

Undergraduate Research in Ecology and Evolutionary Biology

How to Edit - 1

Editing for Conciseness



Lecture 3: 14 October 2013



Bioe 183 W

Some guidelines for writing and editing

References:

Pechenik: A Short Guide to Writing about Biology (7th edition)

Strunk and White: The Elements of Style (4th edition)

Hofmann: Scientific Writing and Communication Papers, Proposals, and Presentations

EEB Writing Guide (links to it in syllabus, assignment pages)

Editing skills:

1. Details – for clarity, grammar, conciseness
2. Flow – logic, points

Pechenik: A Short Guide to Writing about Biology

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REVISING FOR CONCISENESS

→ Omitting unnecessary words will make your thoughts clearer and more convincing. In particular, such phrases as, "It should be noted that," "It is interesting to note that," and "The fact of the matter is that" are common in first drafts, but should be ruthlessly eliminated in preparing the second. Such verbal excess also takes less conspicuous forms. How might you shorten this next sentence?

Dr. Smith's research investigated the effect of pesticides on the reproductive biology of birds.

The next example requires similar attention:

It was found that the shell lengths of live snails tended to be larger for individuals collected closer to the low tide mark (Fig. 1).

A good editor would eliminate the first phrase of that sentence and prune further from there. In particular, what does the author mean by "tended to be larger"? Here are two improved versions of the sentence:

Live snails collected near the low tide mark had greater average shell lengths (Fig. 1).

Snails found closer to the low tide mark typically had larger shells (Fig. 1).

These and most other wordy sentences suffer from one or several of four major ailments and can be restored to robust health by obeying the corresponding Four Commandments of Concise Writing.

First Commandment: Eliminate Unnecessary Prepositions

Consider this example:

The results indicated a role of hemal tissue in moving nutritive substances to the gonads of the animal.

Any sentence containing such a long string of prepositional phrases—of tissue, in moving substances, to the gonads, of the animal—is automatically a candidate for the editor's operating table. This sentence actually contains a simple thought, buried amidst a clutter of unnecessary words. After surgery, the thought emerges clearly:

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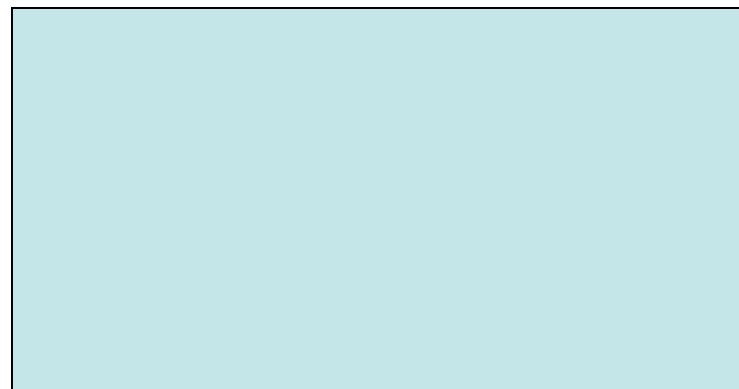
Dr. Smith investigated the effect of pesticides on the reproductive biology of birds.

We have eliminated one word and the sentence has not suffered a bit. Working on the sentence further, we can replace "the reproductive biology of birds" with "avian reproduction," achieving a net reduction of three more words:

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Live snails collected near the low tide mark had greater average shell lengths (Fig. 1).

Than what?

Snails found closer to the low tide mark typically had larger shells (Fig. 1).

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Live snails **collected** near the low tide mark had greater average shell lengths (Fig. 1).

Passive

Snails ^{living} ~~found~~ closer to the low tide mark typically had larger shells (Fig. 1).

Active

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Common unnecessary phrases

Avoid:

The question as to whether

There is no doubt but that

Used for fuel purposes

He is a man who

In a hasty manner

This is a subject that

Their result is a strange one

The reason why is that

Use:

whether

no doubt (doubtless)

used for fuel

he

hastily

this subject

their result is strange (or, their strange result)

because

“the fact that”

Owing to the fact that

In spite of the fact that

Call your attention to the fact that

I was unaware of the fact that

because

though (although)

remind you

I was unaware that

But the most overused and superfluous word is “the”...you can often delete “the” from a sentence (especially at the beginning) with no loss of information.

Hemal tissue moved nutrients to.....

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The results indicated that hemal tissue moved nutrients to the animal's gonads.

