

Ay31 - Class #3

April 19, 2019

Structure of Written Documents

Lifecycle of First Draft

Being Precise

Announcements

1. Sign up for one-on-one meeting to go over outline. See email for link.
2. First draft due in two weeks (Friday, May 3)

Structure: Beginning

Title orients reader to document

Summary tells reader what happens
in document

Introduction prepares reader for the middle

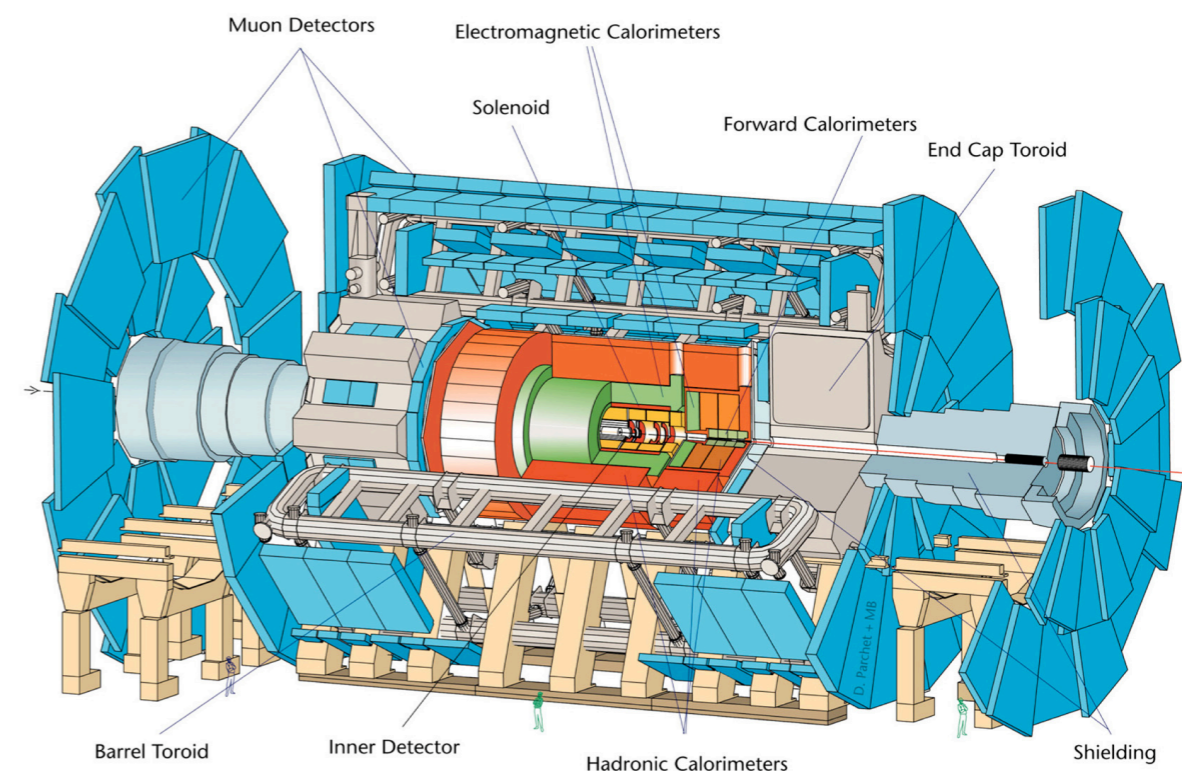
Structure: Middle

Parallel Parts



Your strategy should be obvious to the reader in the headings, subheadings, transitional phrases, etc.

Flow



Structure: End

A strong ending provides synthesis and broadens conclusions

Conclusions

Analyze results from overall perspective

Analysis of Results

Future Perspectives

Several options:

Make recommendations

Discuss Future Prospects

Repeat Limitations

General Format of Research Papers

- Title
- Abstract [Porush Chapters 6, 7]
- Introduction [Alley Chapter 2]
- Methods and Results
- Analysis and Discussion
- Conclusions [Porush Chapter 15]

Q: What makes a good title/abstract in a research paper?

