

How to increase your creativity in scientific writing

while preventing writer's block

Mostly a short summary of a two-days writing workshop, California, USA,
with a few additions

Amos Bouskila

Dept. of Life Sciences, Ben-Gurion University of the Negev, Israel

Introduction

People have different modes of thinking, and often they may tend to use one more than the other. It is useful to recognize two very different modes that influence writing and learning skills. The following table summarizes some of the differences between these mode of thinking:

Logic mode	Creative mode
Logical	Random
Rational	Intuitive
Analytical	Holistic
Sequential	Synthesizing
Objective	Subjective
Looks at parts	Looks at wholes

When we consider writing skills, the creative mode is mostly responsible for creating new connections, while the logic mode takes the role of rational organized editing. During the years of learning at schools and universities, especially in the sciences, we are usually trained to develop our use of the logic mode. However, the process of writing a proposal, an article or a thesis may suffer from this, because some parts of writing need creativity, which many of us got into the habit of suppressing. **The aim of the points below is to prevent writer's block and to improve our writing. To do this we want to tap into our creativity first, and only then use the skills of the logic mode to approach the final product of our writing.** A key point is that using these two modes of thinking in an opposite order will not work efficiently.

Creating the skeleton of the writing product

In most scientific products there is a common structure; for example, in an article: Abstract, introduction, aims, methods, results, discussion and bibliography. We cannot be creative in that structure, because it is often required in that sequence. However, in writing some of these parts, and especially the introduction and the discussion, we can benefit a lot by using the following stages. Let's say that we address from now on an introduction of a research proposal you have to write for your thesis. We assume here that you have done all the reading that you need to do, and you know very well what you want to propose in the study. The question remains, which parts from your reading and which ideas should go into the "Introduction" section.

We start by two preliminary stages before writing.

Brainstorming: On a large page (A3 or two A4 pages stapled together, or on the computer screen) we start throwing ideas that **may** be included in the introduction. Do not write them in a list. It's a good practice to surround each idea by a circle (bubble). No order is implied, and the bubbles should be spread on the whole area of the page. Related ideas that came to your mind in clusters may be written in the same area of the page, but don't waste time thinking which idea is related to which. It will be done later. You shouldn't be critical and **any** possible idea for that introduction should be written, even if you suspect it may not eventually be included. Ideas that you suspect as you write them down that they are not suitable or good enough should be still left on the page – remember? No criticism at this stage. This should be done until absolutely no more ideas can be tapped out of your creative mind (can take a few days to be sure you have no more ideas).

1. **Building connections and order.** On the brainstorming page you use a pencil to connect the different circles with arrows that will represent the flow of ideas. The sequence of ideas can be connected in several different orders. Don't get locked on the first one that came to your mind. Be flexible and use the eraser on the pencil to try different orders. As you do this, you may discover some bubbles are left out and there is no good way to connect them to the flow. You should consider crossing them out or choose to transfer them to a different chapter etc. Your end product should be a series of arrows starting from one circle, going once only in each circle through all the circles that you did not cross out. This forms the sequence of your introduction. If you want to show the sequence to someone – this is a good time, before you have begun writing the paragraphs. This way they can consider and comment on the general structure. If you show them your work written at a later stage, a supervisor or a colleague are trapped in your paragraph sequence and are less likely to see alternatives.

Writing the actual paragraphs

Now that you have the skeleton of your introduction, you can start writing the actual paragraphs. It may seem to you that you do not need creativity any more, but this is not the case – the same outline you have created can be expanded in different ways and each sentence can be written in more than one way. The worst enemy of a writer is the habit of writing two sentences, erasing half of the first, and working on correcting the other and so on. One cannot get a feeling of achievement at this working style – it is slow and frustrating. In addition, you don't have the whole picture of the introduction you are writing, so you cannot be sure what style is most suitable. You may waste a lot of time editing and polishing a sentence, and eventually you may remove this whole sentence completely once you have a better image of your whole introduction.

1. **Writing creatively** can be achieved only if you remove all criticism. Thus when you write a paragraph, you should not correct it at the same time. You should not allow yourself to change it or correct **anything** at this stage (not even spelling mistakes). If you are not happy with the wording, spelling, spaces etc – you will correct them later at the editing stage (see below). If you are really unhappy with the sentence structure – hit the "return" button, in the middle of the sentence and start the sentence all over again in the next line in a different way. The process of writing with no criticism is a special experience

- you write freely and quickly, with no regret, and you may even reach a stage of "High" when you do this.
2. **The correct role to the opening sentence** of a paragraph. Many readers (and reviewers...) will read your written proposal, thesis or article under time pressure. They are likely to skim over paragraphs and read only those that interest them. They will decide whether to read a paragraph or not usually by the first sentence. This is why you have to make sure your first sentence in a paragraph provides a good description for the rest of the paragraph, sometimes almost like an abstract.
 3. **The correct role to the closing sentence** of a paragraph. The last sentence is the bridge to the next paragraph. It helps the reader if you can close the first paragraph by connecting it to the next. It's not always easy, but you should try.
 4. **Follow your outline** (circles and arrows). Don't forget that the outline is supposed to be your best choice for the order of ideas. You shouldn't question this order now, you are only concerned with the order of sentences within a paragraph, and even this is not the final order, so don't let it delay your writing.

