

Revising sentences for clarity

Key points:

- Academic style is hard to interpret
 - Subjects and verbs don't tell you what's happening
 - Extra words
 - Monotonous
- How to simplify academic style: paramedic method
 - Underline or highlight the forms of "is" —are, is, was, were, be, being, been—these sentences likely need revision
 - Find the action and make it the verb
 - Don't have to eliminate every "is" —only those that aren't necessary
- Alternative approach
 - Make the topic of the story the subject
 - Determine what it does in the sentence and make that the verb
- Last step: boil it down
 - Replace wordy phrases with single words and complex words with simple ones
 - Eliminate redundancy
- Use specific words

We've so far covered whole documents, sections, paragraphs, and sentences in relation to those before and after them; this final lesson considers sentences individually—how well each one conveys its idea. Sentence clarity comes last in the series not because it's less important than other topics—it isn't. No matter how well organized a piece of writing is, it might still be difficult to understand if the structure of the sentences obscures its meaning. This topic follows the others simply because the other types of revision will likely lead to re-writing of sentences, so revising sentences for their own messages saves you from having to do so multiple times. Nonetheless, composing the sentences in early drafts so that they say directly what you mean will save you from having to revise every sentence later, so these lessons could just as easily go in the reverse order.

Academic style

This typical example illustrates the sort of sentence structure that makes deciphering the meaning of each sentence more difficult than necessary:

Example part 1: academic style

Many diseases, and cancer in particular, are a consequence of alterations in gene expression patterns leading to deranged biological functions in cells. In cancer, studies over the last four decades have clearly shown that genetic mutations alter the expression and/or function of genes, and that these mutations are a primary molecular mechanism driving the cancer

phenotype. More recently, it has become clear that, in addition to DNA sequence mutations, epigenetic alterations can also lead to changes in gene expression in cancers, as well as in other diseases. There is a growing understanding that the epigenome is widely perturbed in most cancers, raising questions about which of the hundreds to thousands of epigenetic alterations are functionally important in cancer. Fundamental questions now being raised are centered on determining how many of the global epigenetic alterations are pathogenic versus how many are simply an indirect consequence of other molecular events in the tumor cells. In order to understand the role of epigenetic regulation and deregulation in disease, mouse models have been developed (or are being developed) to provide systems in which to assess the effect of epigenetic gene regulation on cell behavior and disease states.

Conerly M and Grady WM, "Insights into the role of DNA methylation in disease through the use of mouse models," *DMM* May/June 2010

This is a unified, logically organized paragraph, and the sentences in it are perfectly grammatical, and all of the words in them are used correctly. Nonetheless, you likely got to the end of it and weren't quite sure what the point was, other than something about cancer and epigenetics. Or, you might have spent a minute or so on each sentence, only to reach the end and realize that this simply introduces a subject in a standard funnel fashion.

Uninformative subjects and verbs in academic style

We can determine why understanding the paragraph is difficult by analyzing the sentence structure. Let's pare them down to subjects, verbs, and objects:

Example part 2: subjects and verbs

Diseases...are a consequence
Studies...have shown
It has become clear
There is an ... understanding
Fundamental questions... are centered
Mouse models have been developed

We can see that the last sentence is an outlier—we can get information from just the pared-down version. In all of the others, however, the subject is vague—either something nonspecific, like "studies," or a pronoun—and the verb doesn't tell us anything either. Even if the verb is something other than a conjugation of "to be," it's not something we could see or feel.

Further, if we consider the purpose of the remaining portion of each sentence, we notice that many of the words aren't all that necessary. Some of them don't really convey information that couldn't be found elsewhere or easily inferred. For example, "primary molecular mechanism" mostly serves as a way to get to "cancer." Such extra phrases can get in the way of the sentence's message—since this one adds words between the subject and what it does (drive cancer), it's harder to see the connection.

