SD4H Scientific Writing Course
October 31- November 4, 2022

Revising Content and Structure

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Thursday 3 November 2022

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advancing health worldwide™

Revising

Look closely at *how* your paper says what it has to say.

The message of your paper must be clear (you want to tilt the balance towards acceptance, not rejection, by the journal editor and reviewers.

It's hard work (few can write first drafts in fluent clear prose).

Revising

Takes place on two levels:

1. Content & Structure
2. Prose Structure & Style

Revising: General Points

Expect to work through at least 2 drafts before the final version.

Some authors revise paper content and structure and prose style at the same time.

Probably more efficient to revise content and structure first—why polish the prose style of text that may be discarded later?

Sequence for Revising Content and Structure

1) Write first draft & wait 1-2 weeks before revising content for sequence and structure.
2) Work on 2nd draft, then distribute to coauthors and colleagues willing to offer thorough criticism. Review their recommendations and revise as needed—may entail adding/deleting/revising figures & tables.
3) Work on 3rd draft (same procedure as 2nd).
4) When satisfied with content (more drafts may be needed), move to revising for prose structure and style.

Sequence for Revising Content and Structure

Why wait 1-2 weeks before revising content for sequence and structure?

- familiarity dulls your ability to see defects that others can see
- your co-authors may also be too familiar with your work to pick up defects, especially defects in evidence and interpretation.
- pick some honest friends to be preliminary “peer reviewers” and be open to criticism (hard!)
- you may wish to acknowledge in the paper the help you received from reviewers who are not co-authors—obtain permission to do so.

Goals for Revising Content and Structure

To make sure you've said all that has to be said and no more than is needed for your message to be clear.

To make sure all elements of your paper are in the right sequence and every detail is clear to other readers.

Revising Content and Structure

Be a sharp critic of your paper as you ask yourself the following questions:

1) Is the title accurate, succinct and effective?

Avoid nonspecific openings like “A Study of” or “An Investigation Into” or “A Review of”.

Start with a key word instead, like “Aspirin for Treatment of Headache”.

Revising Content and Structure

2) Does the Introduction make clear the basis for the main question considered, or the hypothesis tested, in the paper? Is that question or hypothesis made clear by the end of the Introduction?

3) Is all of the rest of the text in the right sequence?

- does the Materials and Methods section follow the sequence in which the research was planned and carried out?
- does the Results section parallel the Methods?

Revising Content and Structure

4) Does the Discussion start by answering the question posed at the end of the Introduction and then consider, as necessary, the validity of the evidence supporting that answer (your evidence, then evidence from other studies)?
5) Does it then consider counter-evidence and resolve conflicts in the evidence?
6) Does it discuss limitations?
7) Does it end with a summary paragraph and implication?

Revising Content and Structure

5) Can any of the text be discarded?

- Introductions often explain more than most readers need to know.
- Results sections sometimes present data that have little or nothing to do with the message (question) of the paper.
- Discussions open with restatements of points made in the Introduction or speculate excessively about the study findings, far beyond hypotheses that can be tested in the near future.
- Hard to leave out text you have “sweated over”.
- Readers will not thank you for unneeded text—they will thank you for getting to the point, sticking to the point, and presenting only content directly relevant to that point!

Revising Content and Structure

6) Is any needed content missing?
   6. Your outline may have been defective
   7. Your writing may have been interrupted
   8. You or your co-authors may have found gaps

7) Can you omit any tables or figures?
   6. some data may have little to do with the point of the paper
   7. figures should show what cannot be conveyed in text
   8. can table contents be described in one or two sentences of text?

8) Do data in the text agree with data in the tables & figures? Changes along the way can create a mismatch.

Revising Content and Structure

9) Have you cited unnecessary references or omitted needed references?
   - Cite only references needed to support key statements in the text.
   - Cite one or two complete and reliable sources—no need to give an additional 4-5 to show you are familiar with *all* of the related literature, unless you are writing a review paper.

Revising Prose Structure & Style

"Good prose is like a windowpane."

George Orwell

"Prose is bad when people stop to look at it."

T.E. Lawrence

What you have to say should not be obscured by how you say it.

Edward Huth

A child would describe a cow this way:

A cow is an animal with four legs and horns on its head. Grass goes in at the head, and manure comes out at the tail end.

But something happens to that child when he or she grows up to become a scientist!

Why this?

An appreciation of these aspects is fundamental to an understanding of the natural history of infectious diseases and to the interpretation of the efficacy of new treatment modalities.

Instead of this?

The natural history of infectious diseases must be understood in order to determine whether new treatments are effective.

There is no form of prose more difficult to understand and more tedious to read than the average scientific paper.

