

Sentence Structure of Technical Writing

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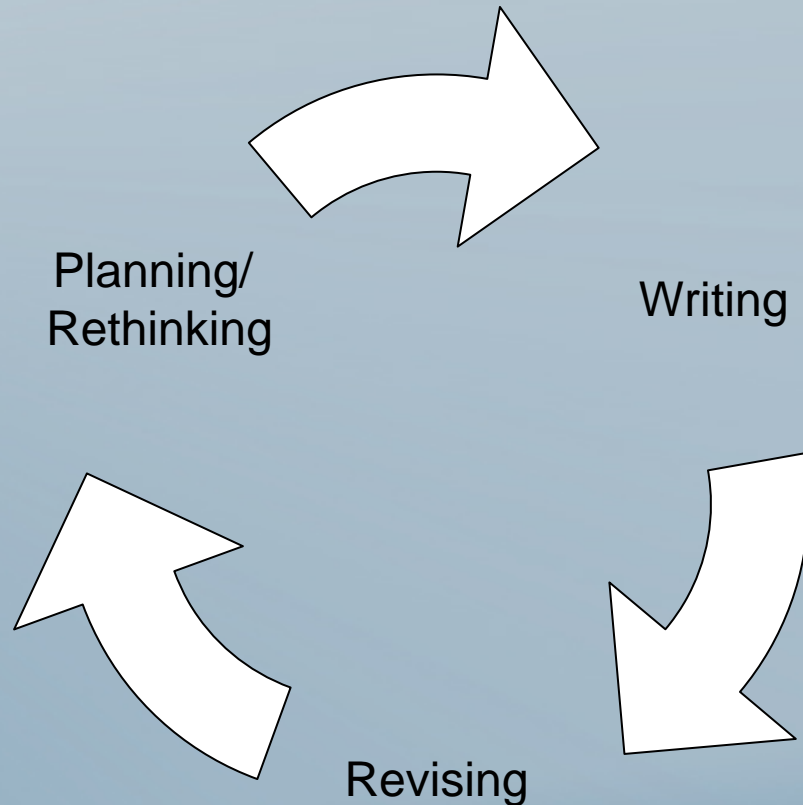
Lecture materials derived from *The Craft of Scientific Writing* © Michael Alley
and “The Science of Scientific Writing” by Gopen and Swan

“The fundamental purpose of scientific discourse is not the mere presentation of information and thought but rather *its actual communication*. It does not matter how pleased an author might be to have converted all the right data into sentences and paragraphs; *it matters only whether a large majority of the reading audience accurately perceives what the author had in mind.*”

--George Gopen and Judith Swan
The Science of Scientific Writing

Good Tech Writers Practice

- Planning
- Clarity
- Brevity
- Simplicity
- Word Choice
- Active Voice
- Committing to Writing as a Process



Planning: Before You Begin

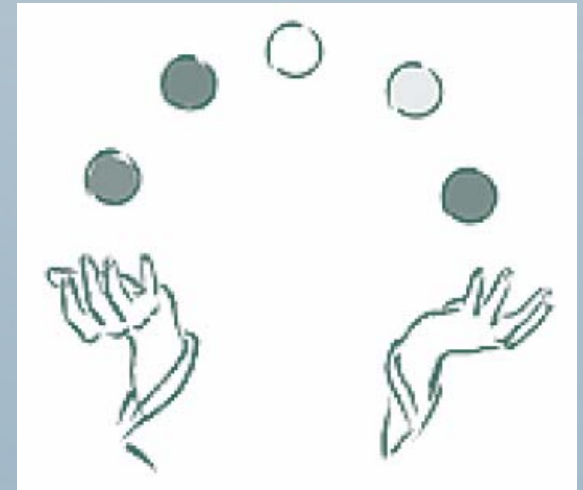
Identify your audience and their expectations

Know your purpose Know your material

Understand the writing task at hand

Organize your thoughts and materials

Budget adequate time to write, review, revise and edit



Clarity: Avoid Jargon

- Jargon: a vocabulary particular to a place of work (*abbreviations, slang*)
- ***Audience familiarity*** with the topic determines appropriate use of jargon

Ex. 1: For the first year, the links with SDPC and the HAC were not connected, and all required OCS input data were artificially loaded. Thus CATCH22 and MERWIN were not available.

