# Literature review advice for UG4/ MSc projects

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*Revised August 2013*

## 1. Understanding and planning a literature review

### 1.1. What is a literature review?

The purpose of a literature review paper (or section within an original paper) is to assess the published work pertaining to a particular topic. In most cases, a review will be selective, and discuss only research which meets certain criteria (published since a given year, uses a specific method, and so on) rather than every single relevant paper which has been published. Literature reviews are common in all scientific disciplines, and may be published as part of an experimental paper to explain why those experiments were conducted (e.g. a gap in current literature which has not been investigated, replicating a previous experiment, etc.), or may be published as a stand-alone paper which summarises the current state of research on some topic. Review papers are generally clearly labelled as such, but you should also know you are reading a review paper if it does not describe a new, original experiment.

Writing a literature review is not simply a matter of listing papers and opinions, nor of summarizing papers one after another. The reviewer's job is to try to *evaluate* and to *make sense* of what is out there—how are these papers related, other than being about the same research area? What are major areas of agreement or disagreement? The main methods? Unanswered questions?

A key difference between a review paper and a literature review section that prefaces original research is that the purpose of the review paper to is show what's out there: recent developments in a field, evolution of a method or argument, evidence for and against a claim or theory...etc. The review section in a paper which reports original work needs to be much more targeted. Its goal is to provide some general background that the reader will need in order to understand the following work, and then to put the following work in context. This is done in a peculiarly backwards way: starting very broadly or with high-level concepts, and working through increasingly specific concepts down to the gap in the current literature where your new, original research will fit.

If your work directly extends an existing research project or programme of experiments, much of this "positioning" work has already been done for you. Check the project proposal and/or existent project publications in order to get an idea of what concepts have been covered, in what order, and where the new work (your work!) should fit. Remember that the review section needs to do two things: provide the information that the reader needs to understand your new work, but also the information *to understand why/how your work provides new knowledge, and what questions the results might answer.*

### 1.2 Planning a literature review

Making sense of one paper can seem difficult enough, and to make sense of *many* papers requires some planning. Think of writing a lit review as creating a coherent narrative out of a group of papers. What story does a body of research tell? Examples of a "research narrative" include:
- Comparing and contrasting how two or more theories relate to a topic
- Looking at the evolution of a field or an idea over time (a chronological narrative)
- Research findings for and against a particular viewpoint or conclusion
- Justification for a programme of work (Give background. Explain how papers Y and Z follow up on unanswered questions from prior work X…). This is usually the type of 'narrative' that will be appropriate for a literature review section in an original paper, though not always.

This planning task is more complicated if you are working on something that is highly interdisciplinary, and you need to provide a lot of background that is not obviously all related at the outset but is all necessary to justify and explain your work. In this case, a major task of the review section becomes illustrating how all these areas interrelate/ mutually inform one another for your work. Sub-headings with informative titles can be invaluable for this type of task, because you are giving the reader tools to follow your train of reasoning and make connections. "This section introduces A, another section introduces B and C, then I will bring them together and discuss other interdisciplinary work." That said, the key task is not to simply include all the areas, but again to synthesise them and show your reader *why* they have been brought together at all, and specifically for your work.

It cannot be over-emphasised that a literature review is not merely a summary, it is a *discussion of work*. It may summarise work from a particular paper (or area of inquiry, in a large review) but this is essentially evidence for a discussion of how this research goes about answering some question, and whether it succeeds, conclusions that can/cannot be drawn, comparisons to other methods... Without this discussion and assessment, it is just a summary, not a review!