~ Francis Crick

The Astonishing Hypothesis, 1994

"Horrendous language offers a formidable barrier to the dissemination and more widespread use of scientific knowledge."

Journals Regularly Plead for Clarity

The infectiousness of pompous prose.
Nature, 1992.

In pursuit of comprehension.
Nature, 1996.

Evidence-based illiteracy: time to rescue "the literature".
The Lancet, 2000.

Compliance (COMmunicate PLease wIth Less Abbreviations, Noun Clusters, and Exclusiveness).
Am. J. Respir. Crit. Care Med., 2002.

Clear as mud.
Nature, 2003.

Why Then Does Pompous Scientific Writing Persist?

1. Bad writing is contagious
2. A “culture” of bad writing tends to be self-perpetuating:
   - It is often seen as a badge of academic credibility to express short simple ideas in long, pondorous phrases.
   - Papers in journals are written badly and aspiring authors are likely to copy the style and write badly themselves.
   - Plain, precise language strikes many scientists as somehow unprofessional.

Clear writing is writing that is incapable of being misunderstood

~ Quintilian, 1rst Century AD

Synonyms for *scientific*, according to Roget's Thesaurus:

–*meticulous*
–*delicate*
–*undeviating*
–*accurate*
–*sensitive*

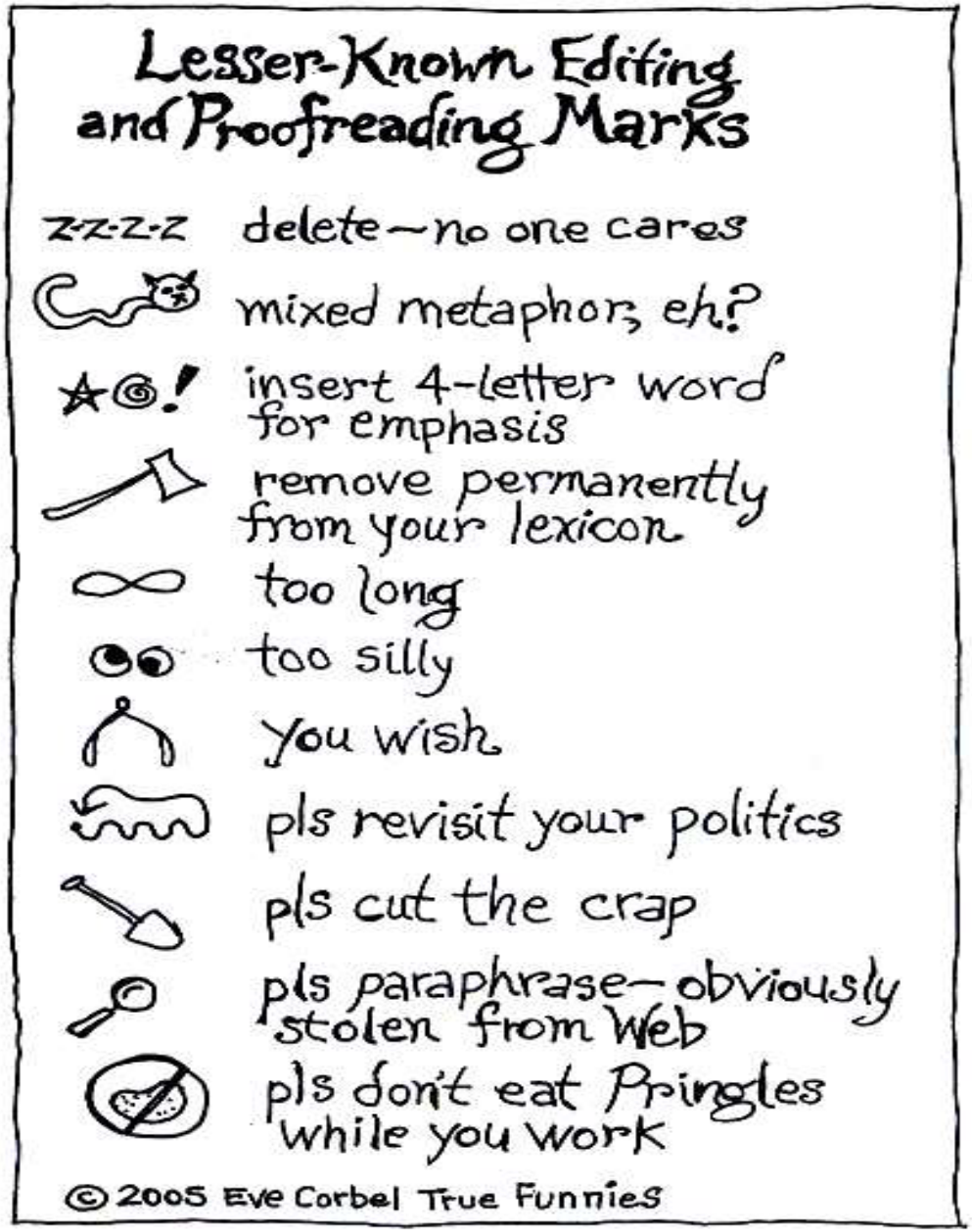
Not listed as synonyms for *scientific:*

