

A CLaSSI Writing Guide

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A Note on This Document

This contains practical advice for writing, and then a specific guide to writing a scientific paper. This is an informal document that I share with students. It isn't a book, hasn't been peer reviewed, and shouldn't be cited.

It contains my own thoughts, and the thoughts of others. It was impossible to cite the ideas coming from others because they have been accumulated, adapted, and filtered over many years. Please do not cite this document. Any quotes from published papers are reproduced for educational purposes.

Here are some of the resources that I know I've taken ideas from. If you like anything in here, you should seek these out.

“Getting Things Done” – David Allen

“Meditations for Mortals” – Oliver Burkeman

“Writing Science in Plain English” – Anne E. Greene

“The Scientist’s Guide to Writing” – Stephen B. Heard

“Scientific Writing” – Jean-Luc Lebrun, Justin Lebrun

“Discovering the Scientist Within” – Gary W. Lewandowski, Jr, Natalie J. Ciarocco, David B. Strohmetz

“Slow Productivity” – Cal Newport

“How to Write a Lot” – Paul J. Silva

I’m sure there is also a lot of advice in here that I learned from my mentors Dr. Penny Pexman and Dr. Gabriella Vigliocco. To be clear, they have not seen any version of this text. So, anything you don’t like probably comes from me, not them.

This is the first version of the document and it will be updated in the future. I’d love to hear about things you find helpful, and things you’d like me to include in updated versions. You can send me an email at david.sidhu@carleton.ca

The latest version can be found here: <https://classilab.ca/resources/writing-guide/>

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Writing

Crafting Sentences

- Aim for short and clear sentences.
- Look for long sentences that can be split into multiple sentences.
- Don't put too many phrases into a single sentence.
 - Don't do this: "We ran a study that found abstract words are processed faster, this was true for all participants, even though some participants had impaired language abilities when compared on a vocabulary test."
- Avoid throat clearing phrases at the starts of sentences.
 - Don't do this: "Speaking to the importance of the work, we found that..."
 - Do this: "We found that... This speaks to..."
- Usually a comma is enough.
 - Use a semi-colon to connect two independent clauses that can stand on their own. "Concrete verbs were responded to faster than abstract verbs; adjectives showed no concreteness effect."
 - Use a colon before a list when the part of the sentence before the colon can stand on its own. "We included words representing multiple parts of speech: nouns, verbs and adjectives." Or use a colon to

preface explanation or elaboration. “The results were surprising: there was no difference between concrete or abstract words.”

- Use an em-dash for an aside mid-sentence. “The words—all of which were under three syllables in length—were presented auditorily.” Or use an em-dash for emphasis. “The results were clear—frequent words are processed faster.”

Crafting Paragraphs

- Each paragraph should be on a single topic.
- The start of a paragraph should signal what the paragraph is going to be about.
- You may want to use a summary sentence at the end of a paragraph.
- Keep the paragraph self-contained: don’t start a paragraph with “This idea,...” referring to an idea from a previous paragraph.

Crafting Sections

- Paragraphs should flow into each other with purpose. Know where you are trying to go.
- You should be able to say what each paragraph is about, and saying this out loud should form a sensible narrative.

Writing Habits

The unfortunate truth is that writing is hard and there is no quick fix to make it not hard. But with practice, it gets easier to put your thoughts into words. It also becomes easier as you figure out a process that works for you. Here are some ideas that I find helpful. Take what is helpful and leave the rest.



Writing requires consistent incremental progress. Don't plan to write a paper in a day. Instead, plan to make a bit of progress each day. Trust that if you do a little bit each day, one day you will look up and see the document is almost done.



Have a writing schedule that you stick to. If possible, aim to write for 3-4 hours a day, most days of the week. If that isn't possible, make a schedule that lets you write for the most amount of time you can commit to. Then increase that over time. If all you can manage is 15 minutes a day, do that for a while. Really commit to writing for those chunks of time—don't let yourself get distracted by other tasks (e.g., email, errands). Experiment and find the time of day that works best for you.



