



NOAA
FISHERIES

Improve your scientific writing:
To be read & remembered,
convincing & influential.

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February 26, 2017

Learning objectives

Differentiate styles of communication

Compare a writer's versus a reader's perspective of a paper

Apply a 'layers of editing' approach

Identify additional advice you need



Scope of this presentation

Scientific writing



- Providing scientific context (references)
- Text > graphics
- Authorship exclusive
- Focus on results & interpretation



Science communication



- Providing societal context (examples)
- Text ≈ graphics
- Authorship inclusive
- Focus on conclusions & recommendations



Authors write for an unmet reader

Alley (1996) asks:

Who will read the document?

What do they know about the subject?

Why – and how – will they read the document?

“Readers do not simply read; they interpret”
(Gopen and Swan, 1990)



Elements of Scientific Writing

Scavenge your proposal

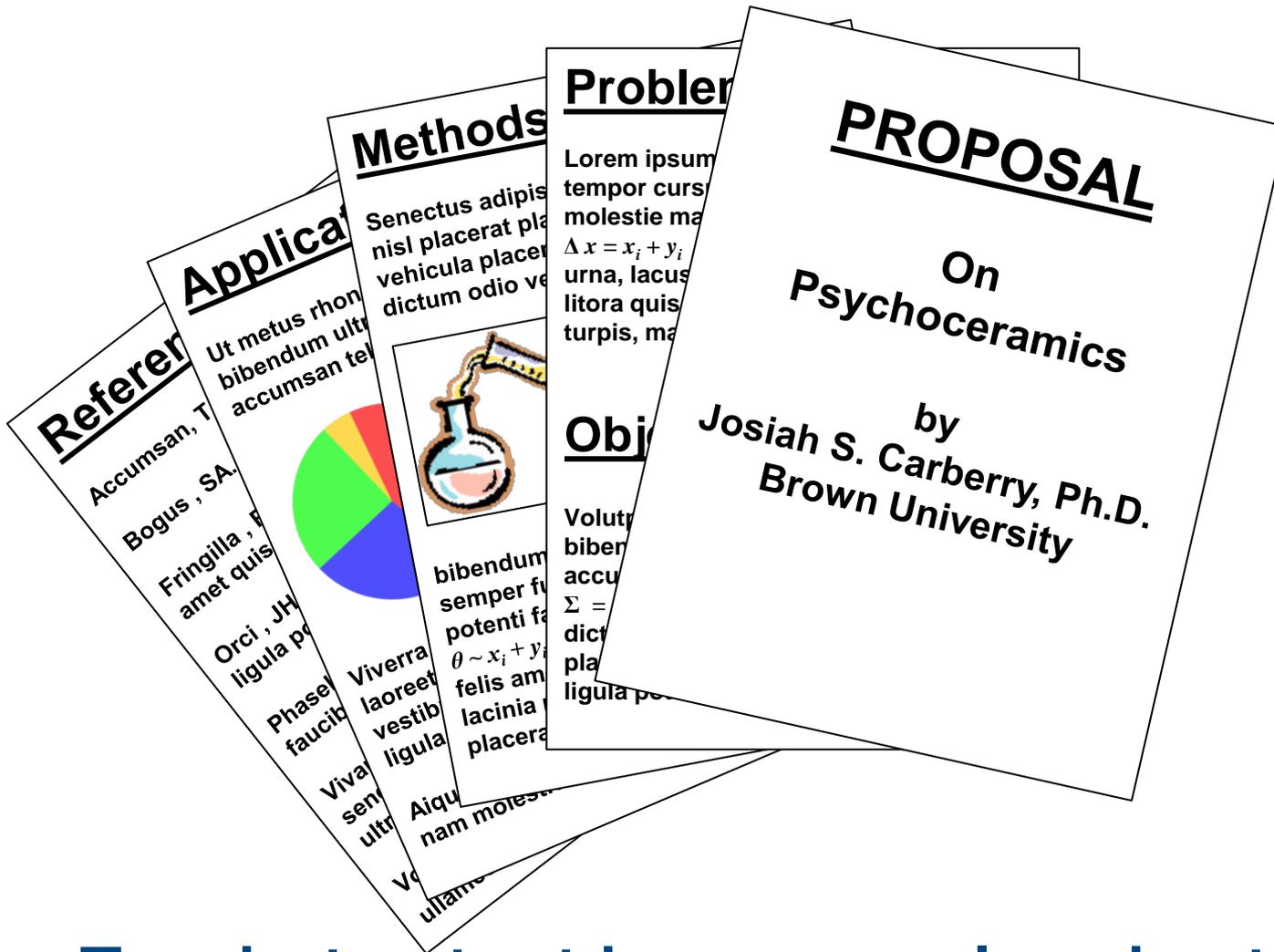
Establish structure with an outline

How writers write

How readers read



Don't forget your proposal



Title

Thesis

Methods

Literature

To what extent have you already started?

What is known?

What is the limit of (or wrong with) what is known?

How does this new paper go beyond what is known?



Time saver tip: outline then write

Introduction

> 3 paragraphs?

Materials and Methods

Include “Study Area” section?

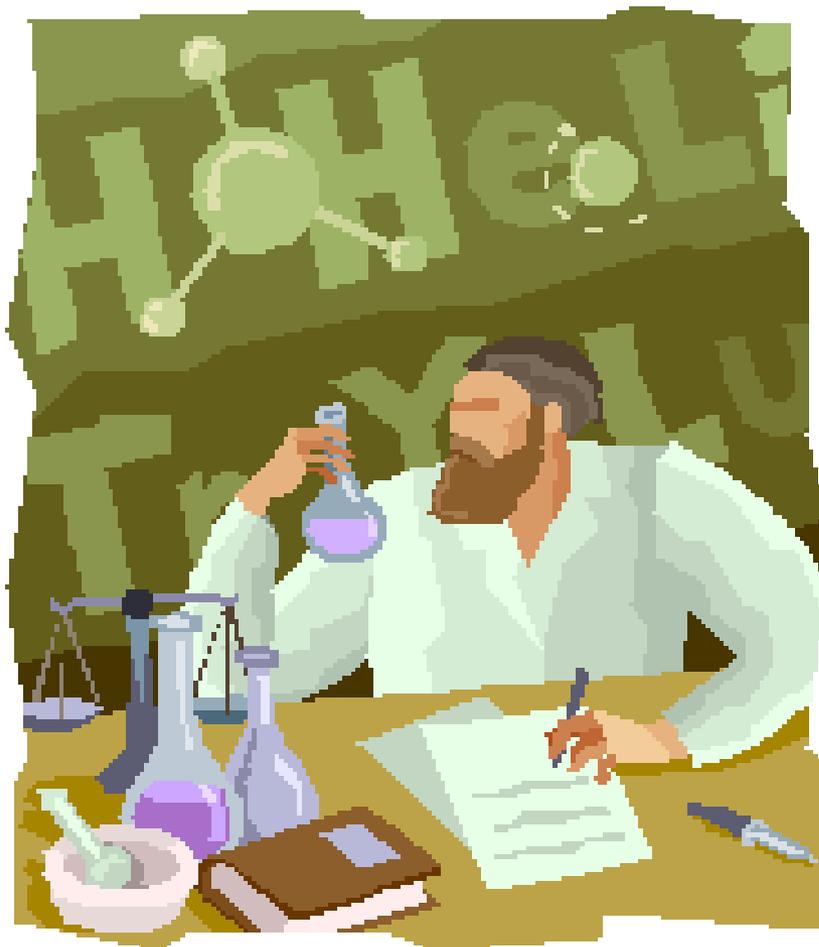
Skip details and cite other papers?