General Format of Research Papers

- Title
 - Exact
 - Clear and complete, but succinct
 - Strong
- Abstract
 - Key information
 - Concise
 - Descriptive (short, contents) vs. Informative (longer, contents and results)

Title and Abstract should contain the most relevant words for indexing in literature searches (e.g. ADS).

These two elements are those that attract readers to your paper.

General Format of Research Papers

- Introduction
 - Motivation and importance of problem (the “why?”)
 - Background, history, context, previous literature (the theory)
 - Current state and unknowns
 - What and how of current contribution (the question/hypothesis)
 - Approach, scope, and limitations (the objective)
 - Layout of presentation (the roadmap)

Introduction prepares the reader.

It generally follows a cohesive “funnel flow” structure.

General Format of Research Papers

- Middle
 - Observations or equations (i.e. methods and materials)
 - Data reduction or equation development
 - Analysis techniques and figures/narrative, in digestible portions
 - All of above in enough detail for a trained scientist to repeat work
 - Findings (i.e. results) and interpretation
 - Discussion of and implications of results; compare to others'
- End
 - Summary, conclusions, future work (nothing *new*)
 - Acknowledgements
 - References
 - Glossary of terms (for some documents)

General Format of (short) Proposals

- Front Matter
 - Abstract / Executive Summary
- Introduction
 - Statement of the problem
 - Short description of how the proposed work will solve problem
- Body
 - Science details
 - Technical details
 - Cost details (could be money or e.g. telescope time)
- Back Matter
 - References
 - Figures and Tables (sometimes in Body)

General Format of (long) Proposals

- Front Matter
 - Transmittal letter
 - Required information form
 - Cover / title page
 - Table of Contents
 - Abstract / Executive Summary
- Introduction
 - Propose of Proposal
 - Statement of Problem
 - Short description of how the proposed work will solve problem

General Format of (long) Proposals

- Body
 - Science details
 - Technical details
 - Cost and schedule details
 - Personnel details
 - Work Plan
- Back Matter
 - References
 - Appendix material
 - Curriculum vitae of relevant personnel
 - Budget forms and budget narrative

General Format of Reports

- Executive Summary
- Introduction, Questions Posed
- Scope, Inputs, Process, Timeline
- Findings, Conclusions, Recommendations
- Summary

General Format of Popular Papers

- Title
- Lede
- Billboard (Nutshell Paragraph)
- Story
- Exit

General Format of Popular Papers

- Title
 - enticing
 - inviting
- Lede and Billboard
 - expository
 - dramatic
 - oblique / intriguing
 - personal

General Format of Popular Papers

- Story
 - establish a point of view
 - use details to excite
 - use analogies and metaphors
- Exit
 - summarize
 - broaden scope
 - set dynamic mood
 - quotation or other memorable close

Exercise - Read Popular Piece

- Read “An Interstellar meteor may have slammed into Earth” by Nadia Drake (National Geographic - April 16, 2019)
- In groups of three, identify and discuss these points:
 - Title
 - Lede
 - Billboard (Nutshell Paragraph)
 - Story
 - Exit
- Is the above structure obvious? Is it effective?
- What did you like/dis-like about the writing?

Lifecycle of a First Draft

Paper requirements. Translate *needs* into specific *requirements*. For example: the paper shall be written within a certain word limit or with sections having certain titles.

Paper structure design. Your paper should contain an introduction, a body with paragraphs, and a conclusion.

Lifecycle of a First Draft

Paper content construction. This phase involves transfer of each thought and idea from bullet points defined earlier into logically structured paragraphs.

Think about each section separately, divide each section into small subsections and small paragraphs.

Can emulate style by studying the way other authors have constructed and worded sentences.