Limit distractions while you write. When writing is difficult, anything will seem more interesting. Avoid needing to resist distractions by removing them altogether. Put your phone in a different room, turn off your email app, go somewhere where you won't be disturbed by people.



Take breaks while you write. It's hard to focus for more than 30 minutes. Look into the Pomodoro technique.



Outline before you write. There are two things to do when you write: figuring out what you want to say and figuring out how to say it. Separate those two tasks by outlining what you want to say first without worrying about how to say it. Have a bullet point for major topics to cover (this might correspond to a paragraph or group of paragraphs on the topic), and then subpoints within those. Once you have a clear enough idea of what you want to say (I'd say when about 50% of it is planned) then start turning bullet points into sentences and paragraphs. My usual process is to make a list of the things I want to say. Then I put them in an order that makes sense. Then I add subpoints to the points I've listed. Then I start writing the easiest sections first.



Break what you are writing down into concrete tasks. Don't aim for the nebulous and impossible goal of "writing an Introduction section". Decide on the next physical action you can take. This might be "fill a paper brainstorming topics for the Introduction", or "write a rough draft of the opening paragraph" and so on. All you need to know is the single next step to take. Then do that and decide on the next step and repeat. Notice I said the next "physical action". This means that something like "think about Introduction" doesn't count. You would need to tie it to something concrete (e.g., "fill a paper with topics for the Introduction").



Start with a messy first draft. Maybe you even call it a "bad draft" to let yourself off the hook. Don't worry about getting things right. Just get a rough idea of what you want to say onto the page. Don't backtrack to reword sentences. Don't get stuck trying to articulate an idea that you can't quite put into words. If there is something you can't find the words for just put a placeholder in for now (e.g., ##idea about pictures vs words here##) and move on.



When I get stuck writing, I go back to working with an outline and bullet points. I probably got stuck because I didn't know what I was trying to say. Instead of trying to figure it out as I'm writing I stop, switch back to "big picture idea mode", and only get back to writing when I've figured out what I'm trying to say.



Do whatever you need to do to get the first draft on paper. No matter how messy, incomplete, or incomprehensible it is. Editing is infinitely easier than writing. My approach to getting to a first draft of a section is to make a bullet point list of all the things I want to say, putting those points in order and grouping them into paragraphs, adding points to the paragraphs, then turning those bullet points into messy and incomplete sentences.



Take some pleasure in the struggle. You're trying to do something difficult, like climbing a mountain or squatting 400 lbs. It isn't easy, but there is satisfaction to be had in trying to do something difficult. It doesn't mean you're doing something wrong.

Tricks for Writer's Block

Here are some things to try when you just can't write. Different things work for different people. If it doesn't work for you, just ignore it and try something else.

- Go back to bullet points. If you are stuck trying to write sentences for a certain section, it might be that you aren't sure what you want to say there. Put the Word document aside and pull out a sheet of paper or a whiteboard. Make a bullet point list of the things you want to say. Only when the section is fleshed out in this "bird's eye view" should you go back to trying to write sentences.
- Write with your eyes closed. This has worked surprisingly well for me. I close my eyes and just type. It prevents me from backtracking and from being too picky about what I'm saying. It lets me just get ideas onto the page that I can fix later.
- Try approaching with an attitude of "just trying things". Just try a certain wording and see how it looks. This takes the edge off. It doesn't have to be perfect. You are just playing around with different words on the page.
- Pick a small manageable interval, say five minutes. Commit to just typing nonstop for that amount of time, no matter what comes out.

- Set a page goal and commit to filling that many pages with words before leaving your desk. It doesn't matter how good or sensible it is. Just commit to getting words on a page.
- Stop writing and read a journal article. Something about this always gets me unstuck.
- Pretend you are explaining this to someone in front of you. Say what you would say to them out loud. Give it a few tries. Then try and write what you said.
- Set out to write a page of the most horrible, vapid, misspelled, embarrassing content you've ever written. You are worried it will be bad? Lean into it and make it bad.