Here is another example:

The cells respond to foreign proteins by rapidly dividing and starting to produce antibodies reactive to the protein groups that induced their production.

The reader's head spins, an effect avoided by this more concise incarnation of the same sentence:

In the presence of foreign proteins, the cells divide rapidly and produce antibodies against those proteins.

By eliminating prepositions, "Gould arrives at the conclusion that . . ." becomes "Gould concludes that . . .". "Grazing may constitute a benefit to . . ." becomes "Grazing may benefit . . .". "These data appear to be in support of the hypothesis that . . ." becomes "These data appear to support the hypothesis that . . .", and "Schooling of fish is a well documented phenomenon" becomes "Fish schooling is well documented."

Second Commandment: Avoid Weak Verbs

Formal scientific writing is often confusing—and boring—because the individual sentences contain no real action; commonly, the colorless verb *to be* is used where a more vivid verb would be more effective, as in this example:

The fidelity of DNA replication is dependent on the fact that DNA is a double-stranded polymer held together by weak chemical interactions between the nucleotides on opposite DNA strands.

What is 1) weak and 2) unnecessary?

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The fidelity of DNA replication is dependent on the fact that DNA is a double-stranded polymer held together by weak chemical interactions between the nucleotides on opposite DNA strands.

This patient suffers from Wimpy Verb Syndrome, with a slight touch of Excess Prepositional Phrase. There is *potential* action in this sentence, but it is sound asleep in the verb "is dependent." Converting to the stronger verb "depends," we read,

The fidelity of DNA replication depends on the fact that DNA is a double-stranded polymer. . . .

But why stop there? Let's eliminate some clutter ("on the fact that") and another weak verb ("is"):

The fidelity of DNA replication depends on DNA being a double-stranded polymer. . . .

Similarly,

Plant vascular tissues function in the transport of food through xylem and phloem.

can be enlivened by converting the phrase "function in the transport of" to the more vigorous verb "transport":

Plant vascular tissues transport food through xylem and phloem.

Note that by choosing a stronger verb, we have also eliminated two prepositional phrases ("in the transport of" and "of food"). Step by step, the sentence becomes shorter and clearer. As often happens during revision, fixing one problem reveals an additional problem, in this case a fundamental structural weakness that makes the reader wonder whether the student understands the relationship between "plant vascular tissues" and "xylem and phloem." Revising now for content, we might rewrite the sentence as

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Plant vascular tissues (the xylem and phloem) transport nutrients throughout the plant.

or

Plants transport nutrients through their vascular tissues, the xylem and phloem.

Third Commandment: Do Not Overuse the Passive Voice

Use active voice as much as possible

The passive voice is often a great enemy of concise writing, in part because the associated verbs are weak. If the subject (rats and mice, in the following example) is on the receiving end of the action, the voice is passive:

Rats and mice were experimented on by him.

If, on the other hand, the subject of a sentence ("He," in the coming example) is on the delivering end of the action, the voice is said to be active:

He experimented with rats and mice.

Note that the "active" sentence contains only six words, while its "passive" counterpart contains eight. In addition to creating excessively wordy sentences, the passive voice often makes the active agent anonymous, and a weaker, sometimes ambiguous sentence may result:

Once every month for two years, mussels were collected from five intertidal sites in Barnstable County, MA.

Whom should the reader contact if there is a question about where the mussels were collected? Were the mussels collected by the writer, by fellow students, by an instructor, or by a private company? Eliminating the passive voice clarifies the procedure:

Once every month for two years, members of the class collected mussels from five intertidal sites in Barnstable County, MA.

Similarly, "It was found that" becomes "I found," or "we found," or, perhaps, "Smith (1986) found." Whenever it is important, or at least useful, that the reader know who the agent of the action is, and whenever the passive voice makes a sentence unnecessarily wordy, use the active voice:

Passive: Little is known of the nutritional requirements of these animals.

Active: We know little about the nutritional requirements of these animals.

Passive: The results were interpreted as indicative of . . .

Active: The results indicated . . . **or: I showed that**

Passive: In the present study, the food value of seven diets was compared, and the chemical composition of each diet was correlated with its nutritional value.

Active: In this study, I compared the food value of seven diets and correlated the chemical composition of each diet with its nutritional value.

Note in this last example that it is perfectly acceptable to use the pronoun *I* in scientific writing; switching to the active voice expresses thoughts more forcibly and clearly and often eliminates unnecessary words.

Fourth Commandment: Make the Organism the Agent of the Action

Note this example:

Studies on the rat show that the activity levels vary predictably during the day (Hatter, 1976).