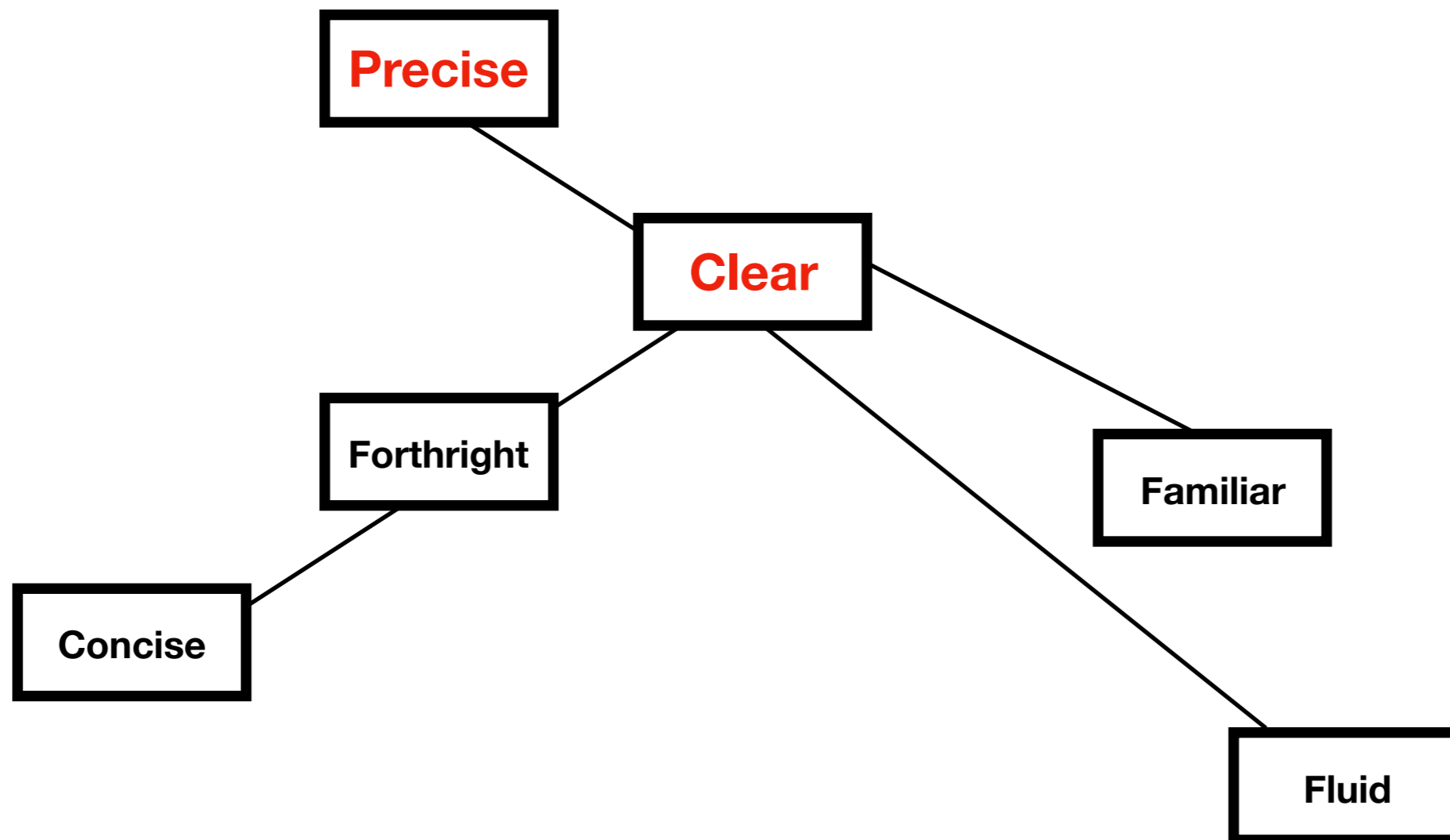
Do not worry yet about writing principles; just get words down.

