible, you will have to be as specific as you can about your methods. For an experimental project, this involves getting into the details of the proposed studies. For a modelling project, this involves specifying the mathematical concepts needed, the computational simulations to be run, or the analyses planned and the empirical data that might be used. For a theoretical project, it involves giving the core elements of the argument that one intends to develop.

Critically, you must make the connection between your question and your methods as clear as possible. *How* do your methods answer the question you present? *Why* is this the right approach? *What* will the results mean for our understanding of cognition? It can be challenging to keep both the breadth of the big question and the narrowness of the specific methods in mind at once, but the committee needs to understand how they are connected in order to see how the proposal will lead to a successful dissertation.

A research proposal is not a student essay. Don't write an overly long literature review, and the one you do write should focus on knowledge gaps. You are expected to show that—as an expert on the research question you raise—you will bring something new to the table. Often, this involves planning to do something small and modest, because that may be better than reinventing the wheel. However, the research proposal is not a scientific paper either. It needs to be broader than a standard research article. Think that you are planning for a doctoral thesis, which should be rich enough to provide material that could be developed into a book or about three scientific papers.

The structure of a research proposal

Here is *an example* structure for a proposal:

1. An introduction, with:
   a. A description of a phenomenon of interest. This can be a behaviour observed in our day-to-day life, a set of puzzling results in the literature, a developmental change, etc. (Avoid clichés and being too general).
   b. A question about the cognitive processes that might shape the phenomenon above mentioned.
   c. A hypothesis, which would provide–if true–a satisfactory explanation of the phenomenon in terms of the cognitive processes involved.
   d. A contextualisation of the hypothesis within the contemporary scientific debate, showing that the hypothesis is compatible with what we already know yet it is new, and would be of interest to an identified community of scientists
2. A first study, with:
   a. A hypothesis that is a corollary of the main hypothesis that is spelled out in the introduction.
   b. A protocol for an experiment (or a line of experiments) that can test the hypothesis because:
      - The protocol together with the hypothesis lead to precise predictions
      - The data gathered by running the experiment can be compared in a rigorous way (e.g. statistical methods) against the predictions
      - The dependent variable and independent variables are clear. The conditions and their purpose are well specified.
   c. Discussion of the planned analysis and expected results. This can include a graph of fake data for illustration.
   d. Discussion of some possible follow-ups and controls. What could be done if the results are not significant, and what could be done if they are.
3. A second experiment (or line of experiments) presented with a structure that is similar to the previous section.
4. A brief discussion section that:
   a. Reminds the reader of the relation between the main hypothesis spelled out in the introduction and the planned studies.
   b. Reflects on the feasibility of the studies and considers alternative plans.

The structure of a research proposal should depend on the research project itself. It is important to understand that the above is only an example of a structure. Variations are numerous:

- Projects can include several experimental studies if these are easy to explain and run.
- Projects can include no experimental studies. Indeed:
   - The means to gather empirical data can rely on methods other than psychological experiments (cognitive ethnography, the exploitation of sociological data sets, etc.). The relevant data can be the results of computer simulations (sometimes called in silico experiments) or it can be found in the literature if the project involves doing meta-analyses.

- The projects can be fully focused on developing a computational model, an evolutionary theory, or any other research activity that is likely to enrich our understanding of cognitive phenomena.
- The starting point might not be an observed phenomenon. The project can start with targeting a method, raising a question, etc.

In all cases, the research proposal should *be* structured so that it provides **an argument** that demonstrates that there is interesting research to be done and that you are in a position to do it. The structure should also make it **easy for readers to navigate the document**. Scientists do not usually read papers and projects as they read novels: from cover to cover in a linear way. They tend to jump around: read the first piece of the intro, look at the graph of the first study, move to the conclusion, get back to the second study, etc. A good structure allows busy and impatient readers to do just that.

What should be especially salient in the research proposal is *what* is to be researched and *how* this will be done.

- The what: this is the main idea of the proposal. It likely takes the form of a hypothesis about the nature of some cognitive processes. Don't hesitate to label it. Readers will look for it in the abstract and relatively early in the introduction. When specifying the '*what*', you need to show that you deal with an important topic.
- The how: it is the means that you will use to provide elements of answers to the questions you raise. Readers will look for this in the method or in the prediction sections. They will especially focus on checking whether the method is sound and whether the predictions will indeed test the hypotheses. When specifying the '*how*', you need to show that your projected research is feasible.

If you do not clearly distinguish the what and the how, your readers might fail to see that your ideas go well beyond predicting behavior in controlled conditions. This happens when the big idea is not salient enough. Conversely, your readers might fail to see that you did consider feasibility if the methodology is not presented as such, but mixed with general considerations. However, it is also important to make sure that the two are connected: A big exciting question can appear in the same proposal with highly rigorous methods, but if it is unclear to the readers how the methods answer the question, the proposal falls apart.

The process of writing a research proposal

The task of writing a research proposal can be daunting. It involves planning for three years of research activities. It involves making decisions about what kind of expert you want to become. It involves having ideas. It requires being sufficiently informed, with a literature that is always bigger than expected and growing everyday. With all that, the end product has to be as clear as possible and convincing to an audience that is trained to be critical. In order to tackle these challenges, make the most of the environment provided by the department and keep focused on producing a research project.