EEB wants you to: use active voice and first person as much as possible.

Sometimes, use of passive voice is needed for clarity – and to break up a string of sentences that start I did ... ‘.

Be aware of the voice you use in each sentence and why you might want to use active or passive in particular circumstances.

—→ Why??

The active voice is **direct** (performer–verb–receiver), vigorous, clear, and concise. The reader **knows** who is responsible for the action.

The passive voice is **indirect** (receiver–verb–performer) and can be weak, awkward, and wordy.

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Studies on the rat show that the activity levels vary predictably during the day (Hatter, 1976).

This is not a terrible sentence, but it can be improved by moving the action from the studies ("Studies show") to the organism involved, the rat:

Rats vary their activity levels predictably during the day (Hatter, 1976).

The revised sentence is shorter, clearer, and more interesting because now an organism is *doing* something. Along the way, a prepositional phrase ("on the rat") has vanished. Alternatively, one could include the researcher in the action:

~~Hatter (1976) showed that rats vary their activity levels predictably during the day.~~

Similarly, redirecting the action transforms

Increases in salinity increased larval growth rates in Experiment I, but not in Experiment II.

into

Larvae grew faster at higher salinities in Experiment I, but not in Experiment II.

Be a person of few words; your readers will be grateful.

REVISING FOR FLOW

A strong paragraph—indeed, a strong paper—takes the reader smoothly and inevitably from a point upstream to one downstream. Link your sentences and paragraphs using appropriate transitions, so that the reader moves effortlessly and inevitably from one

thought to the next, logically and unambiguously. Minimize turbulence. Always remind the reader of what has come before, and help the reader anticipate what is coming next. Consider the following example:

Since aquatic organisms are in no danger of drying out, gas exchange can occur across the general body surface. The body walls of aquatic invertebrates are generally thin and water permeable. Terrestrial species that rely on simple diffusion of gases through unspecialized body surfaces must have some means of maintaining a moist body surface, or must have an impermeable outer body surface to prevent dehydration; gas exchange must occur through specialized, internal respiratory structures.

This example gives the reader a choppy ride indeed, and cries out for careful revision, not of the ideas themselves but of the way they are presented. In the following revision, note the effect of two important transitional expressions, *thus* and *in contrast to*. The first connects two thoughts, while the second warns the reader of an approaching shift in direction.

Since aquatic organisms are in no danger of drying out, gas exchange can occur across the general body surface. Thus, the body walls of aquatic invertebrates are generally thin and water-permeable, facilitating such gas exchange. In contrast to the simplicity of gas exchange mechanisms among aquatic species, terrestrial species that rely on simple diffusion of gases through unspecialized body surfaces must either have some means of maintaining a moist body surface, or

REVISING FOR GRAMMAR AND PROPER WORD USAGE

Appendix C (p. 229) lists a number of books that include excellent sections on grammar and proper word usage. While on the lookout for sentence fragments, run-on sentences, faulty use of commas, faulty parallelism, incorrect agreement between subjects and verbs, and other grammatical blunders, you should also be on the lookout for violations of seven especially troublesome rules of usage when revising your work:

- 1. *between/among*. *Between* (from *by twain*) usually refers to only two things:

The 20 caterpillars were randomly distributed between the two dishes.

Among usually refers to more than two things:

The 20 caterpillars were randomly distributed among the eight dishes.

- 2. *which/that*. Most of your *which*'s should be *that*'s.

This fish, which lives at depths up to 1000 m, experiences up to 100 atmospheres of pressure.

A fish that lives at a depth of 1000 m is exposed to 100 atmospheres of pressure.

In the first example, *which* introduces a non-defining, or non-restrictive clause. The introduced phrase is, in effect, an aside, adding extra information about the fish in question; the sentence would survive without it. On the other hand, the *that* of the second example introduces a defining, or restrictive clause;

we are being told about a particular fish, or type of fish, one that lives at a depth of 1000 m.

Improper use of *that* and *which* can occasionally lead to ambiguity or falsehood. Consider the following sentence about the production of proteins from messenger RNA (mRNA) transcripts:

This difference in protein production is due to different amounts of mRNA that translate and produce each particular protein.

Here, *that* correctly introduces a restrictive clause: Which mRNA molecules? The ones coding for these particular proteins. The writer is telling us that proteins are produced in proportion to the number of mRNA molecules coding for them within the cell. Replacing "that" with "which" drastically changes the meaning of the sentence:

The difference in protein production is due to different amounts of mRNA, which translates and produces each particular protein.