Lifecycle of a First Draft

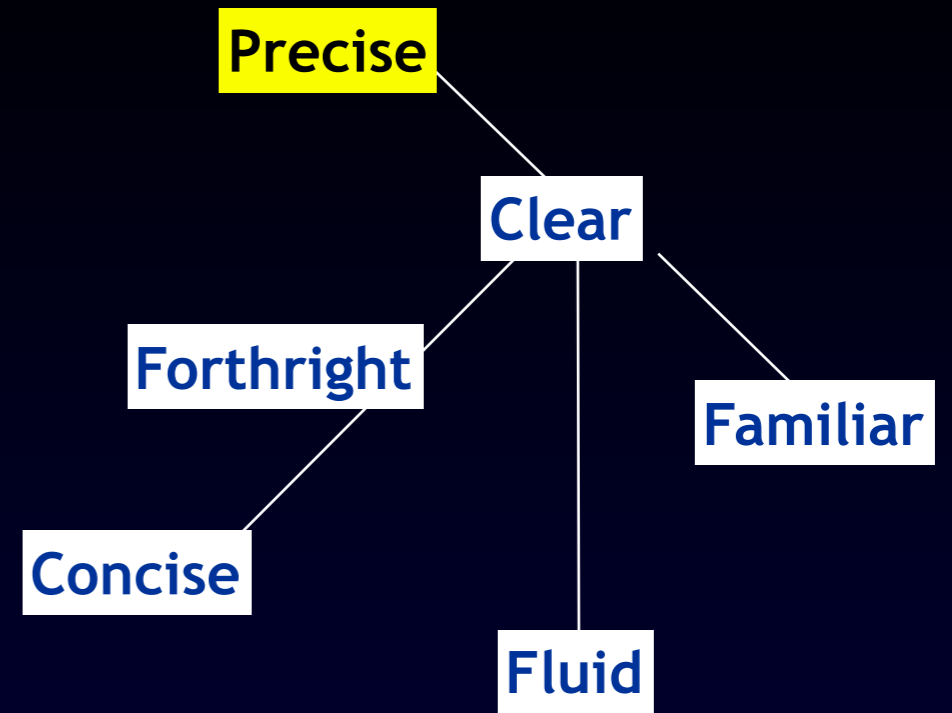
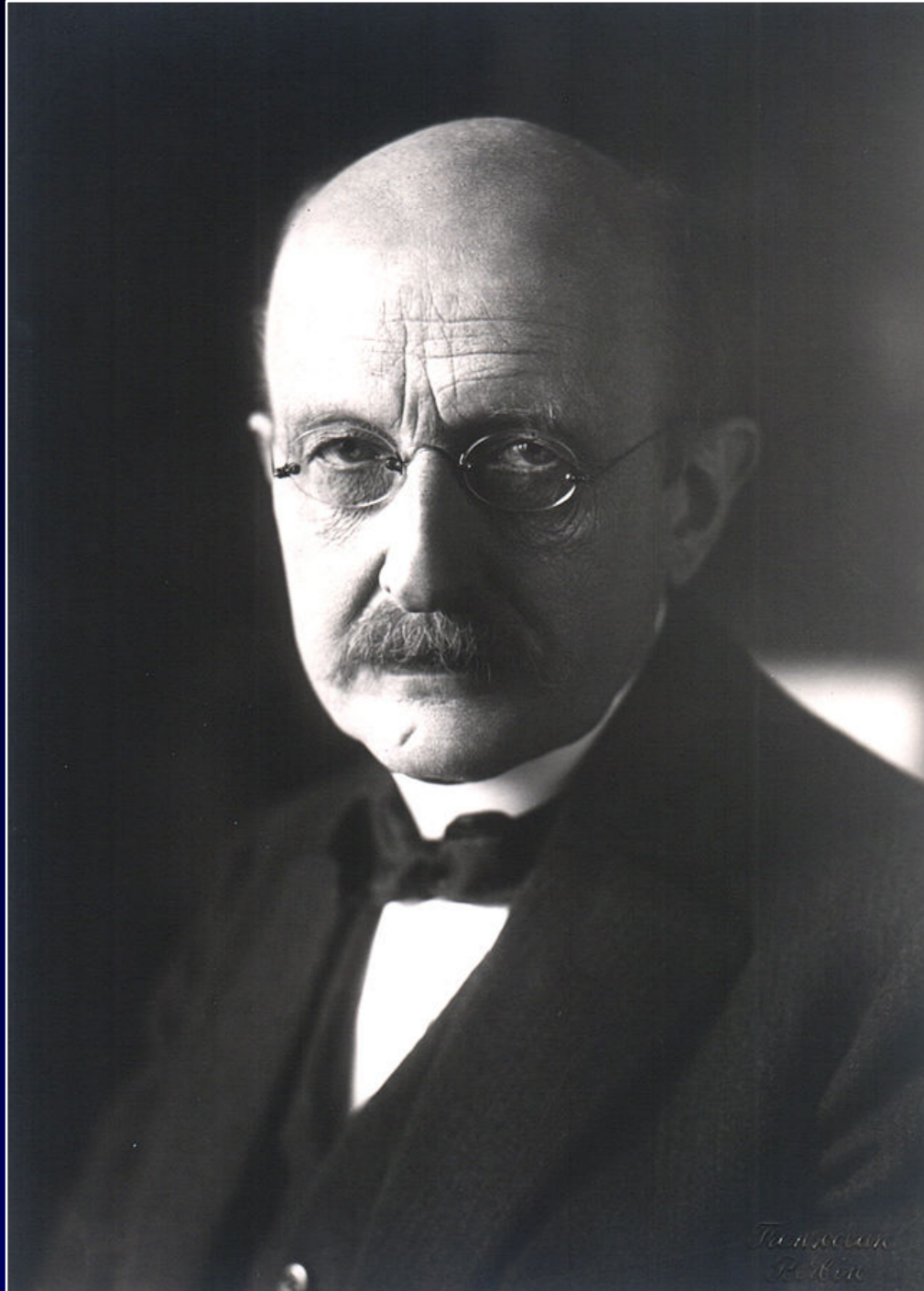
Paper integration. During this phase you cohesively integrate your separately written paragraphs.

