A student's viewpoint on the æsthetics of publications, from the perspective of effectiveness

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1. What you need to do to write a good article

> "*The only mistakes in typography are things done in ignorance.*" [2]

We here presume that the reader is familiar with LaTeX. Evidently, using LaTeX is not a necessary condition for a good work, but it might simplify your task to some extent.

1.1. Use LaTeX

LaTeX's first role is to help the writer to focus more on the *content* of the document than on its appearance. 'Other' writing programs can sometimes lead to inconsistencies in the general presentation and layout of documents (if bad choices are made, for example), and the number of such inconsistencies generally increases with the document's length: it is more difficult to have a global view of a document (and thus on its presentation) when the document is lengthy.

The appearance should not go against the message. The choice of the appearance of a document is conditioned by the message it conveys: you would not use the same style for an advertisement and a scientific paper.

As a result, if LaTeX is correctly used, the 'default' layout of a LaTeX document should inspire a clear presentation of concepts. If each element of the document is presented clearly, the resulting document should be clear too. This is important because every scientific document should be as clear as possible. This is not the case in some advertisements, for example, where mysteries might be artificially stirred up to have some special effects on the reader.

Using LaTeX correctly implies you need to structure your work. That is, you need to use `\part`, `\section`, and other hierarchical elements. This is, for me, the most difficult part of any work: the structure.

It is often said that 'rules' are better understood when counterexamples are given. Thus, consider texts that you found difficult to understand because they were lacking in clarity. There are no universal 'guidelines' that one can follow to write a good document, but one can learn a lot from reading poorly-presented or poorly-written documents.

1.2. Structure

Why was the message unclear? Because of a *lack of structure*? Were such documents missing sections, subsections, ..., paragraphs, enumerated lists? Don't repeat these mistakes if you hated reading these documents. A reader should understand what your work is generally about when reading the table of contents.

Remember that the step of structural creation is a difficult one, mostly because it asks you to categorize concepts, and thus to compare their similarities to find the relations between every concept.

We will here detail some ways to write a clear document. A clear document is a document which is concise, precise, adapted, and univocal. There might be some other aspects to take into account, but these are the most important ones. We will develop them one by one.

1.3. Write concisely

Let us now consider that you structure your work correctly using LaTeX. Now, one might have a tendency for writing much for saying 'nothing interesting.' This is generally not a good option for a scientific paper, because it needs to be *concise*. As a result, ensuring that the document conveys the information you wanted it to convey, in the *most direct way*, is an important, but tedious, task: one generally needs much reviewing to get a correct idea of his text and to be sure that some elements are not necessary.

Note that you can evidently reformulate or paraphrase, from time to time, some preceding concepts, but do that only if it's worthwhile: if your structure is already clear, and your reformulation will contain exactly the same elements as elements which are already appearing clearly, there is no need to repeat them. If, on the other hand, there are some concepts

whose roles are not highlighted from the text's structure, first ask if there could be a structural problem in your text. Then, if necessary, repeat them, but knowingly.

1.4. Write precisely

Now, *all the words* that are used look necessary. But are they *sufficiently precise*? A bad choice of words is regrettable, because people only read what you wrote, not what you thought. As a result, if you used a more general word for a specific concept, it is possible that they would never make the connection with the precise concept you were thinking about when using the more general word.

1.5. Write appropriately

Now that you are sure that the words do not look ambiguous, confusing, or simply imprecise, *are they adapted to the audience*? That is, is the article targeted well for its intended readers, or are you the only one who can actually understand it fully? It is a shame to realize that some authors are more interested in demonstrating their erudition than in presenting information clearly to their readers.

Writing an article for a cutting-edge journal in a specific research field is not the same as writing an article for a less 'aware' public. This verification is often omitted, and, to be sure that your text is appropriate, try to find readers with the same level of knowledge as your article's potential readers, and ask them if the article is too difficult, or not.

Moreover, do not forget that being able to vulgarize some text if necessary without implying (too much) errors, but only deficiencies, is also an important scientific skill. Less knowledgeable people in your field might be interested in your research too.

1.6. Write univocally

Another important aspect to consider is the univocity of interpretations. Keep in mind that one may interpret a word in one sense, while another might interpret it differently. Such interpretations generally depend on one's past and experiences.

As a result, global (general) words might have different meanings for different persons. If you need to use global words, refer to the dictionary to be sure that you use the *right word for what you mean*. You will then *use univocal sentences*.

1.7. Correct, but later

After having worked a long time on an article, a common mistake is to re-read it *immediately* to find what needs to be changed. While that may work for obvious errors, and is morally comforting, it is generally better to *let an article 'sleep' and then re-read it with 'different eyes.'* If you cannot do this objectively, it is generally possible to ask others to do it. Be sure to re-read it with a totally different mind, just as if you were a potential reader or reviewer.