Commit early but do not over-commit

Committing to an idea should save you from losing yourself in the literature. It allows you to be goal-oriented. This is important because of time constraints: the qualifying exam arrives

early, and it always arrives earlier than one would have liked. You began the academic year with the project you sent when applying. Since you have been accepted to the program, this is probably a good starting point. This can provide some material for early discussions with faculty members and your new colleagues. Specifying the direction of your future research early allows you to orient your readings and be on the lookout for inspiring methods, useful results, and thought-provoking theories.

Be pragmatic and seize opportunities that are presented to you by your supervisor or recently published papers. While changing direction is costly (and the later you do so, the more costly it is), it sometimes is a good decision to take. Indeed, there is a high probability that your initial ideas need more than a refinement. You should be open to that.

Read and talk

Adapt the pace of your reading. You have to read fast, because you have to read a lot. You need to form a mental map of the literature that is relevant to your project. At the same time, you need to select a few papers—maybe ten or less—that are really central to the question you address or to the method you want to use. You need to read these papers carefully so that you thoroughly master their content.

Know when to stop reading. At some point, you will have to take the plunge: design a study of your own and write. It is hard to realise when reading becomes more of an excuse to postpone writing. You are likely to keep feeling that maybe you have missed a relevant paper. Maybe the study that you want to do has already been done and can be found somewhere. Still, if it is time to design studies and write, you should do so.

The Individual Study Course corresponds to the time you should specifically dedicate to doing a review of the literature. You can use the work that you do for this course as informing and shaping the introduction of your research project.

Papers do not talk back. They don't listen and don't ask questions. This is why it is very important that you talk to people. You might think you have clear ideas, but that is not the case until you have been explaining them clearly to others. In addition, explaining one's ideas to someone else is often an excellent way to have new ideas. Of course, you should talk regularly to your primary supervisor, but you should also make the effort to talk to other faculty members, to other doctoral students and to postdocs. Join lab meetings and volunteer to present your ideas.

Write

You have to avoid finding yourself having a writing block in front of a blank page. The way to do that is to prepare preliminary writing materials. Writing materials include notes that you have taken when reading, and notes that you have made of your ideas. Take notes for your research project on a day-to-day basis. When you decide it is time to write your research project itself, your first task should not be to write something on a blank page, but rather to organise your already existing material.

Plan to have a draft ready **much before the deadline** (at least 3 weeks) so that you can ask your supervisors to read it and still have time to make corrections. The last touches always take more time than expected.

It's also a good idea to take the Academic Writing course. It is offered in Winter, perfect timing to learn as you go.

Resources about how to write a Research Proposal can be found here:

https://guides.umd.umich.edu/c.php?g=529423&p=3620599

https://www.reading.ac.uk/pcls/phd/how-to-apply/writing-research-proposal

The next two references are geared towards proposals for external funding, but the logic is the same: You need to convince someone that your work is worth doing!

The Writing Workshop, chapter "Proposals": https://osf.io/z4n3t

Denicolo, P., & Becker, L. (2012). Developing research proposals. SAGE Publications, Ltd, https://doi.org/10.4135/9781526402226

Work with your supervisor

Your supervisor can help at all the stages of the process: when brainstorming about the general ideas, when designing studies, when writing up, etc. Do rely on your supervisor's experience. Make the most of their ideas and, also, of their criticisms (btw: we know that answering to criticisms is hard: we have to do it all the time with, e.g., reviewers).

Your doctoral work is yours and it is important that you appropriate it. At the same time, think that you are preparing for a long term cooperation with your supervisor. Try to find a way of working together that would make this cooperation as fruitful as possible.

While your doctoral supervisor is the main person with whom to work, remember that you are always welcome to ask for advice from other faculty members: that can be because they have complementary expertise or simply because it is good to have a second opinion.

Useful advice about maintaining a good relationship with your supervisor can be found here:
https://phdcomics.com/comics/archive.php?comicid=1296
https://phdcomics.com/comics/archive.php?comicid=1531
https://phdcomics.com/comics/archive.php?comicid=921

The oral exam

The oral exam is a defense of your proposal, where you will present and discuss your research project in front of the board of faculty members in a rather official setting. You only have 15

minutes to present ideas that have taken many pages to expose in the research proposal. In order to face this challenge, you need to carefully prepare your presentation and to practice it. Practice will help you deliver the presentation in the way you intend; it will also help you to keep time.

All the members of the Committee members will have read your Research Proposal by the time of your presentation. However, you still need to present the main ideas clearly and illustrate your methodology. It is better to sample some elements of your research proposal rather than cramming everything into the allocated fifteen minutes. However, be ready to answer questions about the content of the full research proposal. Expect critical questions and comments: These do not aim to destroy your proposal but to give you opportunities to defend it. There is no perfect proposal that cannot be further improved. Consider the questions and comments carefully: neither dismissing nor uncritically accepting them is a good strategy at the exam. You can prepare the question session by means of discussing your projects with others: collect some common questions and have ready-made answers for these. You can prepare some additional slides that could be useful for answering some questions. The most important, however, is to carefully listen to the question and give a targeted answer. Do not hesitate to admit if you did not understand a question. You can also try to reformulate the question and check whether it corresponds to what the member of the committee meant. It is also better to say that you don't know than to give an answer that does not address the question or that is wrong.