Paper evaluation. During this phase the paper should be checked against your requirements, proofread (but not yet “read aloud”), and give to a colleague or friend for top level feedback. Careful consideration should be given before undertaking the revision.

Six Goals of Language in Scientific Writing



Chapter 4: Being Precise



How upset [Max Planck] was
whenever he inadvertently gave out
the wrong information....

Lise Meitner

Precision means choosing the right words and appropriate level of detail

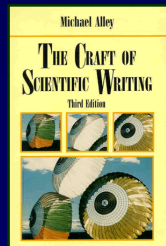
choosing the right word

right word
word
word
word
word
word
word
word
word
word
word
word
word

choosing appropriate level of detail



detail
detail
detail
detail
detail
detail

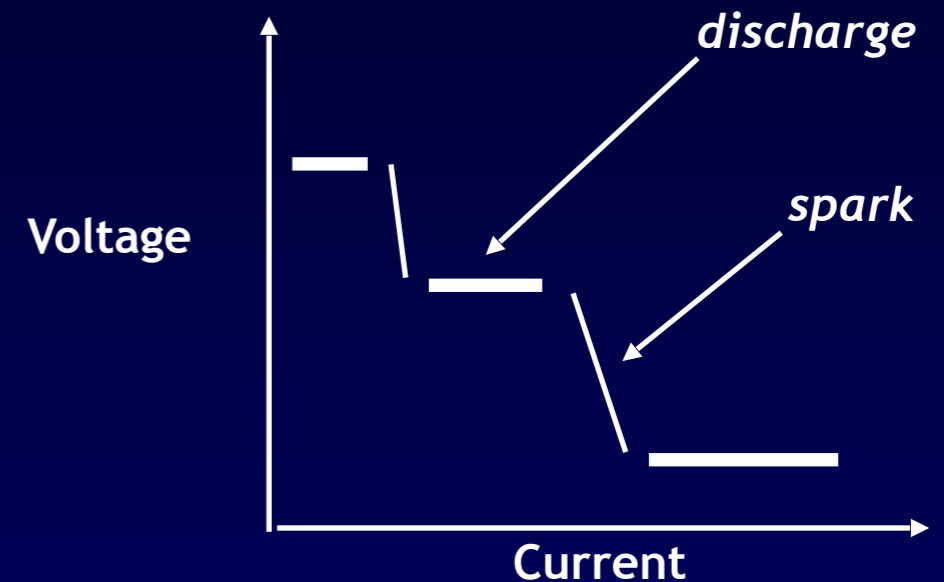


Choose words carefully because many scientific terms have specific meanings

The last decade has seen a rapid development of new techniques for studying the enormously complex phenomena associated with the development of sparks and other gas discharges.

spark: the transient irreversible event from one steady state of the electrical breakdown process to another.

gas discharge: any of the three steady states of the electrical breakdown process.