→ *Words that don't add meaning obscure the point of the sentence*

Monotony in academic style

A final reason that some of these sentences are difficult to decipher is the way they sound. A high ratio of prepositions to total words makes a sentence sound like this:

Example part 3: list of prepositional phrases

Many diseases, and cancer
in particular,
are a consequence
of alterations
in gene expression patterns leading
to deranged biological functions
in cells.

Each preposition breaks the sentence into a series of short phrases, which makes it sound like a list. A list conveys information, but doesn't directly convey an idea; the reader has to determine the relationships among the items. Further, since the list includes so many similar items, it's hard to figure out which one matters most—they all sound the same. This structure also makes the writing feel monotonous, which makes it harder for the reader to stay interested; even as she reads, she might not really pay attention.

→ *A high proportion of prepositions makes a sentence sound like a list*

How to revise sentences for clarity

There are so many ways that this sentence structure works against reader understanding that converting the sentences into a better format likely seems daunting. However, applying a simple, stepwise approach can vastly improve sentence clarity (it's called the paramedic method, and is explained and justified in detail in the book *Revising Prose* by Richard Lanham):

- 1) Underline or highlight the forms of "is"—are, is, was, were, be, being, been [helps identify which sentences need revision]
- 2) Find the action in each sentence
- 3) Identify the actor for that action, if there is one

Let's pause here to illustrate how to apply the first few steps using the example paragraph. I've highlighted "is" forms in yellow, the action in green, and the actor in pink:

Example part 4: identifying the action and the actor

Many diseases, and cancer in particular, are a consequence of alterations in gene expression patterns leading to deranged biological functions in cells. In cancer, studies over the last four decades have clearly shown that genetic mutations alter the expression and/or function of genes, and that these mutations are a primary molecular mechanism driving the cancer phenotype. More recently, it has become clear that, in addition to DNA sequence mutations, epigenetic alterations can also lead to changes in gene expression in cancers, as well as in other diseases. There is a growing understanding that the epigenome is widely perturbed (no actor) in most cancers, raising questions about which of the hundreds to thousands of epigenetic alterations are functionally important in cancer. Fundamental questions now being

raised are centered on determining (no actor) how many of the global epigenetic alterations are pathogenic versus how many are simply an indirect consequence of other molecular events in the tumor cells. In order to understand the role of epigenetic regulation and deregulation in disease, mouse models have been developed (or are being developed) to provide systems in which to assess the effect of epigenetic gene regulation on cell behavior and disease states.

This example illustrates that the real action in a sentence where the verb is “is” or “are” is often not a verb at all. You might wonder how to identify the action in such cases—how did I determine that “consequence” and “pathogenic” should become verbs in the revision? They each express the key relationship between the grammatical subject and the rest of the sentence. Another way to think about this is to think a step ahead—come up with a verb that would convey the same meaning without using “is” or “are.” In this approach, whatever word gives you the best idea of what the verb should be is the one that tells you the action.

As you may have noticed, some sentences don’t include the actor responsible for the action. This often happens because the identity of the actor can’t be identified or isn’t important to the meaning of the sentence. For example, in “the epigenome is widely perturbed,” the author doesn’t say by what perturbs the genome because it either isn’t known or it’s a complex process that would be impossible to convey in a phrase. For the other action without an actor (“determining how many of the global alterations...”), it’s omitted because it would be something vague like “cancer researchers” or “current investigations,” which doesn’t help the reader understand anything about epigenetics and cancer. In either case, our revision won’t have an actor either.

Now we can move on to the next step. In those sentences that don’t yet follow this rule:

4) Put the action in the verb

By “put the action in the verb,” I don’t necessarily mean that you must put the verb in the active voice—grammatical structure isn’t as important as using the verb to express something important. The verb includes more than just the one word that’s conjugated, so a passive verb can express action—it’s just described in reverse. In cases where the actor is unknown or unimportant, you would need a passive construction.