- *complicated*
- *contorted*
- *longwinded*

A Clarity Clinic for Scientific Writing

Revising prose structure and style takes place at the level of…

1. the word
2. the sentence
3. the paragraph



Word Choice

Words *in scientific writing should be:*

1. Precise (increase/decrease NOT change; dog, mouse, NOT animal)

2. Simple (prior to→because, following→after, initiate→begin)

3. Necessary (fewer words = less "noise" and more message)

4. Familiar

Do not invent words (endorphinized→injected endorphins)

Avoid jargon

Limit use of abbreviations

5. Humane *(the patient did not fail therapy)*

1. Use Precise Words

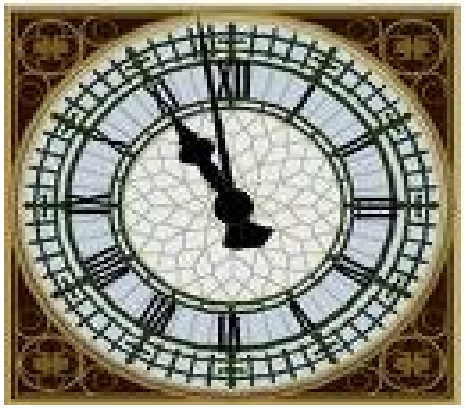
Example

Maximal coronary vasodilation <u>with</u> carbochromen had other effects.

Use Precise Words

Revision

Maximal coronary vasodilation induced by carbochromen had other effects.



Use Precise Words

What do you really mean by "with"?

with—by, when
with—upon
with—resulting in, creating
with—plus, and, containing

Use Precise Words

Example

Renal blood flow was drastically compromised when the aorta was obstructed.

Use Precise Words

Revisions

Renal blood flow was greatly decreased when the aorta was obstructed.

Renal blood flow was reduced by X% when the aorta was obstructed.

2. Use Simple Words

Example

The superiority of this technique has not previously been demonstrated.

Use Simple Words

Revisions

Whether this technique is better is not known.

We are the first to show that this technique is better.

Use Simple Words

- *administer* for *give*
- *demonstrate* for *show*
- *employ or utilize* for *use*
- *encountered* for *found, and*
- *following* for *after*

Find a simple word for…

- *constitutes*
- *represents*
- *exists*
- *serves as*
- *adopt*
- *afford*
- *initiate*
- *initial*
- *elevated*
- *enhanced*

Find a simple word for…

- *encountered*
- *majority*
- *methodology*
- *modality*
- *modify*
- *optimum*
- *paradigm*
- *perform*
- *prior to*
- *superior to*
- *target*
- *visualize*

3. Use Fewer Words

In this example, two empty phrases can be dropped. Can you find them?

In order to get a complete history from the patient, it would appear that the inexperienced clinician needs a systematic line of inquiry.

3. Use Fewer Words

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What words can be cut from these sentences?

The patients were examined on a daily basis.

It is too early to tell if this is the case or not.

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What words can be cut from these sentences?

The patients were examined on a daily basis.

The patients were examined daily.

It is too early to tell if this is the case or not.

It is too early to tell if this is so.

Replace Empty Phrases 1

Find a 1-2 word equivalent:

has the capability to = can
is of the opinion that = we think
was unable to = ?
was applicable to
as a consequence of
accounted for by the fact that
at the present moment
at this point in time
by means of
despite the fact that

Replace Empty Phrases 2

due to the fact that

during the course of

during the time that

for the purpose of

the reason that

give rise to

if conditions are such that

in all cases

in a position to

in a satisfactory manner

Replace Empty Phrases 3

in an adequate manner

in close proximity to

in connection with

in (my, our) opinion it is not an unjustifiable assumption that

in order to

in the event that

in view of the fact that

it is clear that

Replace Empty Phrases 4

it is often the case that

it is possible that the cause is

it is worth pointing out that

it would appear that

it may, however, be noted that

lacked the ability to

numbers of

on account of

on behalf of

on the basis of

Replace Empty Phrases 5

on behalf of

on the basis of

on the grounds that

owing to the fact that

prior to (in time)

referred to as

subsequent to

take into consideration

the question as to whether

through the use of

Replace Empty Phrases 6

was of the opinion that

with a view to

with reference to

with regard to

Replace Empty “Numerical” Phrases

one of the = one

a small number of = ?

a limited number of

a proportion of

a sufficient number of

a number of

a majority of

fewer in number

Omit Entire Phrases

It is important to acknowledge that

It is interesting to note that

It is not impossible that

A not unlikely cause could be that

It may be said that

It is not a large theoretical leap to consider that

It has been reported that…etc etc etc.

