PMU199Y
Some of the Basic Essentials for Scientific Writing

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“What Do You Mean I Can’t Write?”

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Everyone SHOULD know the basics of grammar and style, but mastery only comes from practice

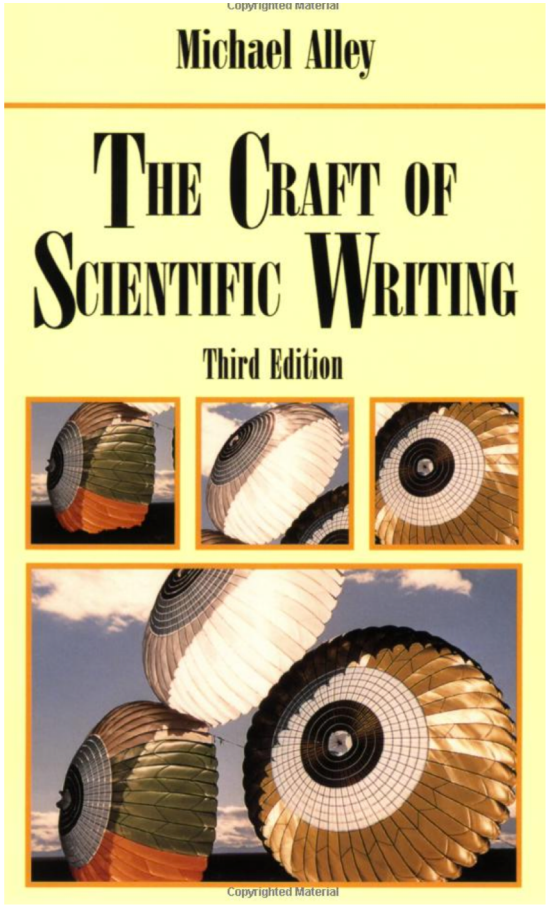
- We come from various backgrounds, so have different experiences
- For some of us, English is a second language
- Correct grammar and style isn't always an emphasis in high school
- Some haven't had much practice in writing

- The good news is that it's never too late!
- The better news is that it is not that difficult to be a better writer
- Essential for anyone with an advanced degree

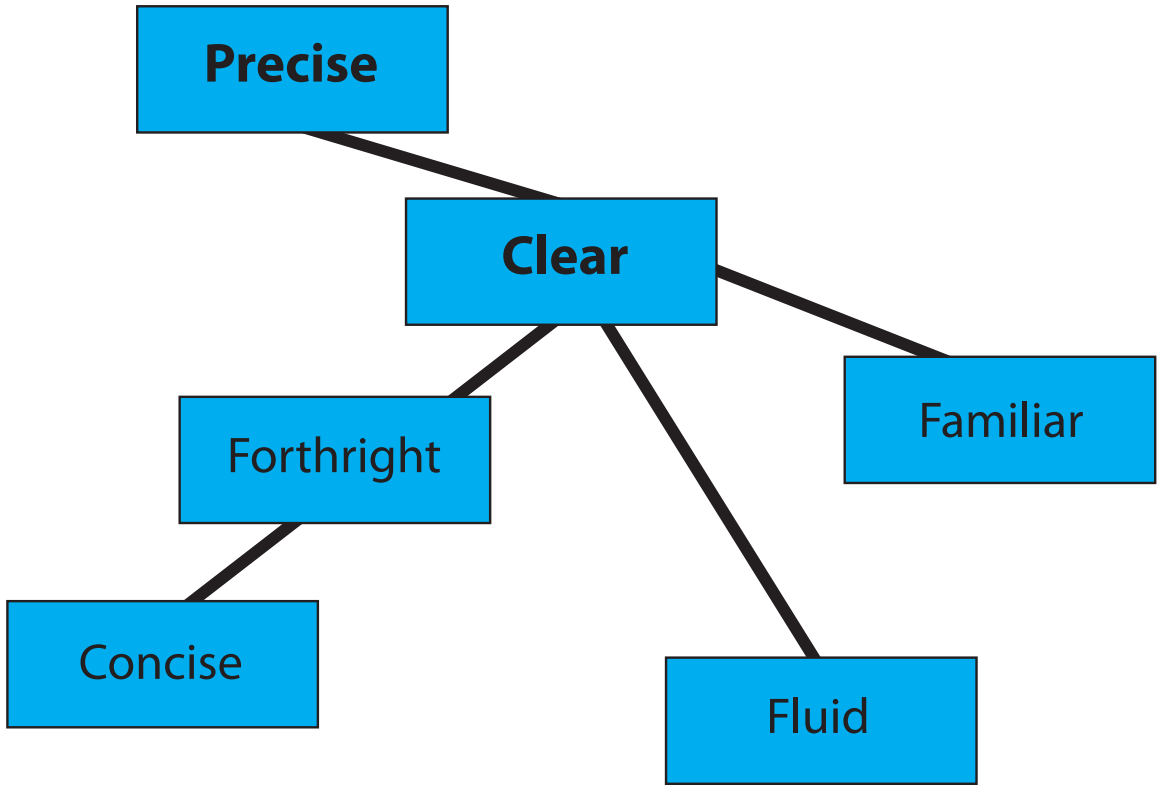
Becoming a good scientific writer – taking practice, time and attention to detail – is one of your goals