Order to Writing a Paper

This is the order I find the most natural when writing a paper. This assumes you've already done the necessary background reading, note taking, analyses, etc., and are genuinely ready to write.

1. Write the Method and Results.
2. Write an outline for the Introduction.
3. Write the Introduction.
4. Write an outline for the Discussion.
5. Write the Discussion.
6. Write the Abstract etc.

APA Style

I won't go over APA format here. There are plenty of resources for that.

The most important things to get right are [headings](#), [citations](#), [tense](#), and [statistics](#).

Writing the Introduction

The Introduction brings a reader up to speed and closes the knowledge gap. It gives them the information necessary to understand your study and its importance. It identifies the problem (i.e., the gap in the literature) and suggests a solution (i.e., the study you ran).

Before you start writing this, you should be able to articulate the key theoretical question you are asking. By “theoretical” I mean the question about how the mind (or something else) works that you will be answering. This is different than the “empirical question” (e.g., will Group A respond faster than Group B). Instead, knowing that Group A responds faster than Group B speaks to some theoretical question.

Will people respond faster to concrete vs abstract words? is an **empirical question**.

This might speak to the **theoretical question** of how perceptual features become active during word processing, for example.

Here is my four-section model of an Introduction section. I arrived at this model by taking a bottom-up approach: thinking about what was common to my Introduction sections and what a modal template would look like. It shares a lot with the Swales model (see the Appendix). This isn't a suggestion to use these headings—just a way to catalogue what should be included.

1. Review the Biggest Concept
2. Review the Existing Literature
3. The Turn (what we don't know)
4. The Present Study

1. Review the Biggest Concept

This is a paragraph at the start of a paper that talks a bit about the biggest concept. For example, if I'm writing a paper on sound symbolism, this paragraph will introduce sound symbolism and do a quick recap of some important points. Think of this like a single paragraph encyclopedia entry on the concept.

Here is an example from the start of a paper on whether the bouba/kiki effect shows up in English:

“When shown the shapes in Fig. 1, roughly 90% of individuals worldwide (Styles & Gawne, 2017; see this paper also for exceptions) associate the round one with nonword labels like maluma and the spiky one with nonword labels like takete. This maluma/takete effect (Köhler, 1929) is one example of sound symbolism, associations between formal language sounds and perceptual and/or

semantic properties. These associations may derive from perceptuomotor analogies between language sounds and properties in other modalities (e.g., between the abrupt sounds in takete and the abrupt changes in outline of the spiky shape; see Sidhu & Pexman, 2018). The maluma/ takete effect has been observed in speakers of different languages (Styles & Gawne, 2017) and across ages (for a review see Fort et al., 2018). It has been demonstrated using both behavioural tasks (e.g., Nielsen & Rendall, 2011) and neuroimaging (e.g., Asano et al., 2015).” (Sidhu et al., 2021; p. 1390)

Here is an example from a paper on whether embodied verbs are better remembered. In this case the first paragraph introduces embodiment in language.

“Embodied cognition is a broad proposal for cognitive science that has taken several different forms (e.g., Barsalou, 2008; Wilson and Golonka, 2013; Glenberg, 2015). A core feature of the embodied cognition proposal is that sensorimotor experience is involved in a variety of cognitive processes. Importantly, sensorimotor experience can play a role in cognition even in the absence of external stimuli or movements, in the form of internal simulations of these experiences (Barsalou, 1999, 2008). According to Barsalou's (1999) Perceptual Symbol Systems theory, sensory experiences of a particular concept become organized and stored as a simulator. For instance, one's experiences viewing a car from multiple angles, hearing a car's engine, feeling a car's vibration, pressing the gas pedal, are all stored as part of the concept car, as perceptual symbols. Then, one can simulate a car, drawing on some combination of its constituent perceptual symbols to recreate the perceptual experience of a car. Studies have demonstrated that perceiving an object automatically elicits a simulation of interacting with it (e.g., Tucker and Ellis, 1998), and that seeing an action elicits a simulation of performing that action (e.g., Buccino et al., 2001). These simulations are similar to the actions themselves and involve similar brain areas (Gallese, 2007).” (Sidhu & Pexman, 2016; p. 1)

As you can see, I don't start too broad. I start by introducing the reader to a relevant and key concept for the study.

