Scientific Writing 201

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Writing Well for Science

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What will be covered in Lecture 2:

More on structure: Providing transition, depth, and emphasis

How to write with precision and clarity

How to write concisely

How to write smoothly

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Writing Well for Science

Structure: Providing Transition, Depth, and Emphasis

"Science is built up with facts,
as a house is with stones.
But a collection of facts is no more
science than a heap of stones
is a house."

---J. H. Poincare

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Transitions Between Details

1. Between sections:

- **Map the sections**
  Using a list at the end of introduction.

- **Smooth the entrances into sections**
  Avoiding three common beginnings:
  an "empty" beginning,
  a "too specific" beginning,
  and a "too general" beginning.

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Transitions Between Details (cont'd)

2. **Between paragraphs:**

   Do not waste the first sentence to repeat what was said in the previous paragraph.

3. **Between sentences:**

   Finish one thing before starting another. Do not go back and forth.

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Depth of Details

1. **Limited by the length of the article**
   GRL versus JGR

2. **Shown by the lengths of paragraphs and sections**

3. **Shown by repetition, wording, illustration, and placement**

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Emphasis of Details

3. **Shown by repetition, wording, illustration, and placement**

   Repetition: mentioning a particular result in the abstract, result section, and conclusion.

   Wording: using **dependent clauses** and **infinitive phrases**.

   because, since, as, although, when…

   to filter out the high-frequency signal…

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Language: Being Precise

1. Choose the Right Word
affect/effect
farther/further
fewer/less
its/it's

2. Choose the Right Level of Detail

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Denotation and connotation of words

A word's connotation is its associated meanings, which may go against its dictionary meaning.

Examples:

adequate ←→ adequate safety record (insufficient)

cheap (negative connotation) / inexpensive

simplistic (negative connotation) / simple

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Language: Being Clear

Avoid Needless Complexity:

1) Needlessly Complex **Words**

2) Needlessly Complex **Phrases**

  (avoiding stringing modifiers)

3) Needlessly Complex **Sentences**

  (avoiding run-on sentences)

**In scientific writing,
  beauty lies in clarity and simplicity.**

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Needlessly Complex Words

Category	Example	Possible Substitute
nouns	familiarization	**familiarity**
	utilization	**use**
verbs	facilitate	**cause**
	utilize	**use**
adjective	aforementioned	**mentioned**
	discretized	**discrete**
adverbs	firstly, secondly	**first, second**

Hint: Opting for the simpler word choices makes your ideas clear to your readers.

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Avoiding Ambiguity

1) **Ambiguity in Syntax**

   Example:

   During 1990-2000,we used in situ data for our anomaly maps.

   We used in situ data from 1990-2000 for our anomaly maps.

2) **Ambiguity in Pronouns**

   "it" and "this"

3) **Ambiguity in Punctuation**

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Avoiding Ambiguity (cont'd)

3) Ambiguity in Punctuation

Example:

We tested neat methanol, neat ethanol, methanol and 10% water and ethanol and 10% water.

We tested four fuels: neat methanol, neat ethanol, methanol with 10% water, and ethanol with 10% water.

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Language: Being Forthright

Avoid the following phrases:

> As is well known, …
>
> The results clearly demonstrate…
>
> It is obvious …
>
> Our results prove …

Use instead:

> The results show…
>
> Our results support …

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Avoiding Weak Verb Phrases

In general, the smaller the verb phrase, the stronger the verb phrase.

is beginning	→	**begins**
is used to detect	→	**detects**
made the decision	→	**decided**
made the measurement of	→	**measured**

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Language: Being Concise

1. **Eliminate Redundancies**

2. **Minimize "Writing Zeroes"**

3. **Reduce Passive Voices**

4. **Reduce Sentences to Simplest Forms**

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Eliminating Redundancies

A redundancy is a needless repetition of words within a sentence.

(already) **existing**

(alternative) **choices**

at (the) **present** (time)

(completely) **eliminate**

(currently) **underway**

first (began)

introduced (a new)

mix (together)

(most) **critical**

never (before)

(still) **persists**

(very) **unique**

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Minimizing "Writing Zeroes"

It is interesting to note that …

It should be pointed out that …

It is noteworthy that …

Use: Note that …

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Simplifying Phrases

Fat Phrase	Reduction
has the ability to	can
in light of the fact that	because
in the event that	if
in the vicinity of	near
owing to the fact that	because

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Reducing adjectives and adverbs

detailed **understanding of …**

somewhat **unique**

somewhat **perfect**

very **important**

very **heavily depending on …**

Note: Avoid adverbs "always" and "never."

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Language: Being Familiar

1. Avoid Unfamiliar Terms

2. Define Unfamiliar Terms

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Language: Being Fluid

1. Vary **Sentence Rhythm**

2. Vary **Sentence Lengths**

3. Vary **Sentence Structure**

4. Vary **Paragraph Lengths**

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Eliminating Discontinuities

1) **Make Transitions Between Ideas by Using Transitional Words.**

   Continuation: also, moreover, first…second…

   Pause: for instance, for example, in other words

   Reversal: however, on the other hand, conversely, nevertheless

2) **Avoid gaps in logic.**

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How to express numbers:

Avoid beginning a sentence with a numeral.

Example:

64.1 milligrams of copper corroded during the tests.

During the tests , 64.1 milligrams of copper corroded.

Sources:
1. *The craft of scientific writing.* **Michael Alley.**
2. *MLA Handbook for Writers of Research Papers.* **Joseph Gibaldi.**