Editing your work

After you have written all the paragraphs, you can resume breathing at a normal pace and have a look at your introduction, and get the feeling of where it went. Now you start from the beginning, and using the best of your logical mode of thinking, you will go sentence by sentence and judge if it has the right to remain in your Introduction, if it is in the right location, if it has the right structure, if there are words that need replacement or typos that need correction. This stage is technical, don't expect to reach the elated feeling you had during the creative writing, but fortunately, this is what scientists are better at doing, and since you have the whole picture already, it will go faster than you think.

Depending on what you have to write, go to A or to B.

A. The correct order for writing sections in a thesis or article

Students new to writing think naively that the introduction is written first, then the methods, results, and finally the discussion. This is not the most efficient way to write, and fortunately, most people do not follow this order. One possible order is as follows:

1. Start by preparing all your results – graphs, tables, statistics etc. List them on a page or copy paste them into a file, and make sure you know what you want to include and what you want to drop. Choose the most logical order.
2. Then write the methods that relate only to those results that were included. Follow the order in which the results will appear in the Results section.
3. Move on to the goals. Check your proposal and see how relevant they still are. Make sure that your goals are achieved by your results. Sometimes goals that you might have had in your proposal but led nowhere will have to be dropped.
4. Write the introduction (following the creative methods above), summarizing current knowledge, but only the knowledge needed to understand the importance of your work. You can use your introduction in the proposal as a starting point for ideas, but remember that you may have ventured to different directions during your study, so don't just copy-paste it. **Ideally, the intro will be structured in such a way that it will lead to the inevitable**

conclusion that something was missing in the previous knowledge, before you started your study. When you write a proper connecting sentence just before your goals, the reader will understand how your goals will just close this gap and add significance to past achievements. (This last suggestion is one that most students have difficulty following, but it is really a good advice and worth your efforts to follow).

5. Write the discussion, again following the creative writing methods. Remember what your goals were, and make sure the readers will feel satisfied at the end of the discussion when they will realize how you covered all your goals and you contributed to closing the gap of knowledge you pointed out at in the introduction. In the discussion you have to be careful not to go overboard in speculations and not to discuss every little detail in your results. Most people write discussions that are much longer than what editors like to publish.
6. Move on to write the abstract. The abstract cannot expand on things that were briefly mentioned in the text. The abstract should represent only the main points of the article.
7. Go over the references and make sure that all references that are cited appear in the bibliography and vice versa. All the references should appear in the same format, ideally, created with a reference software (e.g., RefWorks, Mendeley, etc.) so that the format can be changed if you need to resubmit to a different journal with different requirements.

B. The correct order for writing sections in a proposal

1. Start with the goals – one to three short sentences. Hopefully, after reading the background literature and thinking, you have an idea of your goals.
2. Write the introduction (following the creative methods above), summarizing current knowledge, but only the knowledge needed to understand the importance of your work. **Ideally, the intro will be structured in such a way that it will lead to the inevitable conclusion that something was missing in the previous knowledge, before you started your study.** When you write a proper connecting sentence just before your goals, the reader will understand how your goals will just close this gap and add significance to past achievements. (This last suggestion is one that most students have difficulty following, but it is really a good advice and worth your efforts to follow).
3. Then write the methods that relate only to those part that you are actually proposing to do.

The orders presented here are not the only ones that can work efficiently. When writing a thesis, some people prefer to start with the Materials and Method, and only then go to the Results. It is true that if you are scared to start writing, Materials and Methods is the easiest and most technical and less creative as possible. However, you risk that some methods will have to be dropped after you wrote them, because you may discover that their results are not good enough, and you will have to throw them altogether. In addition, some people write the Discussion before the Introduction. This is possible, but you run the risk that your goals are not fully developed yet, and thus the discussion will not be fully tailored to fulfill those goals.

Good Luck!

[My personal experience: when I wrote the first chapter of my Ph. D. thesis, it took me four frustrating months. Then I had the opportunity to attend this two days workshop, and by applying its principles, the second chapter took me two weeks, and then the third chapter took me only one long weekend of continuous writing. The most difficult part for me was to avoid editing parts immediately after I write them. It was so built-in within me, that the only way I managed to get out of this habit was to disable the buttons “backspace” and “delete” on my computer keyboard, until I felt I can overcome it. That’s how the third chapter took only one weekend to write.]