Don't spend too much time thinking of a "catchy" opening. This isn't a novel where you need to grab the reader. A person will read your paper if they are interested in the topic. Even then, they'll probably skip by the first paragraph anyway. Just jump right in. I find the best way to start is by defining a relevant and broad concept.

A possible flourish here, if you can manage it, is to end the first paragraph stating the purpose of the present study.

Sidhu, D. M., & Pexman, P. M. (2016). Is Moving More Memorable than Proving? Effects of Embodiment and Imagined Enactment on Verb Memory. *Frontiers in Psychology*, 7.
<https://www.frontiersin.org/articles/10.3389/fpsyg.2016.01010>

Sidhu, D. M., Westbury, C., Hollis, G., & Pexman, P. M. (2021). Sound symbolism shapes the English language: The maluma/takete effect in English nouns. *Psychonomic Bulletin & Review*, 28, 1390–1398. <https://doi.org/10.3758/s13423-021-01883-3>

2. Review the Relevant Existing Literature

This is the heart of the Introduction and maybe the most difficult part of a paper to write. You review the literature that is necessary for the reader to 1) understand your research, and 2) its importance.

I think it makes the most sense to write this part of the Intro last, so skip ahead to Section 3 and 4, then come back.

Thinking about this as a "literature review" can be misleading. That suggests a leisurely discussion of topics. Instead, this should be forward moving, with no wasted

energy. You are charting a course from the general topic you introduced in Section 1 to the Present Study you will introduce in Section 4. Review everything that is necessary between those two points.

You can think about this section as including synthesis and summary paragraphs. A synthesis paragraph collects a few references on a topic to convey some general point. A summary paragraph summarizes a single paper, structured a bit like a mini paper (i.e., context, methods, results, takeaways).

I approach this by making a list of every topic that is necessary to understand my study and its importance. Then I put them in an order that makes sense, so that each topic flows into the next one. This movement should be “vertical” rather than “horizontal”. Each topic gets closer to the specific topic of the present study, rather than moving laterally to discuss a wide range of subjects.

3. The Turn

At some point in the Introduction you transition from discussing what we know to discussing what we don’t know. This points out gaps in the literature that your study will fill. Here are some strategies for doing this from Swales (1990).

- Counter-Claiming: Refute or challenge earlier research by making a counter claim. “While Jones and Riley believe X method to be accurate, a close examination demonstrates their method to be flawed.”

- Indicate a Gap: Demonstrate that earlier research does not sufficiently address all existing questions or problems. “While existing studies have clearly established X, they have not addressed Y.”
- Question-Raising: Ask questions about previous research, suggesting that additional research needs to be done. “While Jones and Morgan have established X, these findings raise a number of questions, including...”
- Continuing a Tradition: Present research as a useful extension of existing research. “Earlier studies seemed to suggest X. To verify this, more work is urgently needed.”

A possible flourish is to combine this with Section 2 and point out gaps in the literature as you review it, instead of making it a separate section.

4. The Present Study

A very short section at the end of the Introduction that says what you will do, and how that will address the gaps from Section 3. “In order to address X, in the Present Study we did Y.”

Writing the Method

This is a guide for readers to understand what you did, and to be able to replicate what you did. It should be dry and clear.

There is a “style” to psychology Method sections. My suggestion is to look at a few similar papers to get a sense of what is included.

The typical Method section will include a Participants, Materials, and Procedure section.

Participants

Give the number of participants, their gender (a count of all genders listed, using “men” and “women” rather than “male” and “female”), the mean and standard deviation of their age.

Give a generalization about the group and location (e.g., “undergraduate students from Carleton University”).

Say how they were selected and any incentives they received (e.g., participants were recruited online through the platform Prolific, and were paid at a rate of \$12/hour”).