### 1.3 Identifying relevant sources for the review

In order to find relevant papers and materials, you need to will need to use online and library resources. First, you need to think about all resources you can use to start a general literature search. You may look in the Library for:

- Textbooks on related topics - look at what they say to get an idea of the related topics
- Journals that are relevant to the topic
- Related Conference Proceedings and workshops
- PhD and Masters dissertations (thesis)

See the main library website here: http://www.ed.ac.uk/schools-departments/information-services/library-museum-gallery

See the E-journals home website here: http://www.ed.ac.uk/schools-departments/information-services/services/library-museum-gallery/finding-resources/find-ejournal/search-ejourn)

Also consider a more detailed plan of *how* you will search for information, instead of just where. For example, consider:

- Google or Google Scholar search: What terms or authors will you search on? Remember that a very general resource like Google Scholar offers limited help if you are not already clear on the keywords or authors for which you are looking.
- What sections of the library would you look at? What textbooks? Which journals? Which conference proceedings and workshops? The online library catalogue and most journal databases have sophisticated search options for narrowing things down (e.g. Look only at certain publication years, see only articles to which the Uni has full-text access, etc.)
- Which specific researchers and research groups? Which specific papers?
- What sorts of topics for PhD and Masters dissertations?
- Whether older work is still relevant to you, or if you should look at newer work only. This may matter more in some fields than others!

In all cases, look at the references that your sources cite and follow these up. One strong, useful book or paper can frequently lead you to others that you may not have found by keyword or database searches alone. Similar strategies include:

- Determining which researchers/ research groups are involved in this area, and following up their projects and publications. Research group webpages can be very helpful.

- Follow up a useful paper and see who has cited it since it was published, this can help you identify follow-up work by the same authors, or find how unrelated authors have built on (or challenged!) this work.

Then there is the question of **using sources effectively,** once you have them. Often this may mean *not* reading an entire book or paper, or not reading a full source in chronological order. For example, when using a journal paper for a literature review, you may look at abstract/conclusion/references or perhaps flick through and look at data/results only. You do not always need to read the full paper. *See section 2 for more on effective source use by "Reading with your writing in mind".*

**Warning:** When you are looking for relevant papers, you are strongly cautioned to NOT just grab the first paper you find with an interesting title. Browse through your options in the library database or Google Scholar search results. Open several papers that sound relevant/interesting, read the abstracts, and look through the papers. If your review is such that you can choose between several examples of something in order to illustrate a field or point, try to choose papers that you think are most relevant or most interesting. If a particular paper seems interesting but also very complicated, consider whether the complexity is "worth it" in terms of the added time to work through the paper and understand it clearly enough to write about. Some times there may not be a simpler option if work in your area is limited, but in many cases there *will* be other options.

## 2. Read with your writing in mind
You are strongly encouraged to keep notes as you read. Not after-- as you are reading! Note down references to follow up, terms you need to look up (or should make sure to define for your own readers in your paper), key claims, hypotheses, and methods.

It is suggested that you start with the parts of a paper most likely to be in plain English and try to understand those before proceeding to the more technical sections. **This may mean *not* reading the paper from beginning to end.** The abstract, introduction, and conclusion are the best places to start, followed by the more technical discussion section, methods, and results. If you read the plain English sections and discover that this paper is not relevant to you after all, then feel free to go to the next one! However, don't forget to note that this paper was not useful. That way you won't waste time re-visiting it later.

Make sure to look for the following types of information in each paper:
- What is the point of this paper?
  - What research question does this paper try to answer? What do the authors hope to find out?
  - What were the hypotheses (testable predictions) investigated in the experiment?
  - How does this paper relate to previous research? (Look in the introduction section for that information)
- How did the authors investigate their hypothesis or their other claims?
  - If there were human participants, who were they? Why this group or groups?
  - Is the design between subjects or within subjects? Are their multiple baselines, ABAB design, or other special features that should be mentioned?
  - What was the experiment the participants did or the programme the participants received/ took part in?
  - *Or substitute questions that may be more suitable for your discipline.*
- If there was an experiment, what were the results of the experiment and what do they mean?
  - Focus on the plain-English description of the results and what they mean. While it can be helpful to report key numbers such as "Group X was 75% more accurate than group Y..." but you do *not* need to report endless numerical results.
- Do the results support the hypotheses? Have any research questions been answered?

Once you have at least some of your information, it is time to begin organising it and planning the "narrative" for your literature review.