Ex. 2: Because some of the links in the computer system were not connected the first year, we could not run all the software codes.

Clarity: Define the Unfamiliar

- If you must abbreviate, define the term in its first occurrence, and ***put abbreviations in parentheses***

Ex: Edgartown Great Pond (EGP) is a vital body of water. Unfortunately, due to an unpredictable influx of saltwater, the delicate ecosystem is in danger of destabilizing.

- ***Italicize first occurrence*** of unfamiliar terms and define them right away

Ex: *Retina* is a light-sensitive tissue, found at the back of the eye, that converts light impulses to nerve impulses.

Brevity: Use Words Efficiently

- ***Never use two words when one word will do.***

Ex. 1: The relationship between the nature of salt water to fresh water in the Edgartown Great Pond that fluctuates often is extremely important to everyone including scientists, residents, and environmentalists on Martha's Vineyard.

Ex. 2: The fluctuating salinity of EGP concerns many environmentalists, scientists, and residents.

Brevity: Less Is More

- ***Pare your language down to the essential message*** you want to get across to your readers:

Ex: Earthquakes can occur at predictable intervals along a given fault segment. Depending on the length and slip in each mainshock, the exact interval can vary by a factor of two. The southern segment of the San Andreas fault has an interval of 145 years, plus or minus a few decades.

Brevity: Most Important First

- Place *key information in the main clause*

Ex. 1: Despite winning the game, the Patriots made several errors in the first half.

Ex. 2: Despite making several errors in the first half, the Patriots won the game.

Ex. 3: The Patriots won the game, despite making several errors in the first half.

Brevity: Remove Redundancy

- ***Combine overlapping sentences*** when possible

Ex. 1: Water quality in Hawk River declined in March. This decline occurred because of the heavy rainfall that month. All the extra water overloaded Tomlin county's water treatment plant.

Ex. 2: Water quality in Hawk River declined in March because heavy rainfalls overloaded Tomlin County water treatment plant.

Simplicity: Use Details Wisely

- Specific details are desirable, but be careful to ***balance detail with audience needs for clarity***—significance is more important.

Ex. 1: The average house in the area has a radon level of 0.4 picocuries per litre.

Ex. 2: The average house in the area has a radon level of 0.4 picocuries per litre, which is considered low by the EPA [Lafavore, 1987]. Levels between 20 and 200 picocuries per liter are considered high, and levels above 200 picocuries per liter are considered dangerous. For reference, the average radon level in outdoor air is about 0.2 picocuries 11
per litre.

Simplicity: Use Details Wisely

- ***Many engineers want to provide as much specific detail as possible, but this can come at the expense of readers understanding*** and their main point

Ex. 1: 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 of $C_{40}H_{82}$ is 62,491,178,805,831.

Ex. 2: The number of hydrocarbon combinations in our study is enormous. For example, the number of possible $C_{40}H_{82}$ is over 60 trillion.

Language: Needless Complexity

Category	Example	Substitute
nouns	utilization functionality	use feature
verbs	facilitate finalize	cause end
adjectives	aforementioned individualized	mentioned individual
adverbs	firstly, secondly, heretofore	first, second previous

Language: Abstraction

- ***Avoid too many abstract nouns***

Ex. 1: The existing nature of Mount St. Helens' volcanic ash spewage was handled through the applied use of computer modeling capabilities.

Ex. 2: With Cray computers, we modeled how much ash spewed from Mount St. Helens.

Language: Needless Words

(already) existing	never (before)
at (the) present (time)	none (at all)
(basic) fundamentals	now (at this time)
(completely) eliminate	period (of time)
(continue to) remain	(private) industry
currently (being)	(separate) entities
(currently) underway	start (out)
(empty) space	write (out)
had done (previously)	(still) persists
introduced (a new)	
mix (together)	

Language: Ambiguity

- Choose words whose meanings are *clear*

Ex. 1: T cells, rather than B cells, appeared as the lymphocytes migrated to the thymus gland.