Results

1. Begin with ‘introductory’ experiment results
 2. Report results as you plan to discuss them
 3. Save most interesting for last
 4. Or, list the most speculative or least solid result last
- ·
·



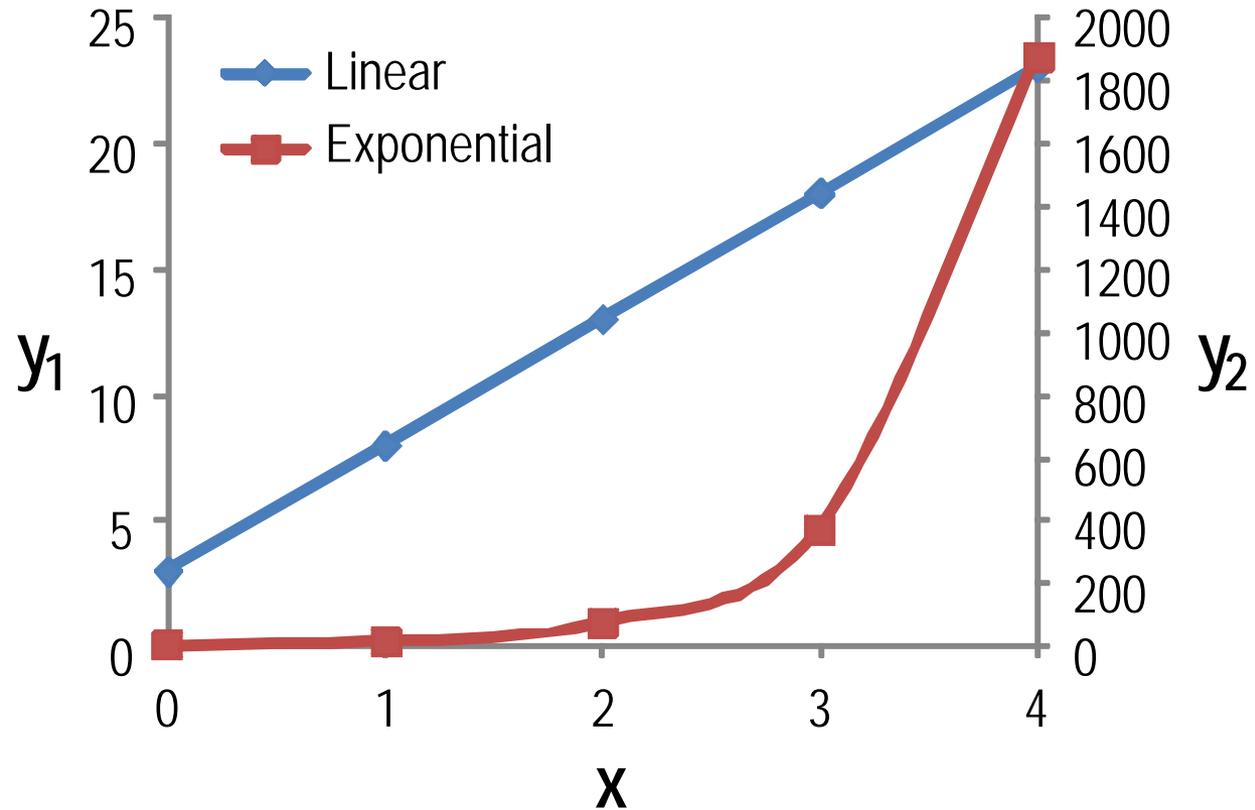
How writers (should) write



Write your methods while they are as fresh as possible.

How writers (should) write

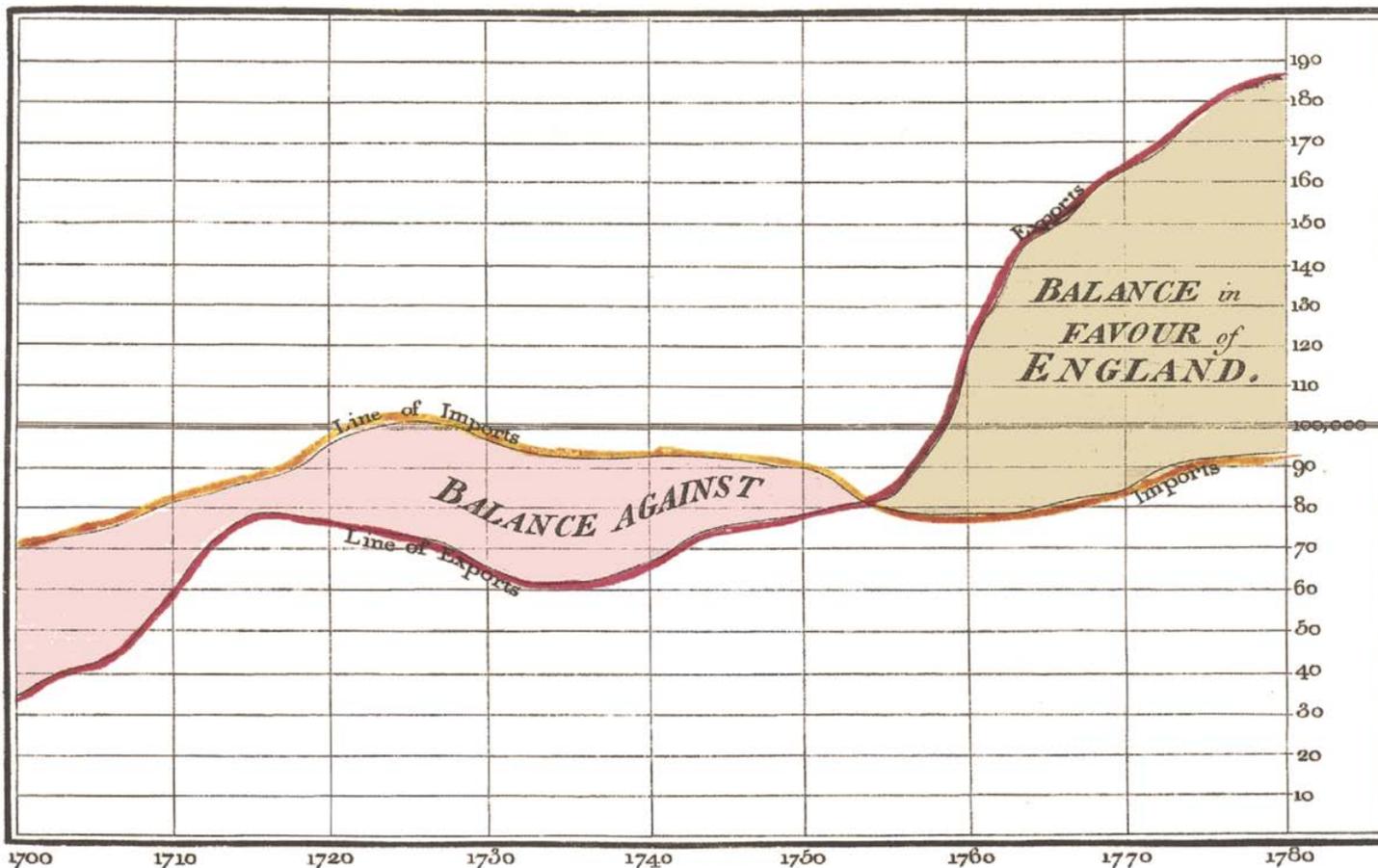
x	y_1	y_2
0	3	3
1	8	15
2	13	75
3	18	375
4	23	1875



Assemble your illustrations (tables, figures, photos, video) to help you write the results.