The sentence has lost clarity, because *which* now introduces a non-defining clause that should be explaining only what mRNA does, in general. In the following sentence, using the word *which* conveys information that is actually wrong.

In squid and other cephalopods, which lack external shells, locomotion is accomplished by contracting the muscular mantle.

Here, the writer asserts that no cephalopods have external shells, which is not the case; some species *do* have external shells. The correct word is *that*:

In squid and other cephalopods that lack external shells . . .

Now the writer correctly refers specifically to those cephalopods with external shells.

As in the examples given, *which* is commonly preceded by a comma. When deciding between *which* and *that* in your own writing, read your sentence aloud. If the word doesn't need a comma before it for the sentence to make sense, the correct word is probably *that*. If you hear a pause when you read, signifying the need for a comma, the correct word is probably *which*.

- 3. *its/it's*. *It's* is always an abbreviated form of *it is*. If *it is* does not belong in your sentence, use the possessive pronoun *its*.

When treated with the chemical, the protozoan lost its cilia and died.

It's clear that the loss of cilia was caused by treatment with the chemical.

While we're at it, let's revise that last sentence to eliminate the passive voice:

It's clear that treatment with the chemical caused the loss of cilia.

In general, contractions are not welcome in formal scientific writing. Thus, you can avoid the problem entirely by writing *It is* when appropriate:

It is clear that treatment with the chemical caused the loss of cilia.

- 4. *effect/affect*. *Effect* as a noun refers to a result or outcome:

What is the effect of fuel oil on the feeding behavior of sea birds?

Effect as a verb means *to bring about*:

What changes in feeding behavior will fuel oil effect in sea birds?

Affect as a verb means *to influence* or *to produce an effect upon*:

How will the fuel oil affect the feeding behavior of sea birds?

Used as a verb, *effect* can indeed be replaced in the above example by *bring about*, but not by *influence*; and *affect* can indeed be replaced by *influence*, but not by *bring about*. Even so, memorizing the definitions of the two words may be of little help in deciding which word to use in your own writing since, as verbs, *affect* and *effect* are so similar in meaning. You may be more successful in choosing the correct word by memorizing each of the above examples and then comparing the memorized examples with your own sentences.

- 5. *i.e./e.g.* These two abbreviations are not interchangeable. *I.e.* is an abbreviation for *id est*, which in Latin, means *that is* or *that is to say*. For example,

Data on sex determination suggest that this species has only two sexual genotypes, i.e., female (XX) and male (XY).

The embryos were undifferentiated at this stage of development; i.e., they lacked external cilia and the gut had not yet formed.

In contrast, *e.g.* stands for *exempli gratia*: *for example*. I will give two examples of its use:

During the precompetent period of development, the larvae cannot be induced to metamorphose (e.g., Crisp, 1974; Bonar, 1978; Chia, 1978; Hadfield, 1978).

However, the larvae of several butterfly species (e.g., Papilio demodocus Esper, P. eurymedon, and Pieris napi) are able to feed and grow on plants that the adults never lay eggs on.

In the first case, the writer uses *e.g.* to indicate that what follows is only a partial listing of references supporting the statement: "for example, see these references," in other words. In the second case, the writer indicates that she gives only a partial list of butterfly species that don't lay eggs on all suitable plants.

- 6. *However, therefore, moreover.* These words are often incorrectly used as conjunctions, as in the following examples:

The brain of a toothed whale is larger than the human brain, however the ratio of brain to body weight is greater in humans (Table 4).

The resistance of mosquito fish (Gambusia affinis) to the pesticide DDT persisted into the next generation bred in the laboratory, therefore the resistance was probably genetically based.

Protein synthesis in frog eggs will take place even if the nucleus is surgically removed, moreover

the pattern of protein synthesis in such enucleated eggs is apparently normal.

These examples all demonstrate the infamous comma splice, in which a comma is mistakenly used to join what are really two separate sentences. Reading aloud, you should hear the material come to a complete stop before the words "however," "therefore," and "moreover." Thus, you must replace the commas with either a semicolon or a period, as in these revisions of the first example:

The brain of a toothed whale is larger than the human brain; however, the ratio of brain to body weight is greater in humans.

The brain of a toothed whale is larger than the human brain. However, the ratio of brain to body weight is greater in humans.

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- 7. And don't forget: *The data are . . .* (see page 11).