Example part 5: revision for action

Alterations in gene expression patterns cause deranged biological functions in cells, which results in disease, cancer in particular. In cancer, genetic mutations alter the expression and/or function of genes, driving the cancer phenotype. In addition to DNA mutations, epigenetic alterations also change gene expression in cancer, as well as in other diseases. The epigenome is widely perturbed (no actor) in most cancers, raising questions about which of the hundreds to thousands of epigenetic alterations contribute to cancer. How many of the global epigenetic alterations cause disease versus how many simply result indirectly from other molecular events in the tumor cells remains to be determined (no actor). In order to understand the role of

epigenetic regulation and deregulation in disease, **mouse models** have **been developed** (no actor) (or are being developed) to provide systems in which to assess the effect of epigenetic gene regulation on cell behavior and disease states.

You probably noticed how much shorter the more direct version is, but even more importantly, making the actor the subject has made the subjects of several clauses match. Now, “epigenetic alterations,” the topic of the review, is clearly the subject of the story, rather than “diseases” or “studies.” However, you might think that making the topic the subject has eliminated some meaning from the original, since we no longer have the contrast between “over the last four decades” and “more recently.” But how important is the period of time over which mutations and cancer have been studied? The point is that the connection between the two is well-established, which the revised version implies—if you can state it without conditionals, it must be relatively certain. The recentness of epigenetics’ link to cancer is less clear from our revision, but we can restore it without making the sentence about something else: “Epigenetic alterations have also recently been shown to change gene expression in cancer.”

→ *Making the actor the subject makes subjects more similar throughout the paragraph—makes clear what the story’s about*

Use judgment about “is”

This choice would introduce another “is” to the paragraph, which still contains two. This seems to indicate a failure to follow the method—if we highlight all of the “is”es, then shouldn’t we get rid of all of them? (You might also remember from previous writing instructors that the active voice is better than the passive, and all of those “is”es are part of passive constructions.) Simply, no—the goal of this revision is to eliminate only those “is”es that are unnecessary and get in the way of the sentence’s message. In at least two cases, an “is” can make a sentence or paragraph better: when the actor is irrelevant to the message and the overall story (as in the example and in methods sections²), and when this allows a logical order of information. A logical order (see the lesson 12, “Revising sentence structure for coherence”) places information previously introduced at the beginning of the sentence so that it provides context for new information.

→ *“Is” is only bad when it keeps the action out of the verb or puts old information at the end of a sentence*

Since putting the action in the verb results in making the topic of the story the subject of the sentence, this reveals another approach to making sentences more direct. If you find identifying the action difficult (and sometimes it’s very difficult—some sentences may not even have any action), consider looking for the term most closely related to the topic of the paragraph and determining what it does in the sentence. This will tell you what the verb would be to make clear what the action is.

→ *Alternative to finding the action: find the actor*

Reduce fluff

This revision is much clearer, but we still have some words and phrases that don't tell us anything. This brings us to:

5) Boil it down. (In Strunk and White's words, "Omit needless words.")

Look for wordy phrases or unnecessarily complex words that mean the same thing as a single or shorter word, and replace them (for a list of wordy phrases, see http://writing.wisc.edu/Handbook/CCS_wordyphrases.html). Further, if any part of a sentence says the same thing as another part of that sentence or an adjacent sentence, or if any part says something implied by the rest, cut it. Applying this to the example, we can eliminate several words and phrases:

Example part 5: revision for conciseness

Alterations in gene expression patterns cause deranged biological functions in cells, which results in disease, cancer in particular. In cancer, genetic mutations alter the expression and/or function of genes, ~~driving the cancer phenotype~~. In addition to DNA mutations, epigenetic alterations have also recently been shown to change gene expression in cancer, ~~as well as in~~ **and** other diseases. The epigenome is widely perturbed in most cancers, raising questions about which of the hundreds to thousands of epigenetic alterations contribute to cancer. How many of the global epigenetic alterations cause disease versus how many simply result indirectly from other ~~molecular~~ events in the tumor cells remains to be determined. In order to understand the role of epigenetic regulation ~~and deregulation~~ in disease, mouse models have been developed (or are being developed) ~~to provide systems in which~~ to assess the effect of epigenetic ~~gene~~ regulation on cell behavior and disease states.