2. What LaTeX brings you

2.1. Structure

We saw in the previous section that LaTeX gives you the opportunity of *structuring your work*. This is an essential element, and a necessary condition for a good work. However, we saw that this condition is far from being sufficient, and that, even if LaTeX helps you to keep the same layout all over the document, it does not do your work for you!

2.2. Automation

Another key feature of LaTeX, missing from typical 'document editors,' is that it is a *programming language*. On the one hand, that means it might appear unintuitive when you first learn it, but on the other hand, it also means that it is a *good tool for automation*.

Consider that you have tasks that need to be repeated, be it at every section, or every (odd, even, both) page, etc. Then, with little knowledge, you can *automate such tasks*. There are many concrete examples:

- Asking the reader to 'turn the page' on every odd page (except the last; see [1] for this),
- Automatically writing a specified text when you use a given command (such as using `\R` for $\mathbb{R}$, thus preventing you from sometimes using $\mathcal{R}$ or $\mathbf{R}$ for the Reals),
- Automatically executing a special command when specific criteria are fulfilled, etc.

More globally, a LaTeX document can be entirely customized, at least to a very large extent, and this customization can be preserved throughout the document, which means that it adds consistency to your document.

2.3. Dynamic referencing

LaTeX also offers you dynamic references: you can send the reader to a given page according to the text present on that page, rather than its number. This means that you do not need to think about page numbers. Introduce such references with `\label{sec:myfirstsection}` where you want, and then cite them with `\ref{sec:myfirstsection}` where you want to refer to them.

3. Graphical æsthetics

3.1. Why not

Clear articles can still benefit from graphical æsthetics. Some well-written documents *look* boring, because they are not sufficiently 'pretty.' Having a clear, concise, precise, and interesting document is nice, but if it is *readable*, that is even *better*.

3.2. But not too much

However, there are *some traps* one needs *not to fall into when prettifying documents and using graphics*. We here give some tips on how to use some kinds of drawings according to the data they represent, or the information they should convey. Most of this comes from [2, 4], sometimes literally. If you are interested in reading more, consider looking at [4].

3.2.1. Example: 2D vs. 3D pie charts

Consider the case of pie charts, for example. Many authors make extensive use of '3D' pie charts, i.e. pie charts with an impression of relief. Adding a relief dimension is interesting only if it contains information; otherwise, generally, pie charts could as well be drawn as simple circles.

Using 3D pie charts introduces a distraction for the reader, and also introduces ambiguity because the relatives sizes in a pie chart are very strongly distorted. Till Tantau even recommends never using 3D pie charts, and qualifies them as 'evil.'

3.2.2. Some tips on drawings

More generally, my philosophy when prettifying documents is: prettify as much as possible to make the article readable, but do not overload, and, above all, do not introduce ambiguities (as in the pie chart example). *Prettifying* should always *serve your document*, and never go against it. Keep this in mind!

After having placed a drawing in a document, ask yourself if it

a. does not introduce ambiguities (e.g. univocal);
b. is really useful (i.e. not redundant);
c. conveys the information directly, or if it can be drawn differently to be understood in an easier fashion. Consider some data. There are some cases where bar charts are more interesting than pie charts, but there are also some cases where rough data is more interesting than bar charts;
d. is minimal, i.e. do not draw complex graphics containing or conveying more data than what is needed for the explanation in their present role;
e. helps the viewer think about the information rather than the design;
f. encourages the reader's eye to compare the data.

In a scientific document, drawings are generally not there for embellishment: they should serve the document's purpose. However, having beautiful graphics is better, and important because scientific documents' embellishment contributes to their readability.

3.2.3. Some tips on graphics

Also think about these tips for graphics:

a. Use as possible the same program and style for creating the graphics of an article (for consistency's sake).
b. Treat graphics as first-class citizens of your papers. They deserve as much time and energy as the text does. Indeed, the creation of graphics might deserve even more time than the writing of the main text since it is likely that more attention will be paid to the graphics and they will be looked at first. Take a look at [3]: you will realize that graphics can be extremely informative, while still being pretty.
c. Do not scale graphics: when generating graphics using an external program, create them "at the right size."
d. Use the same font(s) both in graphics and the body text.
e. Almost all graphics will contain labels, that is, pieces of text that explain parts of the graphics. Do not forget to write axes' names, even if the graphic appears trivial. What might be trivial to you might be very hard to understand for somebody else. When placing labels, stick to the following guidelines:
   (a) Follow the rule of consistency when placing labels. You should do so in two ways: be consistent
      i. with the main text, that is, use the same font as the main text also for labels;
      ii. between labels, that is, if you format some labels in some particular way, format all labels in this way. In addition to using the same fonts in text and graphics, you should also use the same notation. For example, if you write 1/2 in your main text, also use 1/2 as labels in graphics, not 0.5. A π is a "π" and not 3.141.
   (b) Labels should be legible. They should not only have a reasonably large size, they also should not be obscured by lines or other text. This also applies to lines and text behind the labels.
   (c) Labels should be "in place." Whenever there is enough space, labels should be placed next

to the thing they label. Only if it is necessary should you add a (subdued) line from the label to the labeled object. Try to avoid labels that only reference explanations in external legends. Readers have to jump back and forth between the explanation and the object that is described.