Graphic display 'revolutionized' data science

Exports and Imports to and from DENMARK & NORWAY from 1700 to 1780.



The Bottom line is divided into Years, the Right hand line into £10,000 each.

Published as the Act directs, 1st May 1786, by W^m Playfair

No. 100, Strand, London.

How writers (should) write

Introduction

Begin broadly,
define terms,
end with a focused
thesis statement.



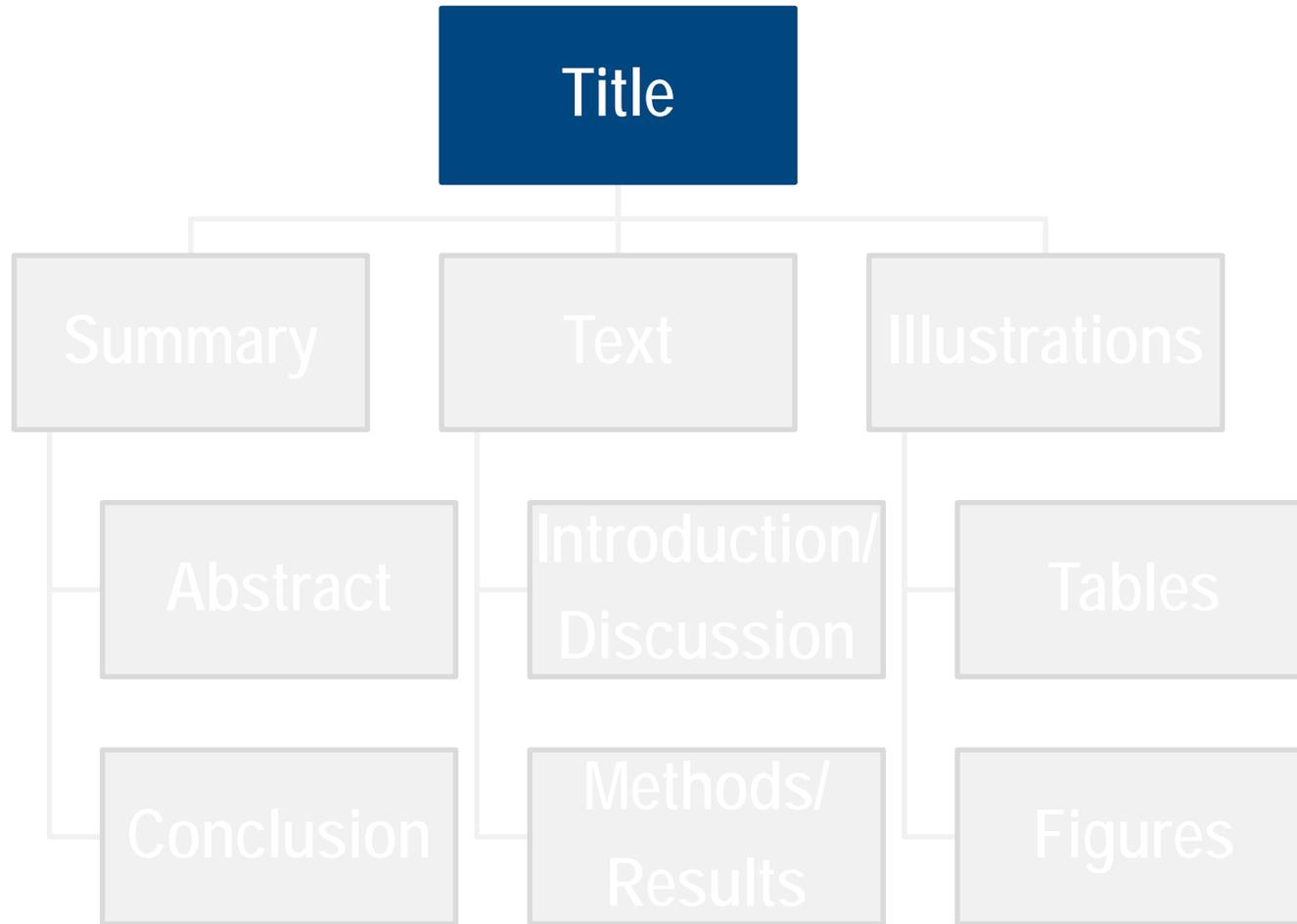
Discussion

Begin with the most
significant finding.
Put in perspective.
End broadly.