This presentation is intended to give you some of the tools to be able to write better

- First, some resources:
  - Michael Alley, *The Craft of Scientific Writing, 3rd edition* (Springer, New York, 1996)
  - Michael Alley, *The Craft of Scientific Presentations, 2nd edition* (Springer, New York, 2013)
  - Strunk and White, *The Elements of Style* (Longman, 1999)
  - APS Style Guide, http://www.apsstylemanual.org/
  - Lynne Truss, *Eats, Shoots and Leaves* (Gotham, New York, 2006)
  - Josh Bernoff, *Writing Without Bullshit* (HarperCollins, New York, 2016)



There are two primary goals of good scientific writing, clarity and precision



Taken from Fig. 1-1, Pg 12, *The Craft of Scientific Writing*

There are three organizational issues that you have to consider up-front before you start writing:

Constraints

Structure

Style

They are related to each other and need to be considered before you start.

Four constraints shape the goal of a writing project

Audience

- Who is going to read it?
- What do they know?
- Why will they be reading?
- How will they be reading?

Format

- "Format" is how the type is arranged on the page
- Often defined by a journal or publisher

Mechanics

- What style has to be used?
  - Eg. British vs American Spelling?
- Many rules in English, not all logical

Politics

- What impact will your writing possibly have?
- Will your audience be biased?

