



# Research Methods in CS

Concision and Simplicity  
in Scientific Writing

## Concision and Simplicity

### Principles:

1. Omit needless words (excessive hedging, ineffectual phrases)
2. Prefer simple words
3. Use simple subjects
4. Use adjectives/adverbs frugally

### Acknowledgement:

- I based these slides mostly on Duke University Graduate School Scientific Writing Resource at <https://cgi.duke.edu/web/sciwriting> (Concision and Simplicity), but I changed several examples to use computing concepts and terminology.

## Principle 1: Omit needless words

### Ineffectual phrases

- Intent to make sentences appear more substantial than they actually are
- But no sentence made more meaningful by their inclusion

### ✘ Examples:

- note that
- it should be noted that
- respectively
- it is important to realize
- so-called

3

## Omit needless words

### Wordy phrases – Multiword phrases that mean nothing beyond a single word

| Instead of                 | Consider         |
|----------------------------|------------------|
| a large number of          | many             |
| due to the fact that       | because          |
| the question as to whether | whether          |
| there is no doubt that     | doubtless        |
| used for testing purposes  | used for testing |
| in a careful manner        | carefully        |
| this is a subject that     | this subject     |
| a large majority of        | most             |
| has a capacity to          | can              |
| whether or not             | whether          |

4

## Omit needless words

| Instead of                           | Consider                        |
|--------------------------------------|---------------------------------|
| are in agreement                     | agree                           |
| prior to                             | before                          |
| subsequent to                        | after                           |
| at this point in time                | now                             |
| in the event that                    | if                              |
| a new initiative                     | an initiative                   |
| nearly unique                        | unique / rare                   |
| plays a key role in                  | is essential to                 |
| both the users were equally affected | the users were equally affected |

5

## Omit needless words

| Instead of               | Consider  |
|--------------------------|-----------|
| adding together          | adding    |
| after the end of         | after     |
| cancel out               | cancel    |
| let us now consider      | consider  |
| divide up                | divide    |
| totally eliminate        | eliminate |
| semantic meaning         | meaning   |
| completely optimized     | optimized |
| separate into partitions | partition |

6

## Omit needless words

- ✘ [118 words] As discussed, the second reaction is really the end result of a very large number of reactions. It is also worth emphasizing that the reactions do not represent a closed system, as  $r$  appears to be produced out of thin air. In reality, it is created from other chemical species within the cell, but we have chosen here not to model at such a fine level of detail. One detail not included here that may be worth considering is the reversible nature of the binding of RNAP to the promoter region. It is also worth noting that these two reactions form a simple linear chain, whereby the product of the first reaction is the reactant for the second.

7

## Omit needless words

- ✓ [92 words] As discussed, the second reaction is really the result of many reactions. The reactions do not represent a closed system, as  $r$  appears to be produced out of thin air. In reality, it is created from other chemical species within the cell, but we have chosen not to model at such a fine level of detail. One detail not included is the reversibility of the binding of RNAP to the promoter. These two reactions form a simple linear chain, whereby the product of the first reaction is the reactant for the second.

8

## Omit needless words

### Revision Technique

- Search for the phrases like the ones listed
- Consider removing or replacing them
- Make sure revision has intended meaning

9

## Principle 2: Prefer simple words

- Never use a complex word when a simple one will do
- Not impressive to use long words—just poor writing
- Choose among alternatives for precise meaning needed

### Methodology vs. method

- Method — a way of doing something
- Methodology — a system of methods followed in a particular discipline

10

## Prefer simple words

### Utilize vs. use, etc.

**Use** — preferred simple word unless nuances meant — use a dictionary or thesaurus to distinguish

**Use** a passive object to accomplish a purpose

**Utilize** something profitably not designed for the purpose

**Employ** person or thing currently idle

**Apply** something general to accomplish a specific, practical result

**Take advantage of (or exploit)** is similar to utilize but maybe more opportunistic or selfish, maybe abusing thing used

11

## Prefer simple words

| Instead of   | Consider   |
|--------------|------------|
| methodology  | method     |
| utilize      | use        |
| elucidate    | show       |
| putative     | (nothing?) |
| etiology     | cause      |
| systematic   | (nothing?) |
| advantageous | helpful    |
| deleterious  | harmful    |
| prescribed   | required   |
| erroneous    | wrong      |

12

## Use simple words

### Revision Technique

- Search for complex words
- Replace if simpler word can convey intended meaning

13

## Principle 3: Use simple subjects

- Scientific writing abounds with complex sentence subjects
- These increase distance between subject (actor) and verb (action) – earlier lecture
- Scientific writers try to cram too much in one sentence
  - define complex abstract entity
  - describe something it does
- Writers should split such “multitasking” sentences into multiple sentences

14

## Use simple subjects

✘ *The sequences that had passed our filtering, trimming, and alignment with ClustalX were scanned for conserved elements across mammals.*