(d) Consider subduing "unimportant" labels using, for example, a gray color. This will keep the focus on the actual graphic.

f. Use the same line width in text and graphics.

g. The "line width" for normal text is the width of the stem of letters like T. For TEX, this is usually 0.4 pt. However, some journals will not accept graphics with a normal line width below 0.5 pt. When using colors, use a consistent color coding in the text and in graphics. For example, if red is supposed to alert the reader to something in the main text, use red also in graphics for important parts of the graphic. If blue is used for structural elements like headlines and section titles, use blue also for structural elements of your graphic.

However, graphics may also use a logical intrinsic color coding. For example, no matter what colors you normally use, readers will generally associate, say, the color green with "positive, go, ok" and red with "alert, warning, action." Consider this too.

h. When you design a graphic, you should also eliminate everything that will "distract the eye."

i. At the same time, you should try to actively help the reader "through the graphic" by using fonts, colors, line widths to highlight different parts.

3.2.4. Some bulk tips

a. In pie charts, and in other drawings/schemes, try to associate ideas belonging to the same concept by using relative colors, and do not apply colors randomly [2].

b. A loosely-spaced grid is less distracting than a very closely-spaced grid.

c. Dashed lines create many points at which there is black-to-white contrast. Dashed or dotted lines can be very distracting and, hence, should be avoided in general.

Do not use different dashing patterns to differentiate curves in plots. You lose data points this way and the eye is not particularly good at "grouping things according to a dashing pattern." The eye is much better at grouping things according to colors.

d. Background patterns filling an area using diagonal lines or horizontal and vertical lines or just dots are almost always distracting and, usually, serve no real purpose.

e. Background images and shadings distract and seldom add anything of importance to a graphic.

f. Cute clip-art images can easily draw attention away from the data.

However, my point of view about clip-art images is that it is generally a good idea to use some specific pictograms such as 'TIP' or 'PITFALL–DANGER' like those found in some textbooks. However, a different pictogram needs to be used for each kind of note, and the same pictogram needs to be used for the same notes.

3.2.5. Some figure tips

For figures:

a. Use interesting captions. A good caption adds as much contextual information as possible. While this information can also be given in the main text, putting it in the caption will ensure that the context is kept.

b. Reference the graphic in your main text.

4. Writing æsthetics

In the preceding section, we gave, among other things, some ways to use graphics correctly. However, pictures and drawings are not the only elements which contribute to a document's æsthetics.

We know that LATEX respects as much as possible standard typographic rules, and it thus generally gives a good-looking document. But once your document is structured, and your text has been categorized in every hierarchical place of the document, there are still some textual elements you might want to work on.

4.1. Emphasizing something

For example, how do you *emphasize something*? There are many different *wrong* ways to do it which are generally used by beginners.

In traditional text editors, emphasizing some portion of text is generally done by applying a 'bold' command so that what needs to be emphasized actually appears as bold text. This is totally disrecommended for typographic reasons. Some other users also underline what they need to emphasize. This is also a bad idea, again for typographic reasons.

A better way to do it is to use slanted text, or italic shape. Do not forget to emphasize key parts of sections, subsections, ... It always looks clearer to me, and it should be the same for you. Take a look at what I emphasized in Section 1.

4.2. Choosing a font

Nowadays, many fonts are available for LaTeX. When publishing in a journal, you have no choice, because the font is imposed by the editor. However, if you write an article for some friends, or anything where you are not obliged to stick with a predefined font, you might either stick up with the good old Computer Modern typeface (the default for (La)TeX), but you could also try new fonts. For this, consider choosing a font that matches your context, and that looks 'pretty' to you. For example, you might decide not to use 'Comic Sans MS' when writing an article on a serious topic.

4.3. Using `fancyhdr`

Readers generally appreciate knowing which part of your document they are currently reading. As hierarchical elements (for example, what comes after `\subsubsection{...}`) might contain a lot of text, it is a good idea to use a package such as `fancyhdr` so that (at least) the current section's title is displayed at the top or bottom of the page.

References

[1] Luca Merciadri and Marc Van Dongen. *The turnthepage package*, 2011. Manual of the turnthepage package.

[2] Till Tantau. *The TikZ and PGF Packages*, 2008. Manual for version 2.00; February 20.

[3] Texample. TikZ and PGF examples, 2010. `http://www.texample.net/tikz/examples/`.

[4] Edward R. Tufte. *The Visual Display of Quantitative Information*. 1983.