Explanation of final revision

These edits may seem overzealous, but all deleted items are either redundant or fluff. For example, "to provide systems in which" adds no meaning at all, since the "systems" are "mouse models," which are already in the sentence³. Further, these prepositional phrases add to the list-like quality of the sentence. "Driving the cancer phenotype" repeats the idea about "deranged biological functions, which results in... cancer" from the first sentence, so it doesn't add anything new. This deletion makes the second and third sentences sound very similar: X changes gene expression in cancer (and other diseases). Since similar messages in such short sentences so close together sounds a bit elementary, we would probably want to combine one of them with an adjacent sentence.

→ *Delete any words or phrases that don't add meaning to the paragraph*

This revision approach probably seems rather formulaic. You might worry that all of your sentences will come out sounding too similar to one another or too simple. However, you'll actually end up with a greater variety of verbs, since there are more potential actions than linking verbs like "is" or "occur," and the form of the verb might be active or passive. If you do find similar sentences after revising, as we did in the example, you can revise further to restore variety. The rigidity of the approach might also lead you to wonder whether there's another route to clear sentences. There are probably many, some of which you could discover by varying the process described here. What matters in this revision isn't following each step

exactly, but making clear what's happening (putting the action in the verb provides a structural clue to readers) and who or what is doing it in each sentence.

→ *Making your verbs convey action won't make your writing dull*

Since our example revision took multiple pages, you might also wonder whether such changes are worth the effort. Can't readers mostly get the message from writing in standard academic style (like the original version)? They might, but only with considerable effort, since it requires hunting through the sentence and guessing at what noun conveys what's happening. Hopefully, your document will have more readers than it does writers, so your effort in revising (or structuring sentences carefully as you draft) will save more hours and attention than you use up. Further, your readers may not feel like putting forth that effort, and will either read without understanding very well, or choose not to read your work at all (especially since putting the action in nouns makes the text feel static, which is rather boring).

Use specific words

Clarity in your writing depends not only on sentence structure, but also on word choice. Your words should tell the reader exactly what you mean—they should be specific. The most common ways in which scientists choose words that are less specific than necessary are by indicating change or regulation, but not its direction, and by suggesting a quantity without stating it. Rather than “regulate,” say “activate” or “inhibit;” rather than “alter,” “change,” or “adjust,” say “increase” or “decrease.” If you see words like “some” or “several” or “many,” replace them with the number; if you see change verbs modified with “greatly” or “somewhat,” replace the vague adverb with the proportion or percent of change.

→ *Specify quantities and directions of change or regulation*

1. If your sentence has more than one actor, you'll need to do some revising before this step. Two actors means that you're talking about two things at once, which is difficult for a reader to follow. Consider the following example:

A temporal and spatial relationship between lipid peroxidation and type I collagen gene expression correlates with an in vitro model of coculture between stellate cells and hepatocytes.

What correlates with the model? The relationship, lipid peroxidation, or collagen expression? Such an overloaded sentence could be revised by separating each actor into its own clause or sentence, so that they each get their own verb. If that would introduce redundancy, your actors might be closely related enough that the reader could guess that they both do the same thing—choose the better of the two and omit the other.

2. In methods sections, it makes more sense to use the passive voice than the active. To form active constructions for methods, every subject would be “we,” which the reader could infer. Further, “we” isn't the topic—the things you did or the things you manipulated are. Using those as the subjects makes it easier to follow the chain of events.

3. "Systems" falls within a category of words that tend to introduce confusion into sentences. Such words don't have very specific meanings, and thus aren't often useful. Others like it include "role," "mechanism," "factor," and "process;" be careful when using such words. Check to see whether it adds meaning—would the sentence work without the phrase in which it appears?
 - A) For more examples or practice before attempting the task, try revising the sentences in the accompanying exercise.