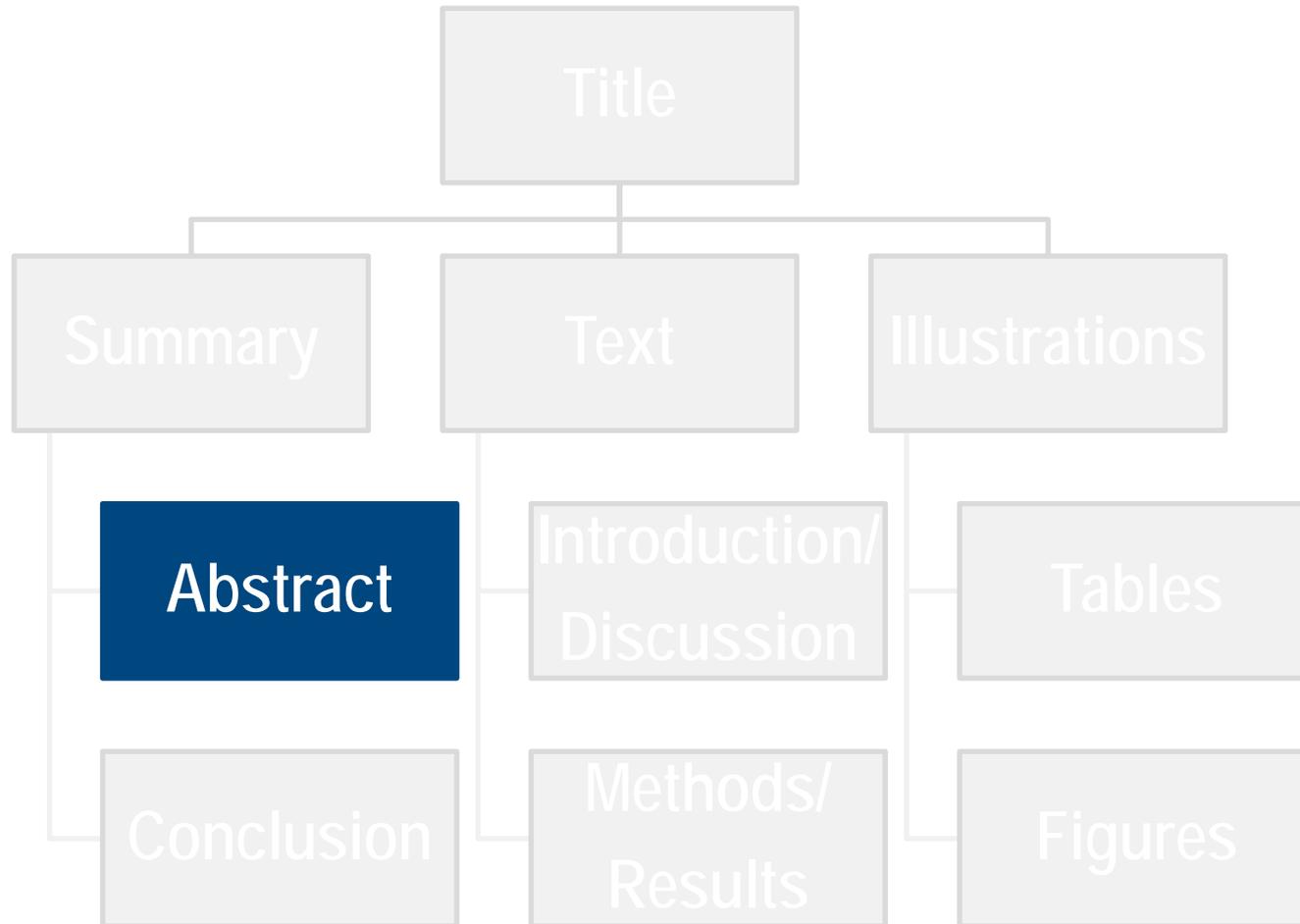


Finish the first draft by writing these two sections as bookends

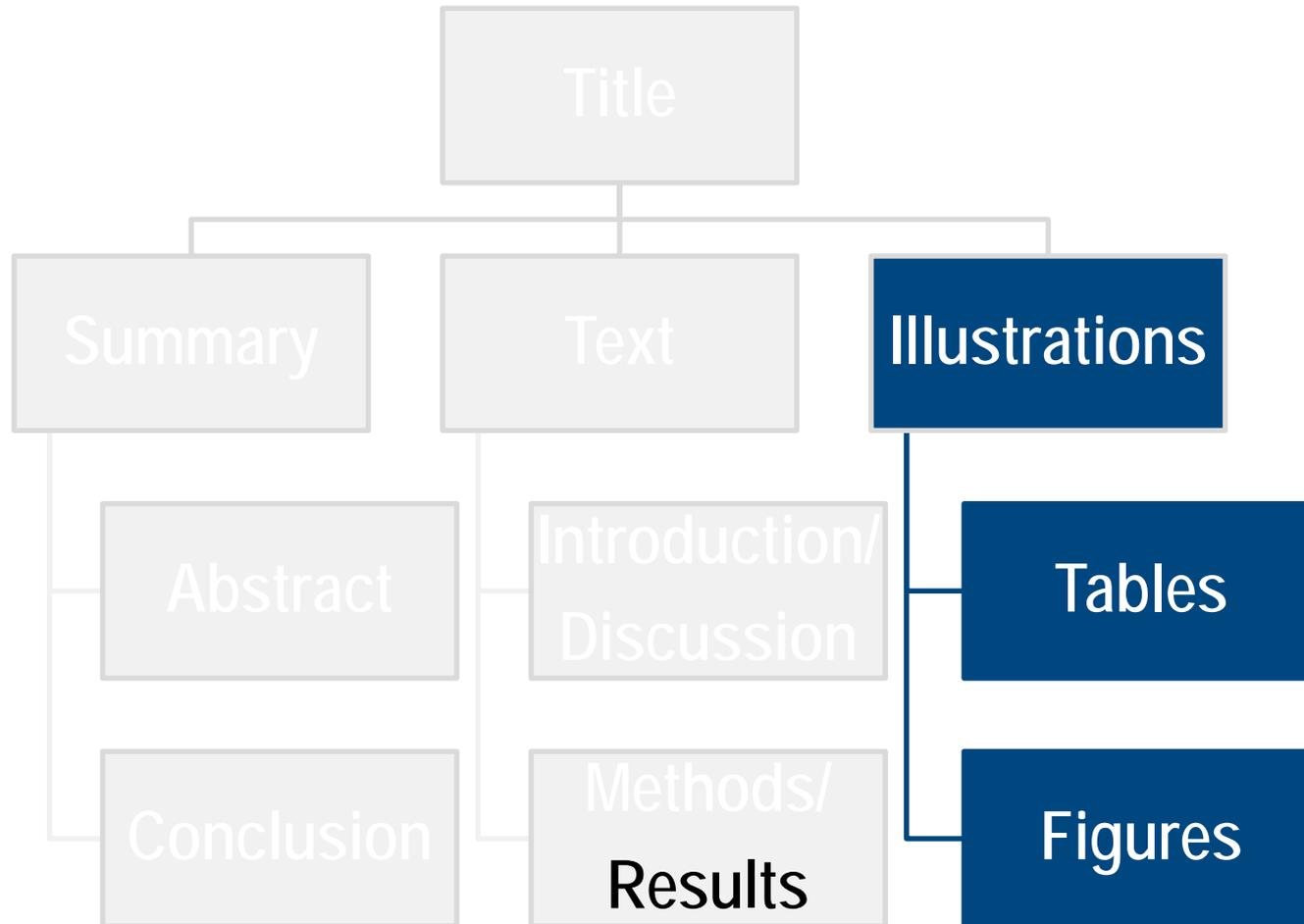
How readers (likely) read



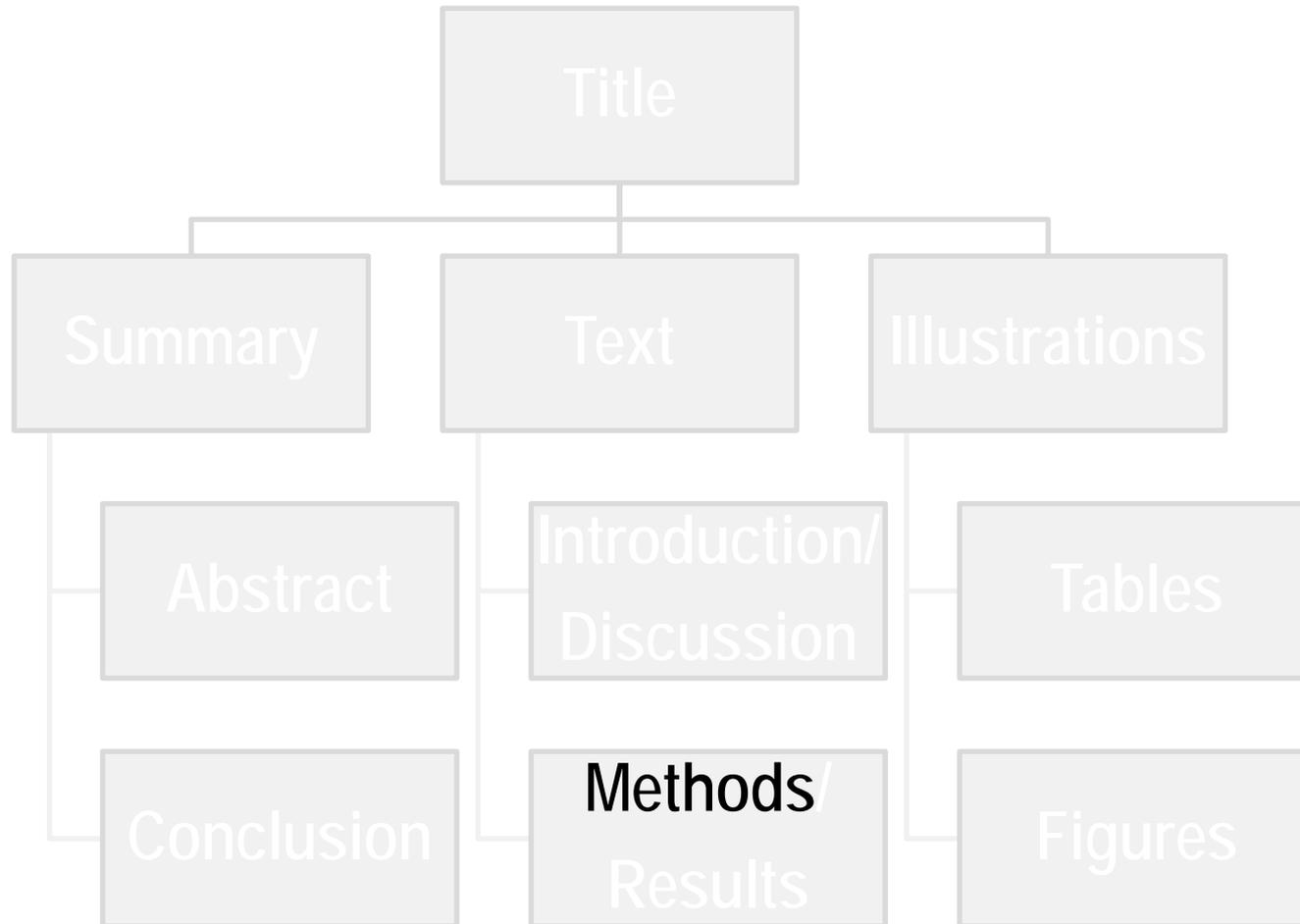
