

# Composition

12 March 2013

# Scientific writing

We want to address global issues of form and content in scientific writing.

Everything today is advice valid for papers and for thesis.

**Composition = Organisation + Simplification**

# Structure

First determine the structure of your paper/thesis.

Section 1 Introduction

Section 2 Notation and preliminaries

Section 3 Design

3.1 Initial Meeting

3.2 Project Objectives

3.3 Time Line

Section 4 Prototype

4.1 Why Should You Build It?

4.2 How Can You Build It?

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Rank the ideas in order of importance, and put the most important ones first.

# Paragraphs

Begin each paragraph with a sentence that

- suggests the topic: Our aim is to construct ..., We now show that ..., We compared the performance of our algorithm with ....
- or helps the transition from the previous paragraph: On the other hand..., Again ..., Next... , For the same reason...



# Paragraphs

Don't rely on the content of the previous paragraph for sense.

## Example

**Bad** In order to achieve convergence it was initialised to ...

**Good** In order to achieve convergence the learning algorithm was initialised to ...

# Active Voice

Write in **active voice** "*X did Y*" instead of in **passive voice** "*Y was done by X*".

**Active voice is more lively, stronger, often shorter.**

## Example

Finally, the complexity of this algorithm can be seen.

There are several constraints that the system must satisfy.

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## Example

Finally, the complexity of this algorithm can be seen.

**We now see the complexity of this algorithm.**

There are several constraints that the system must satisfy.

**The system must satisfy several constraints.**

# Positive form

Make definite, positive statements. Avoid hesitating, noncommittal language.

## Example

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Fact (A) is not true.

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## Example

Fact (A) is not true. Fact (A) is false

He did not have confidence in ... He distrusted ...

# Positive form

Words such as would, should, could, may, might and can suggest doubt. Use them only for situations of real uncertainty.



# Concrete language

Prefer the specific to the vague.

## Example

**Vague** A period of unfavourable weather set in.

**Specific** It rained every day for a week.

# Omit needless words

Good writing is **concise**.

A sentence should contain no unnecessary words, a paragraph no unnecessary sentences.

This doesn't mean that your sentences should be short. Ideal sentence 15-18 words.

**Every word should count.**

# Omit needless words

the question as to whether	=	whether
there is no doubt but that	=	doubtless
he is a man who	=	he
this is a subject that	=	this subject
the reason why is that	=	because
owing to the fact that	=	since
in spite of the fact that	=	though

# Avoid waffling

Go to the point, in each paragraph.

## Example of a waffling paragraph

We would like to have more information about the high-frequency data, but our model can account for all the information in our simulations. Observations in nature are, however, all too few. But the fact remains that much can be learnt by simulation. Acquisition of real data would necessarily mean that we would have to correct our initial model. In the meantime, the work on improving the simulation will continue.

# Avoid a succession of loose sentences

Refers to **sentences of two clauses**, the second introduced by a conjunction (and, or) or relative (who, which, when, while, . . . ).

Avoid having several such sentences in a row.

Makes the text sound trite.

# Avoid a succession of loose sentences

## Bad

The image is first thresholded, **and** then the binary version is extracted for further processing. The Laplacian pyramid is calculated, **and** the Gaussian pyramid is also computed for later use. The two pyramid structures are stored in an image structure of type image array, **while** the image itself uses the normal image structure. Wavelet transformation theory can be used to do scale analysis, **but** Fourier theory is usually adequate for most applications.

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## Better

The image is first thresholded, **and** then the binary version is extracted for further processing. Both the Laplacian pyramid and the Gaussian pyramid are computed for later use; they are stored in an image structure of type image array, **while** the image itself uses the normal image structure. Although Fourier analysis is adequate for most purposes, recent research indicates that the wavelet transform gives much better results for scale analyses.

# Avoid a succession of loose sentences

If you find you have written a series of loose sentences, rewrite!!! Every scientist rewrites many times before final version.

- try to recast enough of them to remove the monotony.
- Replace some by simple sentences.
- Join some clauses with a semi-colon.
- Sentences with three clauses can also be useful.



# Express coordinate ideas in similar form

Expressions that are similar in content and function should have the **same outward structure**.

Enables the reader to recognise more readily the likeness of content and function.

## Example

In SIMD, multiple data sets are processed simultaneously by the same instructions, whereas in MIMD multiple data sets are processed simultaneously by different instructions.

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If ideas fall naturally into **groups**, use a similar sentence structure within each group.

Or, express your ideas in a **table** or a **list** (itemize environment).

# Keep related words together

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We notice a large loop in the algorithm that is right in the centre.

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## Example

We notice a large loop in the algorithm that is right in the centre.

We notice a large loop right in the centre of the algorithm.

# In paragraph, keep to one tense

Favour **present tense**, especially in summaries (introduction or conclusion).

Do not change tense within one paragraph. It is confusing for the reader.

For literature review, past tense is OK.



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## Compare with:

The writer should usually place at the end or at the beginning of the sentence the words or group of words that need to be emphasised.

This principle applies to

- words in a sentence,
- sentences in a paragraph,
- paragraphs in a composition.

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In scientific writing, italics is used for definitions.

# Rhythm

Sentences have a definite spoken rhythm - always read aloud what you have written and change the wording if it does not flow smoothly.

# Conclusion

**Start early** Start writing today. Don't wait for the research to be finished, write down all progress.

**Write, rewrite, rewrite, rewrite** Nobody ever gets it right first. Always consider your first attempt as a draft and be prepared to work on it, over and over again. (Week 6: revising a draft)

**Read** Read as much as possible. It sharpens your style and improves your critical faculties. In particular read papers in your area.



# Conclusion

**Model the reader** Keep in mind what the reader knows so far, and what the reader is expecting next.

**Master the medium** You need a good vocabulary, skill on a good word-processing or typesetting program ( $\text{\LaTeX}$ ), the ability to create tables, graphs, images, indices, and bibliographies.

**Master the material** Understand your work well, and use writing as a means of understanding it even better. Reorganise your material to see which organisational structure is best for writing.

# Conclusion

**Simplify** As Einstein said, “Everything should always be made as simple as possible, but not simpler” .

**Aim for excellence** Aim for excellence, not perfection.

**Back up** Back up as much as possible. Valid for electronic and paper documents.

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**Avoid recycling** Don't use bits and pieces from old papers when writing a new paper. Always start again from scratch, and explain your material with a fresh view. Recycled material looks recycled, and the overall impression of your work will be disjointed. It goes without saying that “recycling from an other author”, i.e. plagiarising, is unacceptable. The only case you can do that is when quoting, while giving a reference to the author you are quoting from.