- Long distance between noun and verb
- Many actions hidden in concept nouns (nominalizations)

Revision: divide sentence, use strong verbs in first, summarizing concept noun in second to link back

✔ *The sequences were trimmed, filtered, and aligned with ClustalX. The resulting alignments were scanned for conserved elements across mammals.*

15

## Use simple subjects

### Revision Technique

- Find the subject (actor) and verb in each sentence
- If too far apart, they may have complex subject
- Try simplifying subject, e.g., by dividing sentence in two or eliminating unnecessary modifying clauses
- Consider using summarizing nominalizations (concept nouns) to simplify subject and link back

16



## Principle 4: Use adjectives/adverbs frugally

Often adjectives and adverb modifiers add no meaning

✘ *This method illustrates the frequency of very high-energy collisions.*

Does *very* add anything to sentence?

Can likely distinguish *high-energy* from *low-energy*

But is there a distinction between *high energy* and *very-high-energy* in this context?

If not, then leave out *very*

Many other such uses of adverbs and adjectives

17

## Use adjectives/adverbs frugally

Repetition problem: using two words where one suffices

- Using multiple synonyms together
  - “completely and utterly alone”
  - “completely alone” → “alone”
  - All have same meaning—generally avoid in scientific writing (but might be stylistically useful in popular nonfiction, fiction, poetry)
- Using word implied by another
  - “new invention” → “invention”
  - Invention* implies *new*, so *new* unneeded

18

## Use adjectives/adverbs frugally

### Excessive hedging

- Scientific writers careful about claims, but too many hedges erode confidence
- ✘ *These results suggest that our method may possibly identify putative enhancer elements.* [4 hedges]
- ✓ *Our method identifies enhancers.* [no hedges]
- ✓ *Our method identifies possible enhancers.* [1 hedge]

19

## Use adjectives/adverbs frugally

Demeaning adverbs: using adverbs “obviously”, “clearly”, “undoubtedly”

- Sometimes point confusing to readers, not clear
- Author should work to bridge conceptual gap with readers
- Author should not demean or insult readers

20

## Use adjectives/adverbs frugally

**Self-aggrandizement: describing merits of your own work more than deserved**

- Be positive, avoid hedging, but do not inflate importance or novelty of your own work in scientific writing
- ✘ *Here we describe an exciting new groundbreaking method to ...*
- What about advertising copy?

21

## Use adjectives/adverbs frugally

**Revision Technique**

- Highlight all adjectives and adverbs
- Ask whether each contributes meaningful idea or is clutter
- Search specifically for overused modifiers like "very", "extremely", or "clearly"
- Cut the clutter

22

## Example 1

✘ *These approaches use different kinds of methodology.*

Problems?

- may be pompous sounding
- different kinds of → different
- methodology → methods

Revision:

✓ *These approaches use different methods.*

23

## Example 2

✘ *To identify RNAs associated with each putative RBP, C-terminal tandem affinity purification (TAP)-tagged proteins, expressed under control of their native promoters, were affinity purified from whole-cell extracts of cultures grown to mid-log phase in rich medium.*

Problem: Subject (underlined above) seems too complex, difficult to parse

Revision—rewrite complex subject as intro sentence, make active, fix dangling modifier, omit unneeded words

✓ *To identify RNAs associated with each RBP, we first tagged each RBP using C-terminal tandem affinity purification (TAP) tags, and expressed these proteins under control of their native promoters. We then affinity purified these proteins from whole-cell extracts of cultures grown to mid-log phase in rich medium.*

24

## Example 3

- ✘ We estimated that as much as 12-18% (depending on the tissue) of inter-species differences in gene expression levels might be explained, at least in part, by changes in DNA methylation patterns.

Excessive hedging – 6 hedges underlined

Revision (still has 2 hedges):

- ✓ Differences in DNA methylation could explain 12-18% of differences in gene expression.

25

## Example 4

- ✘ Epigenetic events contribute to the etiology of diabetes; however, the lack of epigenomic analysis has limited the elucidation of the mechanistic basis for this link.

Much simpler revision!

- ✓ Epigenetic problems can cause diabetes, but how?

26

## Exercise 1

(from Zobel, p. 54)

**A well-known method such as the venerable quicksort is a potential practical alternative in instances of this kind.**

27

## Exercise 1

(from Zobel, p. 54)

**✘ A well-known method such as the venerable quicksort is a potential practical alternative in instances of this kind.**

**Are we interested in impractical alternatives?**

**Much simpler revision!**

**✓ A method such as quicksort is a potential alternative.**

28

## Exercise 2

(from Zobel, p. 46)

**We are planning to consider possible options for extending our work.**

29

## Exercise 2

(from Zobel, p. 46)

**✘ We are planning to consider possible options for extending our work.**

**Much simpler revision!**

**✓ We are considering how to extend our results.**

30