Another consideration in choosing the correct word is the connotation

Denotation

dictionary
meaning

adequate:
sufficient; enough
for what is required

Connotation

adequate:
sufficient

adequate:
insufficient

suggested meaning

Words have both denotations and connotations

Negative

Neutral

Positive

cheap



inexpensive



cost-effective

strange



unusual

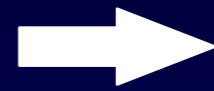


novel

simplistic



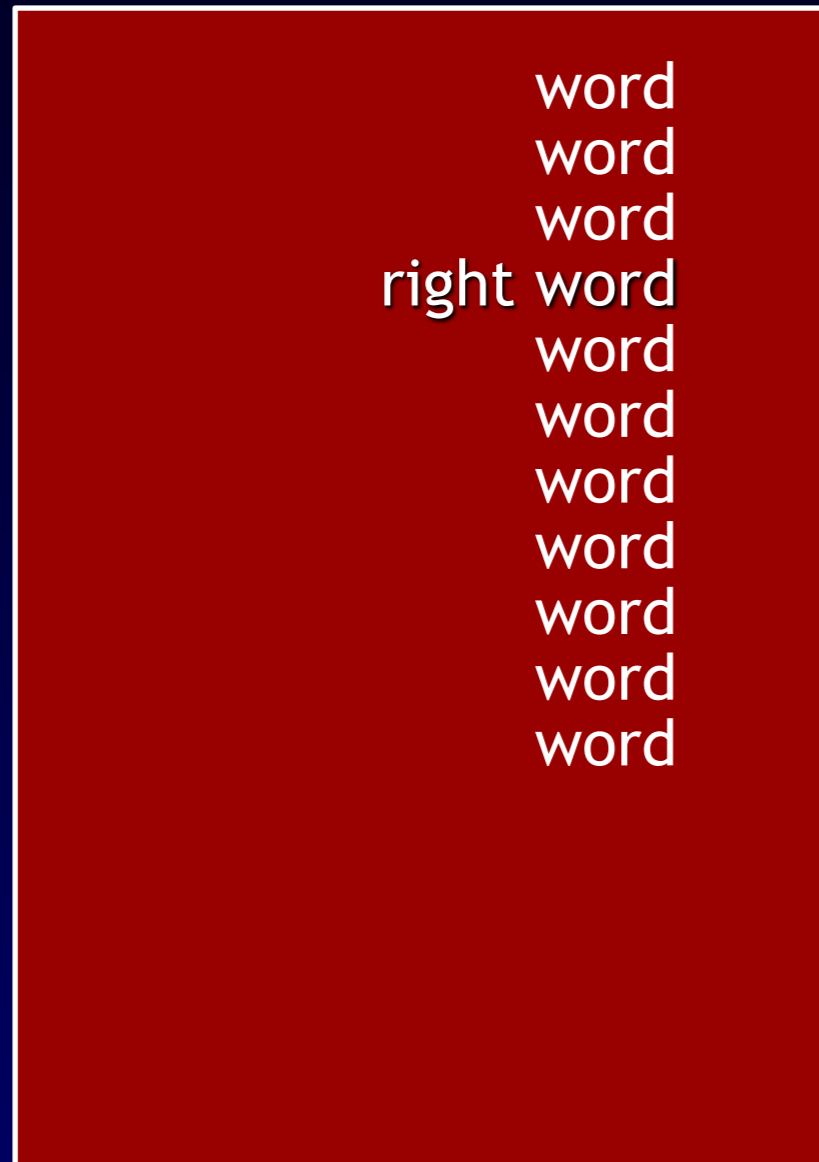
simple



streamlined

Precision means choosing the right words and appropriate level of detail

choosing the right word



choosing appropriate level of detail



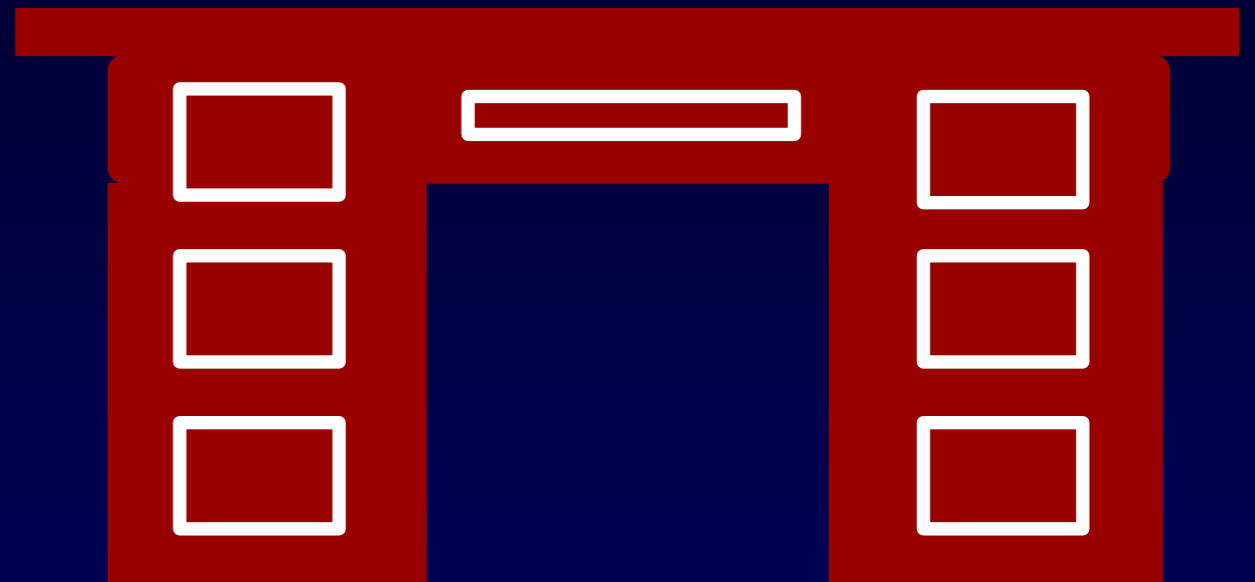
detail
detail
detail
detail
detail
detail

Generalities that are not anchored with specifics are soon forgotten

After recognizing some problems with the solar mirrors, we took subsequent corrective measures.

Trash

After finding that high winds (and not hail) had cracked the ten solar mirrors, we began stowing all mirrors in a horizontal position during thunderstorms.



For precise language, you should avoid over-specifying details

The number of particular hydrocarbon combinations in our study is enormous. For example, the number of possible $C_{20}H_{42}$ is 366,319 and the number for $C_{40}H_{82}$ is 62,491,178,805,831.



The number of hydrocarbon combinations in our study is enormous. For example, the number of possible $C_{40}H_{82}$ is more than 62 trillion.

For precision, you must choose the appropriate level of detail

Operations at the plant stopped momentarily because the thermal storage charging system desuperheater attemperator valve was replaced.



Operations at the plant stopped for 1.5 hours so that a valve in the thermal storage system could be replaced.