How readers (likely) read



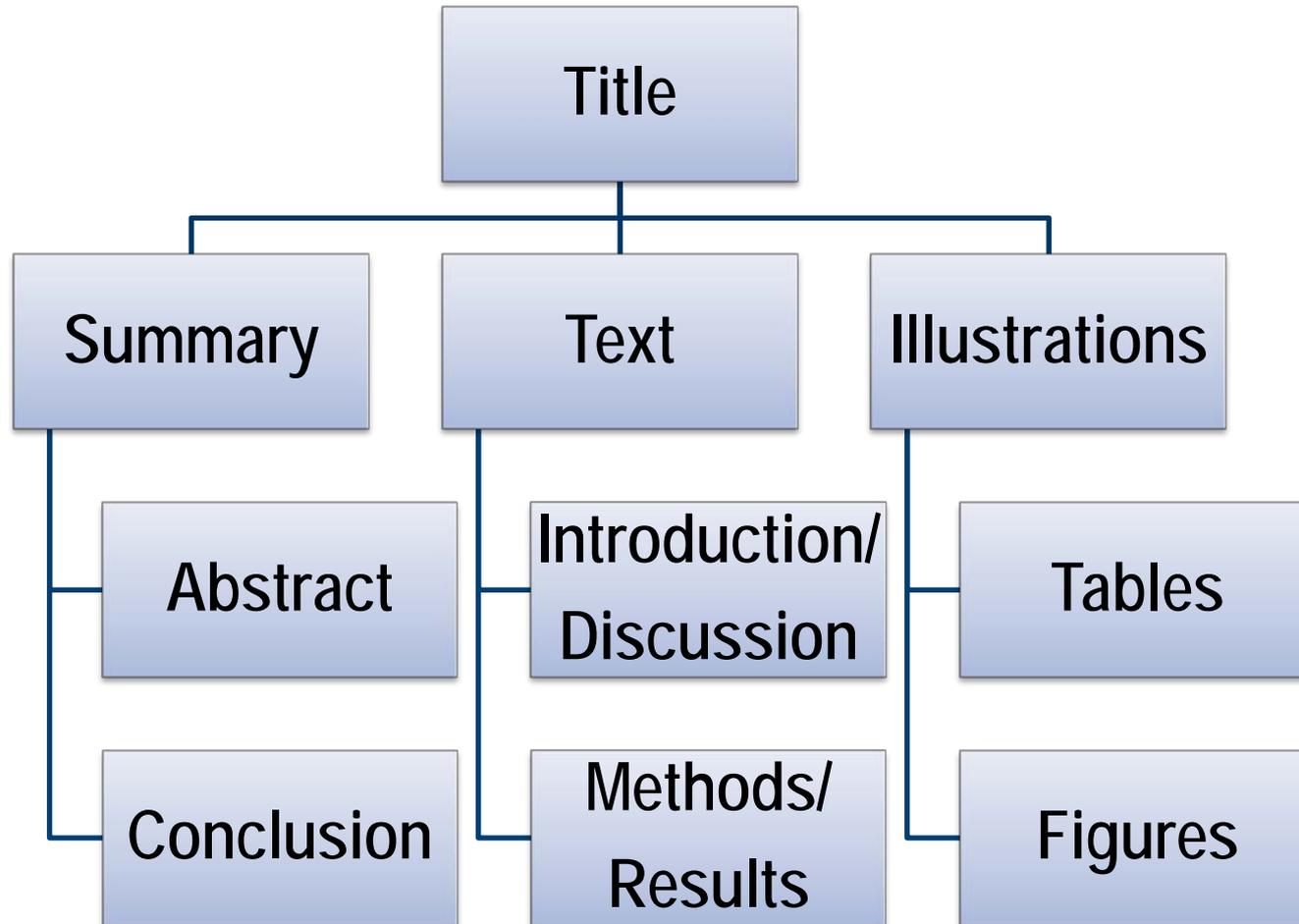
How readers (likely) read



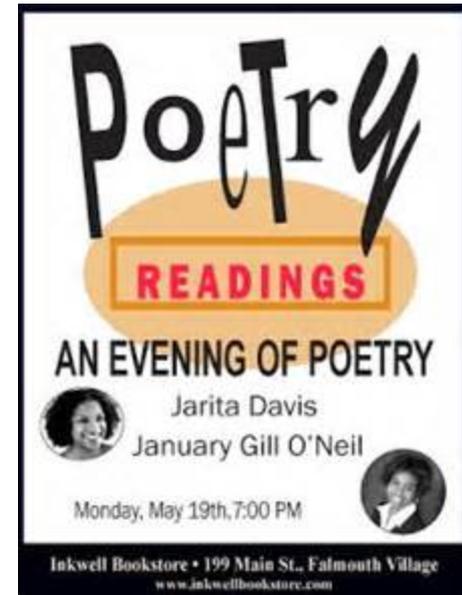
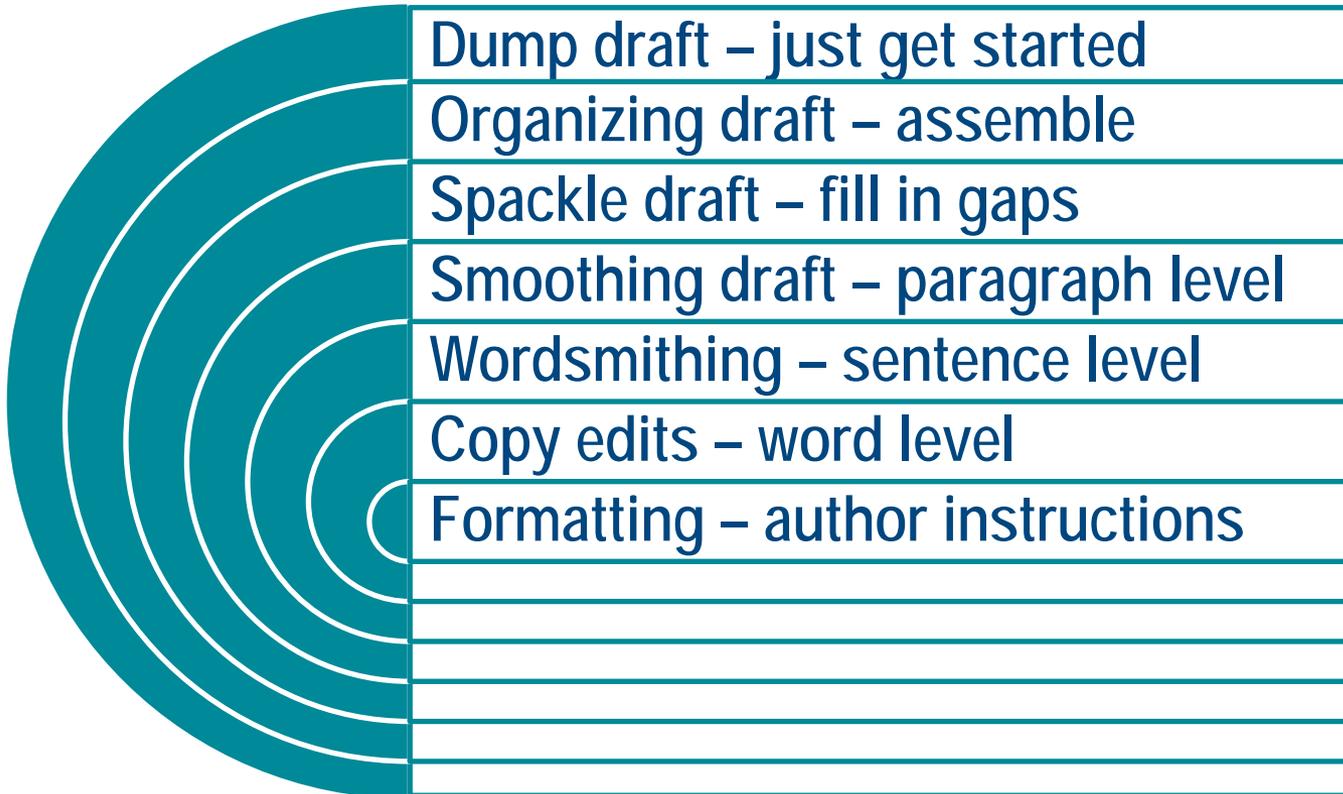
How readers (likely) read