Mention inclusion or exclusion criteria (e.g., participants were fluent English speakers).

Method

Participants

Participants were 100 undergraduate students from Carleton University (63 female, 25 male, 12 non-binary; $M_{\text{Age}} = 21.00$, $SD_{\text{Age}} = 3.00$), recruited through the undergraduate recruitment pool using convenience sampling. Participants took part in exchange for course credit.

Give any information on how you determined your sample size.

Materials

Describe the items you used: how many altogether, where they come from and how they were chosen (e.g., if they were matched on certain criteria). If there are different kinds of items (e.g., abstract and concrete words) mention that manipulation here.

Materials

Our stimuli consisted of 100 line drawing of objects, taken from the International Picture Naming Project (Szekely et al., 2004). Of these, 50 were pictures of living things (e.g., an apple, a tree) and 50 were pictures of non-living things (e.g., a computer, a compass). Living and non-living images were matched on overall visual complexity and word-frequency. See Appendix A for a list of all stimuli.

Importantly, this isn't the place to describe a concept. For example, a study on word concreteness wouldn't talk about why concreteness matters for word processing here. That would happen in the Intro.

This is also not the place to describe how people received or responded to the items. That happens in the Procedure. Think about the Materials as the list of ingredients, and the Procedure as the actual steps you take to cook with those ingredients.

Procedure

Describe the procedure, step by step, in chronological order.

As you get to a task, describe what happened in the task, in chronological order.

- E.g., Participants first took part in a lexical decision task. This consisted of a fixation cross followed by a... Participants then took part in a surprise recall task. On this task they were asked to...

You can omit unnecessary details (e.g., that participants waited outside the testing room, were greeted by a research assistant, etc.) that are common to all psychology experiments.

Mention counterbalancing, randomization, different conditions if appropriate (e.g., if there were differences in the task).

Procedure

Participants first took part in a naming task in which their task was to name each line drawing as fast as possible, one at a time. Each trial began with a fixation cross. This remained onscreen for 500 milliseconds until it was replaced by an image. Participants were asked to name the image out loud, as quickly as they could without sacrificing accuracy. Their vocal response triggered a blank screen. This remained onscreen for 1000 milliseconds before the next trial began automatically. Images were presented in a random order.

After completing the naming task, participants were given a filler task in which they solved addition problems for two minutes. Following this, they took part in a surprise recall task. They were given five minutes to recall as many images as they could from the naming task. Participants typed their responses.

Writing the Results

This section will vary the most from study to study. My best advice is to find a few good papers reporting a similar set of analyses and use their format.

There is a general format to reporting the results. For each one you should 1) say what test was run, describing the variables involved, 2) say the results of the test and report the relevant statistics, and 3) if significant, summarize the pattern.

Importantly, keep the interpretation for the Discussion section. Here you'll just say that, for example, participants responded faster to concrete vs. abstract words. Wait until the Discussion to say what that tells us.

Be sure to follow APA format for reporting [numbers](#) and statistics, and for how to deal with [tables](#) and [figures](#).

Writing the Discussion

The Discussion section is where you say what your results mean, particularly for the gaps and open questions that you identified in the Introduction. The Results are like a bone you dug up in the ground. The Discussion paints a picture of the animal that we now know used to live, because we found that bone.

This is what I see as the typical skeleton of a Discussion section. This is not a suggestion to use these headings—just a way to catalogue what should be included.

1. Recap Paragraph
2. Interpretation of Key Findings
3. Bigger Picture Interpretation
4. Other Interesting Thoughts
5. Weaknesses
6. Future Directions
7. Conclusion

1. Recap Paragraph

Remember that many readers will skip to here first. Start the Discussion with a quick recap of the purpose of your study, what you did, and what you found. This is not rewriting other sections of the paper but just giving the reader the quick bullet points if they just want to read your Discussion alone.