- If you are having a great deal of difficulty deciding how to organise your source materials, make sure to ask yourself whether they are related enough. Is your topic too broad, or your starting point for the review too far away from the new, original work that you will present?
- If you have, for example, three papers that go well together and an odd one out, you may wish to cut the paper that doesn't fit or replace it with a more appropriate one. However, this is probably *not* an appropriate strategy if it means that you are trying to avoid acknowledging disagreement or controversy in the area under discussion.

## 3. Tips for writing the literature review section

The good news: there is no one way to write a literature review. The bad news: there is no one way to write a literature review. However, the following are some general pointers that will almost always apply and will help you to write a clear review section.

### 3.1 Things to make sure you include
- Make sure that your review section has an **introduction** where you make the reader aware of your topic and your chosen theme. Assume that your reader has some basic general knowledge of psychology and informatics.
- **Define technical or specialised terms** if appropriate. Also give at least basic descriptions of key areas, methods, theories, and constructs.
- **Discuss existing work**, according to your plan from section 1.2.
  - Make sure to *be clear* about any claims you make. Be especially careful of comparison words (more than who or what? Better than what? What does "better" even mean?)
  - Back up your claims with evidence from the papers, **cited appropriately.** Think of yourself as a lawyer, citing your experts to convince the reader.
- Make sure to include clear **transitions** between topics and parts of the review, and even between new papers. Rather than saying something like "here is another paper about X" please help your readers by explaining the relationship between the two sources or studies.
  - Does the new paper or study extend the findings of the first one? Contradict the findings? Is this next part of the paper something different entirely, such as your conclusion?
  - Transitions do not need to be long or complicated. Instead of just starting to talk about the new paper, you can say something like "Expert et. al. (2010) used a variation on this methodology..." and go into explaining what they did. Or, "Not all findings agree with (whatever you just said), such as Expert et al. (2010)."
- At the end, you should have created a neat slot into which you should fit your own original research or argument, and you can introduce what you plan to do.

### 3.2 Headings within the review section
Headings and sub-headings can help keep your review from turning into a confusing stew of words and citations. They can provide useful labels as to what will be discussed next, and mean that you can refer readers forward or back (e.g. "see section 5.1") to avoid endlessly repeating details.

More importantly for you, subdivisions and labels within the review *can help you to structure your writing, as you write*. It is much less overwhelming to write several smaller sections and then work them together than it is to sit down and write one giant review without a clear organisation. Labels can also help you to identify when your current structure may not be working. For example, you may notice that you already have a section about Introduction to Your Concept, but now you are writing more general information about it several sections later. This may prompt you to ask yourself

whether the new content should move, or perhaps if the original chunk of content needs to come later, where you are writing now.

### 3.3 Notes about quoting

When you get to a key point or piece of information, such as a hypothesis or critical finding, it may be tempting to quote the source authors directly rather than re-stating these points in your own words with a subsequent citation (paraphrasing). Quoting can't be a substitute for understanding! If you are confused and think that quoting can hide this from your tutor or supervisor... it can't. The more complex the material, the more apparent this becomes. **It is almost always better to try to re-state key points in your own words than to quote!**

The general rule in scientific writing is to avoid using quotes except when the original authors' words are so concise, insightful, wise, or even witty that you could not possibly improve upon them. You may also quote if you are essentially using those words as evidence to support a claim, or challenging the authors' conclusions, and the *exact* wording is important.

Don't worry if you quote sparingly or end up not quoting at all. Many research reviews at the professional level may not have quotes at all, or very, very few even in a large paper. If you do quote, make absolutely sure that you are citing correctly!

### 3.4 Images, graphs, and tables

Images, graphs, and table are generally *not required* as a part of your literature review. If you feel that any of these would be particularly useful to your reader in understanding the background information (for example, a sample of stimuli on which experimental participants were tested, screen shots from programs, etc.), feel free to include a small number of them. Make sure to use appropriate, consistent citations to refer to these items in text, and to attribute them to the original authors.

**Again, beware of plagiarism. Keep track of your sources when taking notes and when writing. Cite all direct quotations, paraphrases, graphics, or other material that is not your own. If in doubt, it is better to cite.**