Readers likely read selectively rather than sequentially



Jarita Davis' 7 layers of Editing



You can't edit a blank page. - Jodi Picoult

The big picture

Anchor everything to a strong claim or hypothesis

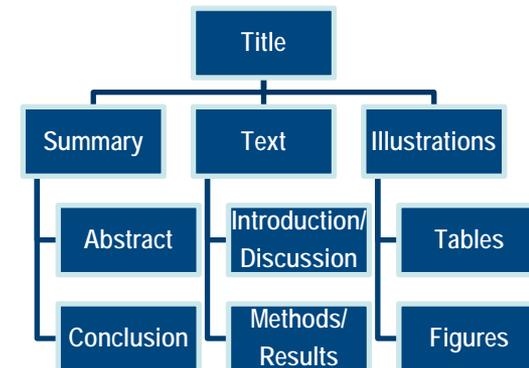
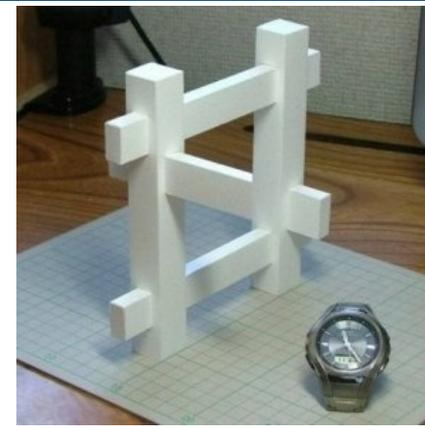
- Is testable, shows discovery, leads to prediction

Each section should be coherent

- Results in 'Results,' etc.

Some sections should be coordinated

- Title, keywords, & abstract
- Text & Illustrations
- Introduction & Discussion



Build strong topic sentences: use this web tool



World Health Organization

Writing Effectively for WHO
Module 1: Effective Writing

Course Guide | Module 1 | Module 2 | Module 3

Search | Printer Friendly | Resources | << Previous Page | Next Page >>

Module 1

- Introduction
- Prewriting
- Organizing
- Drafting
 - Ordering ideas into paragraphs
 - Paragraph patterns
 - Topic sentences
 - Practice: Evaluate topic sentences**
 - Practice: Write topic sentences and paragraphs
 - Portfolio preparation: Analyse paragraphs
- Revising for style and mechanics
- Revising for flow and consistency
- Proofreading
- Assignment 1
- Resources
- Summary

Practice: Evaluate topic sentences

Look at these example paragraphs. In each case, the topic sentence is the first sentence. Does the topic sentence represent the main message of the paragraph in each case? If it does not, what might be a more appropriate topic sentence?

When you have considered each paragraph, compare your responses to ours.

Example 1 Read the paragraph on the left, and then write your comments in the space provided. Click on the button to reveal our comments.

We sent two urgent shipments using your courier company to our West Bengal state office in Kolkata. We found both shipments arrived two weeks after they were sent. Please explain why these deliveries were so late.

Your comments:

Topic sentence good or bad?

Suggested topic sentence:

Click here to reveal our comments.

© WHO 2011



There is a science to scientific writing.

The seven principles of scientific writing

(1) Place the "new information" you want the reader to emphasize in the *stress position* at the end of the sentence. Save the best for last.

(3) Place "old information" (material already stated) in the topic position, to link reader backwards.

(4) Follow a subject as soon as possible with its verb.

(7) In general, ensure that the emphasis of the *substance* coincides with the expectations for emphasis raised by the *structure*.

We have directly measured the enthalpy of hydrogen bond formation

between the nucleoside bases 2'deoxyguanosine (dG) and

2'deoxyctidine (dC). dG and dC were derivatized at the 5' and 3'

hydroxyls with triisopropylsilyl groups; these groups serve both to

solubilize the nucleosides in non-aqueous solvents and to prevent the

ribose hydroxyls from forming hydrogen bonds. Consequently, when

the derivatized nucleosides are dissolved in non-aqueous solvents,

hydrogen bonds form almost exclusively between the bases. Since the

interbase hydrogen bonds are the only bonds to form upon mixing,

their enthalpy of formation can be determined directly by measuring

the enthalpy of mixing. From our isoperibolic titration measurements,

the enthalpy of dG:dC base pair formation is -6.65 ± 0.32 kcal/mol.

(2) Place the person or thing whose "story" a sentence is telling at the beginning of the sentence, in the topic position.

(5) Provide context for your reader before asking that reader to consider anything new.

(6) Articulate the action of every clause or sentence in its verb

From "The Science of Scientific Writing" by George Gopen and Judith Swan.

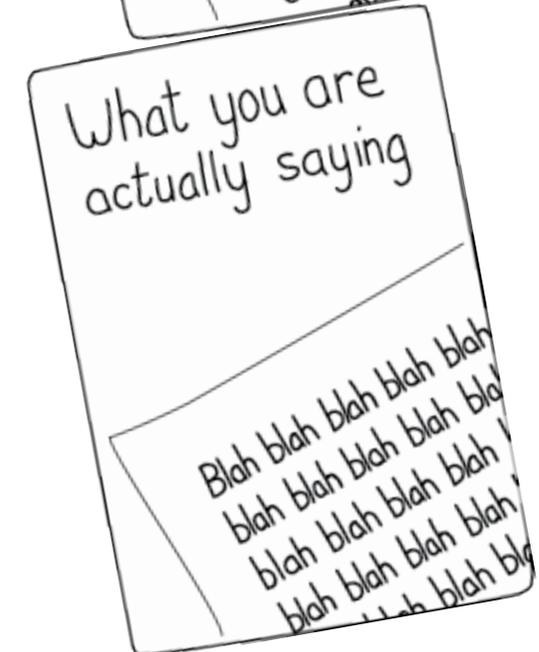
Master the language

Define – or avoid – jargon, slang, or idioms

Define (or avoid) abbreviations & acronyms

Choose terms and stick with them

Use words that work.