Here is an example of a paper on the effects of iconicity on lexical decision:

“It had traditionally been assumed that the relationship between a word’s form and its meaning is arbitrary (e.g., Hockett, 1963), but a more recent perspective is that this relationship contains aspects of arbitrariness and iconicity (Dingemanse et al., 2015; Perniss et al., 2010). Here we tested the possibility that recognition might be facilitated for relatively more iconic words. Indeed, we found that more iconic words were processed faster and more accurately in a visual LDT, and faster in a phonological LDT.” (Sidhu & Pexman, 2020; p. 176)

Sidhu, D. M., Vigliocco, G., & Pexman, P. M. (2020). Effects of iconicity in lexical decision. *Language and Cognition*, 12, 164–181. <https://doi.org/10.1017/langcog.2019.36>

2. Interpretation of Key Findings

Make a list of the key findings of your paper. Put them in order of importance. Spend one or more paragraphs interpreting each of them (beginning with the most important one).

What is a key finding? This refers to the important takeaways, and can group similar patterns together (e.g., if you run three experiments and find that people respond faster to concrete vs abstract words each time, that is one key finding, not three).

Think about what you would tell someone who asked what you learned by running your study. This can refer to specific results (e.g., group A was faster than group B) or more general observations (e.g., across all studies, participants performed better in person than online).

For each finding do the following:

- Clearly identify the finding. E.g., “We found that participants were faster to respond to actions vs. objects...”
- Say what it means, answering one or more of the following.
 - What answers does this provide for the questions in your Introduction?
 - What processes/mechanisms might have lead to these results?
 - What other conclusions can we make about how the mind works from this result?
 - How does it compare/contrast with other findings in the literature?

This is a bit like hypothesizing in reverse. Instead of “if X is true then we should observe Y”, now you say “we observed X, this could suggest that Y is true.”

3. Bigger Picture Interpretation

While Section 2 was about interpreting a specific finding, you can go a bit broader here and talk about how your general findings integrate or connect with theories in the field. In practice there might not always be a sharp distinction between Sections 2 and 3.

4. Other Interesting Thoughts

Here is your license to say interesting things that you find fun to talk about. For example, if you found something unexpected, you can offer speculation as to why.

You might consider alternate explanations for your results. Or other things that are related to your results but don't fit elsewhere.

5. Weaknesses

No study is perfect, and acknowledging the weaknesses can be a powerful tool. It also gives you the chance to comment on them and why they might not be fatal. You can talk about how particular limitations in your study set boundaries on what you can conclude. You can also talk about how these limitations might be addressed (leading to Section 6).

6. Future Directions

What are some follow up studies, or general directions of research that could follow from your study? Are there some new questions that your study creates, or new avenues for research that your study points to? Are there some questions you weren't able to answer, have an idea about how a future study can?

7. Conclusion

One final concluding paragraph that sums up the main contribution of your paper.

Appendix

Swales (1990) Create-A-Research-Space Model

This is a modified version of a standard outline to an Introduction section.

1. Define a research territory.

- a. General context of the work. A few sentences laying out the broad context for the work, to a general audience.
- b. Review more specific research areas more relevant to your study, introducing the concepts you'll be working with.

2. Establish a niche within that territory by identifying a gap or other need for research. Here are some ways to do this.

- a. Counter-Claiming: Refute or challenge earlier research by making a counter claim. "While Jones and Riley believe X method to be accurate, a close examination demonstrates their method to be flawed."
- b. Indicate a Gap: Demonstrate that earlier research does not sufficiently address all existing questions or problems. "While existing studies have clearly established X, they have not addressed Y."

- c. Question-Raising: Ask questions about previous research, suggesting that additional research needs to be done. “While Jones and Morgan have established X, these findings raise a number of questions, including...”
- d. Continuing a Tradition: Present research as a useful extension of existing research. “Earlier studies seemed to suggest X. To verify this, more work is urgently needed.”

3. Occupy the niche.

- a. Specific research question addressing the identified gap.
- b. Brief overview of the research to come making clear how it will address the gap.

Swales, J. M. (1990). *Genre analysis*. Cambridge University Press.