Ex. 2: T cells, rather than B cells, appeared because the lymphocytes migrated to the thymus gland.

Language: Ambiguity

- ***Order the words*** in your sentences carefully

Ex. 1: In low water temperatures and high toxicity levels of oil, we tested how well the microorganisms survived.

Ex. 2: We tested how well the microorganisms survived in low water temperatures and high toxicity levels of oil.

Language: Ambiguity

- ***Do not overuse pronouns—particularly “it” and “this”—because it is often difficult to identify the antecedent***

Ex: Because the receiver presented the radiometer with a high-flux environment, it was mounted in a silver-plated stainless steel container.

Because **the receiver** presented **the radiometer** with a high-flux environment, it was mounted in a silver-plated stainless steel container.

Language: Weak vs. Strong

- ***Avoid too many “to be” verbs***
“is” “was” “were” “has been” “have been”
- ***Avoid excess words***, which slow comprehension of the main point

made arrangements for	arranged
made the decision	decided
made the measurement of	measured
performed the development of	developed
is working as expected	works as expected

Active Voice: Strong Verbs

- Technical writers want to communicate as efficiently as possible, and ***active voice is more straightforward*** and is stronger than passive voice

Ex 1: The feedthrough was composed of a sapphire optical fiber, which was pressed against the pyrotechnic that was used to confine the charge.

Ex 2: The feedthrough contained a sapphire optical fiber, which pressed against the pyrotechnic that contained the charge.

Active Voice: Natural Sound

- When in doubt, ***read passages out loud*** to determine the natural sound*

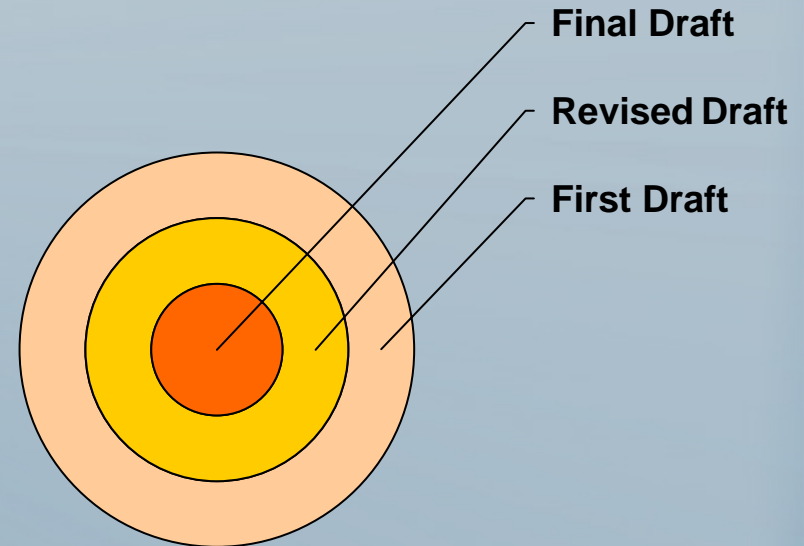
Ex 1: A new process for eliminating nitrogen oxides from diesel exhaust engines is presented. Flow tube experiments to test this process are discussed. A chemical reaction scheme to account for this process is proposed.

Ex 2: We present a new process for eliminating nitrogen oxides from the exhaust of diesel engines. To test this process, we performed experiments in flow tubes. To explain this process, we developed a scheme of chemical reactions.

*always defer to your professor, your journal, or your company style guide for use of “I” and “we” in technical papers

Writing Is a Process

- Good writing doesn't happen overnight; *it requires planning, drafting, rereading, revising, and editing.*
- Learning and improvement requires *self-review, peer-review, subject-matter expert feedback, and practice.*
- There are *no shortcuts*; practice makes perfect!



To summarize

- ***Plan your project before*** you begin drafting.
- ***Understand basic qualities of good technical writing***; use the examples presented to guide you in your writing and revising process.
- ***Good writing is a habit that takes time to develop***; practice makes perfect.

Questions?

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