Style and Format

A Guide to AFS Publications Style American Fisheries Society 2013

1. Abbreviations and Acronyms
2. Capitalization
3. Italics
4. Mathematics and Statistics
5. Numbers and Measurements
6. Punctuation
7. Quotations
8. References
9. Species Names
10. Spelling and Compound Words
11. Symbols
12. Tables and Figures

13. Vendors
and Commercial Products
14. Word Usage

Appendices

- A. Spelling List
- B. Symbols, Abbreviations,
and Acronyms
- C. Plurals of Fish Names
- D. Geographic and Geological Terms

Revise, revise, revise

“Vision plays an important role in notifying animals of imminent danger, such as an impending collision with a predator or an environmental surface.”

Appeared in Science (1995), written by 3 Caltech PhDs

Flesch Reading Ease: college graduate level

Fog Scale Level: very difficult

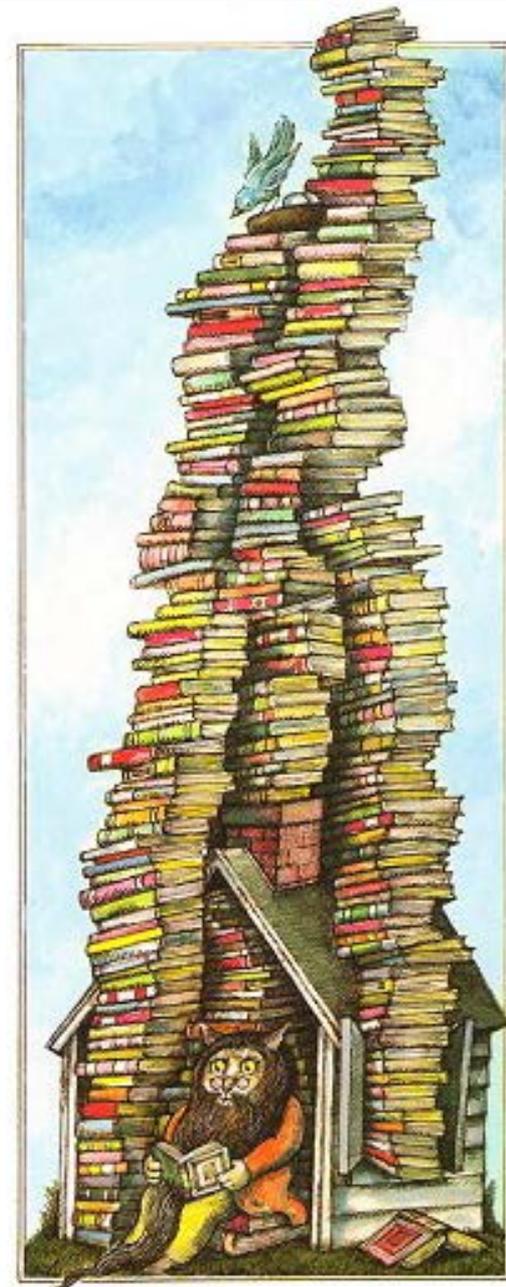
“Without eyes, you'd soon crash into a tiger or a cliff.”

Suggested revision by Nicholas Wade, New York Times

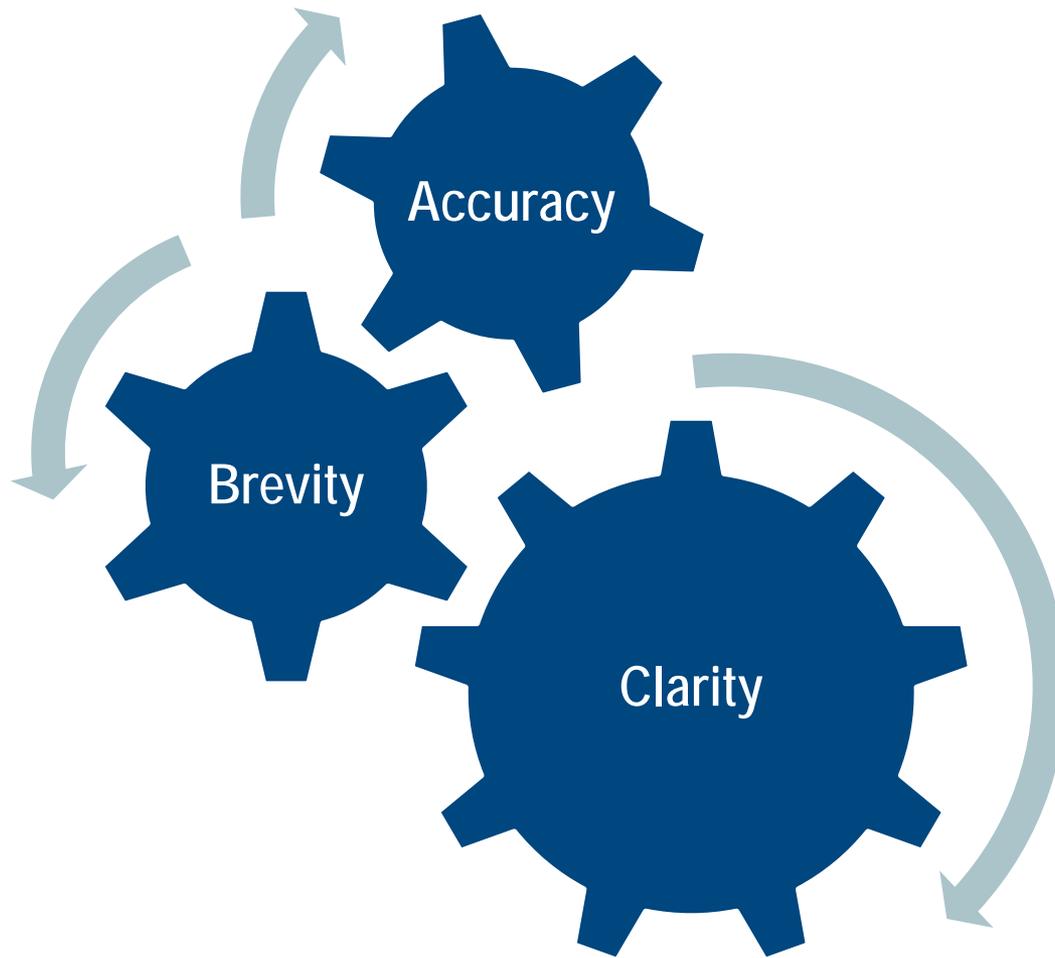
Flesch Reading Ease: plain English

Fog Scale Level: readable

**Science is complex enough,
don't make it more so.**



Fred Serchuk's ABCs



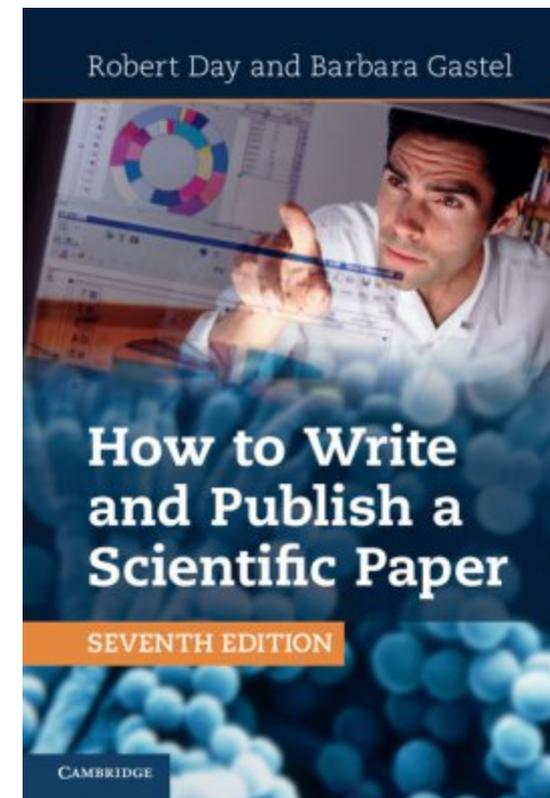
Day & Gastel's "cookbook"