What can be cut?

Oxygen uptake in response to drugs was examined and found to vary considerably.

Anesthesia under wartime conditions.

Symptoms of a neurological nature.

What can be cut?

Oxygen uptake in response to drugs was examined and found to vary considerably.

Oxygen uptake varied considerably.

Anesthesia under wartime conditions.

Anesthesia during war.

Symptoms of a neurological nature.

Neurological symptoms.

What can be cut?

inflammatory process

cancer process

birth process

By definition, each of these is already a process, so adding “process” is tautologous.

4. Use Familiar Words

- Few abbreviations
  - Used often enough in the paper so that the reader does not forget the meaning (> 10 X).
  - Readers can handle 2-3 abbreviations per paragraph.
  - Readers won't notice that you write terms out—they'll just have an easier time reading your paper.
  - Standard abbreviations for units of measurement can be used freely.

4. Use Familiar Words

- Abbreviations
  - OK to use:
    - Units of measurement (g, mol, mL)
    - Standard abbreviations
      - Chemicals: DNA, ATP, Tris, HEPES
      - Methods: ELISA, MRI, PCR
      - Diseases: HIV, HPV
    - Very long terms no one can pronounce
      - Tetradecanoylphorbol acetate (TPA)

Use Familiar Words

- Abbreviations

If you are creating "alphabet soup" because you are worried about word limits, remember:

- Many words and whole phrases can be cut!
- The first principle of word choice is clarity.
- Abbreviations definitely detract from clarity.

Use Familiar Words

- Avoid jargon and slang
  - temp, prepped, labs
  - In English, words enter as nouns and leave as verbs (biopsy)
  - That doesn't mean you can make up verbs (spinalized, coverslipped)
- Avoid tired cliches and "admin speak"
  - think outside the box
  - interface, cutting edge

5. Use Humane Words

Example

Four of the patients who failed radiation therapy were placed on a chemotherapy regimen.

Patients should not be blamed if therapy fails.

Use Humane Words

Revision

Four of the patients for whom radiation therapy failed underwent chemotherapy.

Use Humane Words

How would you revise?

Six cases of schistosomiasis were admitted to the clinic within the evaluation period.

Use Humane Words

Revision

Six patients with schistosomiasis were admitted to the clinic within the evaluation period.

Word Choice Exercises

Word Choice Exercises

Precision

Try revising the underlined word in each of the following:

1. Large proportions of even asymptomatic lesions are pre-malignant or malignant.

2. The cells were exposed to lipoprotein-deficient serum for 48 h.

3. In all animals, X was inhibited.

Word Choice Exercises

Revisions

1. Between 3 and 8 percent of asymptomatic lesions are pre-malignant or malignant.

2. The cells were incubated in to lipoprotein-deficient serum for 48 h.

3. In all mice, X was inhibited.

Word Choice Exercises

Simplicity

Try revising the underlined word(s) in each of the following:

1. Blood samples were drawn from the 5 female and 3 male children at 1/2, 1, 2, 3, and 4 h following the initiation of treatment.
2. Once a fistula has been identified, there are several methodologies employed to localize it.
3. It is necessary for us to know who operates on children so we can target our questionnaire accurately.
4. Patients with positive treatment outcomes had an average follow-up time of 24 months.

Word Choice Exercises

Revisions

1. Blood samples were drawn from the 5 girls and 3 boys at 1/2, 1, 2, 3, and 4 h after treatment began.
2. Once a fistula has been identified, there are several ways to localize it.
3. We need to know who operates on children so we can question the right people.
4. Patients who did well? had good outcomes? had an average follow-up time of 24 months.

Word Choice Exercises

Necessity

Try revising the underlined word(s) in each of the following:

1. After 4 h of hemodialysis, we abruptly ended the hemodialysis procedure.

2. Oxygen uptake in response to drugs was examined and found to vary considerably.

3. Spalt genes are expressed in the developing nervous system, however the role of these genes in the development and function of neurons is largely unknown.

Word Choice Exercises

Revisions

1. After 4 h, we abruptly ended the hemodialysis procedure.

2. Oxygen uptake in response to drugs varied considerably.

3. Spalt genes are expressed in the developing nervous system, but their role in the development and function of neurons is largely unknown.