The structure of your writing plays a key role in how effective it is

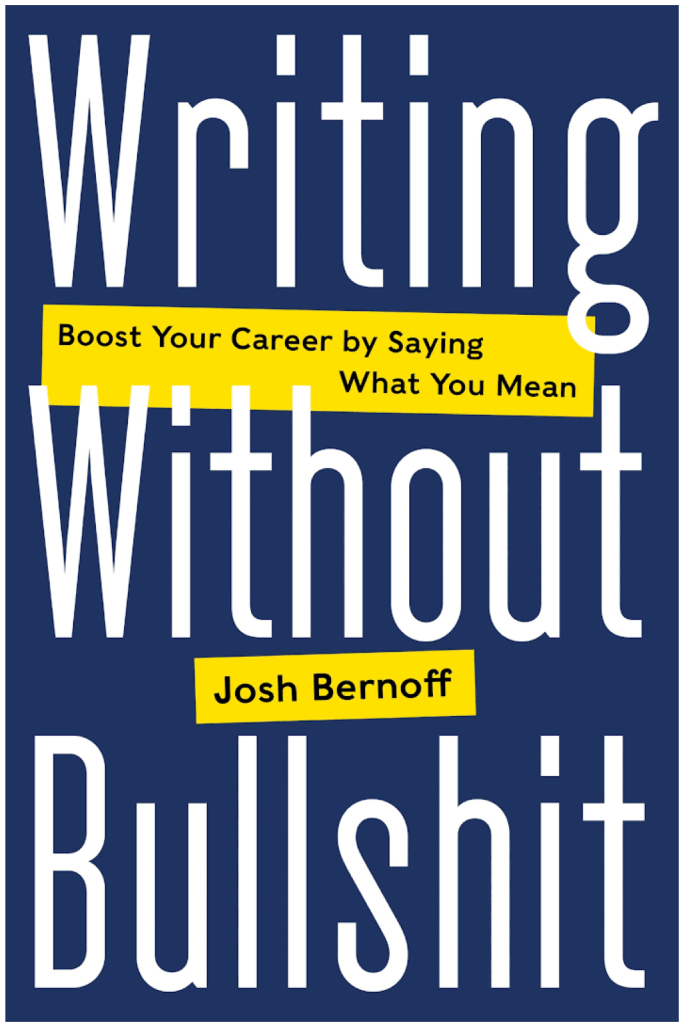
Elements of Structure

- Title
- Abstract or Executive Summary
- Main Sections
- Illustrations
- Tables
- Conclusion
- Back Matter

The style of the writing depends on the context, but there are some good guidelines to follow

Clarity	KISS, avoid complexity, avoid ambiguity
Conciseness	Omit unnecessary words, phrases, sentences
Precision	Use the correct word
	Avoid excessive use of synonyms
Familiar	Avoid jaron; remember your audience
Forthright	Avoid pretentious words, clichés
	Use concrete nouns rather than abstract nouns
	Avoid passive verbs
	Be suspicious of any sentences starting with “it”
	Be specific rather than general
Fluidity	Vary rythym
	Vary length of sentences and paragraphs
	Vary openings of sentences

Writing Without Bullshit is a screed against "poorly written crap."



"The tide of bullshit is rising.", first sentence of WWOBS.

Bernoff makes a strong case:

- More and more written material (thank you, WWW)
- More and more uneditted stuff
- Less discipline

He invokes an **Iron Imperative**:

Treat the reader's time as more valuable than your own.

Bernoff even has a way of measuring what he calls "bullshit" writing:

Innovaloi is a leading technology company that combines advanced cloud-based data analytics and data-driven intervention platforms to achieve meaningful insight and impactful clinical and quality outcomes, utilization and financial performance across the healthcare landscape. Innovaloi's unique achievement of value is delivered through the effective progression of Turning Data into Insight, and Insight into Action. Large proprietary datasets, advanced integration technologies, sophisticated predictive analytics, data-driven intervention platforms, and deep subject matter expertise deliver a seamless end-to-end capability that brings the benefits of big data and large-scale analytics to the point of care.

$$\text{meaning ratio} = \frac{\text{meaningful words}}{\text{total words}} = 59\%$$

Being precise is critical to effective communication of science

Example of an email posting following an analysis procedure distributed to a 3,000 member collaboration:

I have a question on :

"Analyses strongly dependent on the c-jet and light-jet uncertainties should not include them when profiling."

How would you define "strongly dependent on" ?

And what's the rationale behind forbidding people to profile some NP? In principle ….

The rejoinder didn't help much:

About "strongly dependent", it should just mean that a variation of the light and c-jet mistag rate would significantly affect the analysis result.

"NP" -> Nuisance Parameter

Here are some examples of things to avoid – redundant and wordy phrases

Redundant phrases

- "alternative choices"
- "basic fundamentals"
- "close proximity"
- "consensus of opinion"
- "as to whether"
- "clearly demonstrates"
- "for the forseeable future"

Wordy phrases

- "due to the fact that"
- "in order to"
- "in the near future"
- "great deal of"
- "as to whether"
- "made the decision"
- "has the potential to"

General agreement that writing in active voice is a more effective way of communicating

Two categories:

1. Passive verbs and passive phrases

1. "the voltage was displayed on the oscilloscope…"
   better as
   "the oscilloscope displayed the voltage…"

2. 1st or 2nd person

2. "The measurement was done by analyzing data…"
   better as
   "We made the measurement by analyzing data…"

   (with the caveat that use of 1st person should be tempered)

Here are a set of random notes and tips collected* over the years

- Read and study the literature!
- Start with a detailed and logically sequenced outline
- Write the abstract last
- Remember that first sentences are particularly important
- One set of ideas to each paragraph
- Short sentences are better – generally – than longer ones
- Redundancy is a needless repetition – but sometimes important content needs to be emphasized!
- Put yourself in the place of the audience, and think about the questions they might have
- Write first, polish after
- Then proof-read again and again, and then proof-read once more

* Credit to Prof. Tony Key, who assembled the initial list!

You can become a good – perhaps excellent – scientific writer – make it one of your personal goals!