Part II. Preparing the Text

7. How to prepare the title
8. How to list the authors and addresses
9. How to prepare the abstract
10. How to write the introduction
11. How to write the materials and methods section
12. How to write the results
13. How to write the discussion
14. How to state the acknowledgements
15. How to cite the references

Part III. Preparing the Tables and Figures

16. How to design effective tables
17. How to prepare effective graphs
18. How to prepare effective photographs



Alley's "craft" approach

Structure

- Not about the I-M-R-D structure per se
- Begin-Middle-End; transitions

Language

- Precision, clarity, forth-rightness, familiarity, conciseness, fluidity

Illustrations

- How you should build your text from your tables & figures

Readers

- How they decode a page, a paragraph, a sentence, a word



Booth et al.'s craft

Claim: It was Mr. Plum who shot the man in the Library with the pipe.

Reason: The cause of the death was blunt trauma, etc.

Warrant: Plum had no motive, and opportunity.

Evidence: Alibi, forensics, nature of relationships, etc.

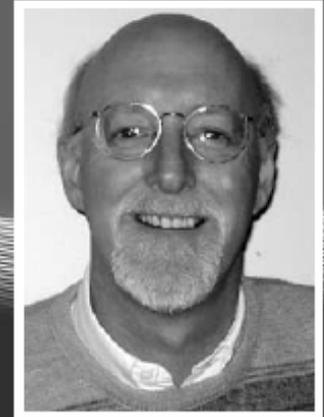
CLAIM *because of* REASON *based on* EVIDENCE

ACKNOWLEDGMENT AND RESPONSE

Don't just take their or my advice

COLUMN: GUEST DIRECTOR'S LINE

Several Books to Read and Thereby Delay Writing Your Thesis



Before "The Simpsons" appeared on television, Matt Groening produced some offbeat cartoons that I followed in the *Chicago Reader*. In one cartoon, an anthropomorphic rabbit, who was struggling to complete graduate school, arrived at a clever delay tactic: "Read another book!"

At the risk of sounding like Groening's rabbit about a dozen websites on the communication ing, and, yes, reading them will

of your own. One chapter promotes the proper usage of the English—and fishery—language using examples of (all too) common writing problems, and another chapter offers advice to assuage the trauma of negative critiques or editorial rejection. The chapter on graphic display of data illustrates 21 different figure types, and 2 chapters introduce the topic of

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is an excellent index that is indis-fer back to the
Writing about
06) covers
the basics of preparing an IMRD

**There are lots of resources out there.
Use them.**

Learning objectives

Differentiate styles of communication

Compare a writer's versus a reader's perspective of a paper

Apply a 'layers of editing' approach

Identify additional advice you need





A presentation is completely different

Approach:

- Speak from points
- Memorize
- Read
- Speak off the cuff

Occasion:

- Formal symposium
- Workshop
- Informal meeting
- After-dinner speech
- Press conference



flickr

Pinterest



tumblr.

LinkedIn



YouTube

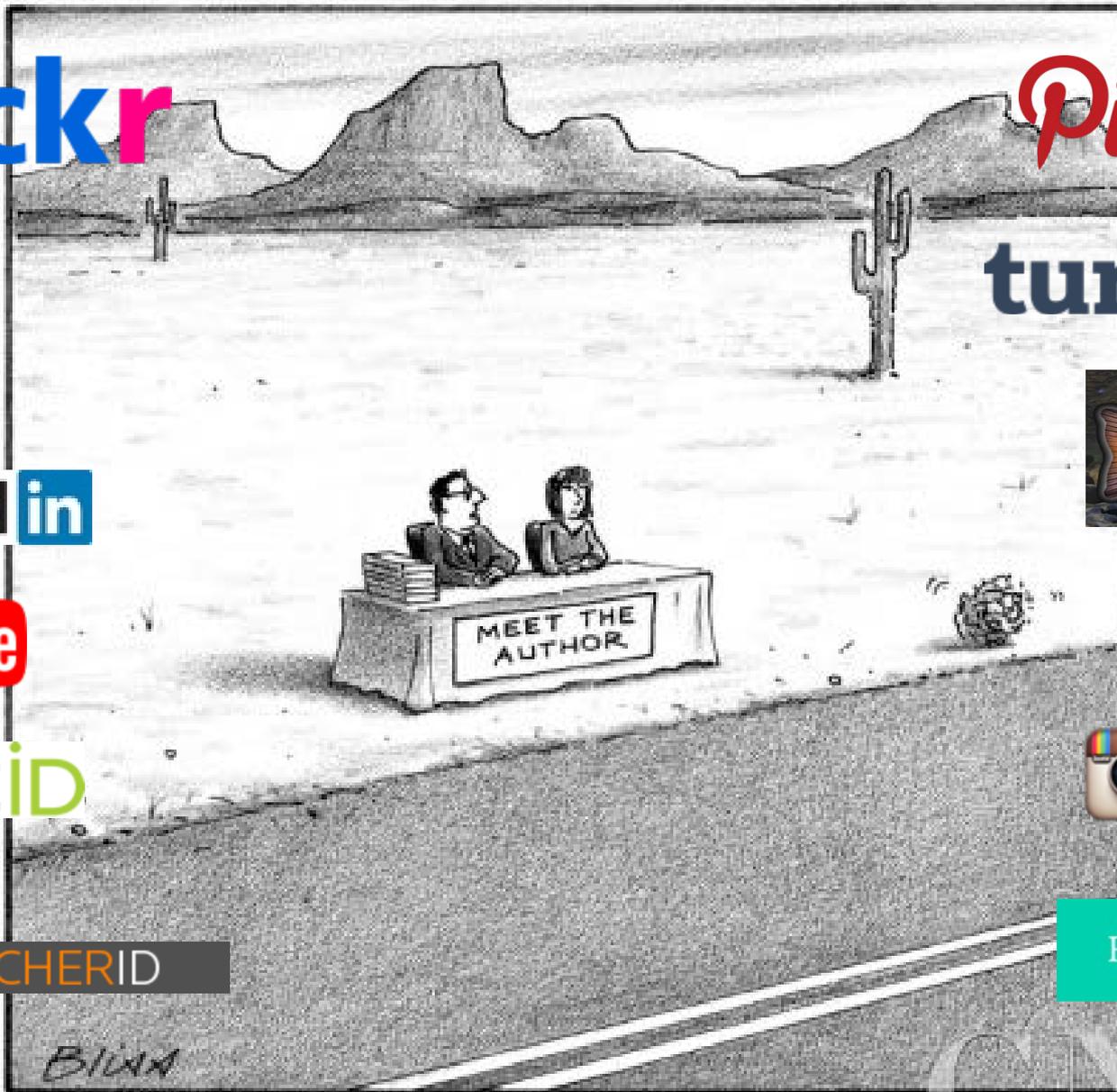
Google

ORCID



RESEARCHERID

ResearchGate



You are, without a doubt, the worst publicist I've ever had.

A picture is worth 1,000 words, but to be so,
it may have to include 100 words. - John Tukey

DIAGRAM OF THE CAUSES OF MORTALITY
IN THE ARMY IN THE EAST.

