

Simplicity: Avoiding unnecessary complexity

Simplicity is the ultimate sophistication.

Leonardo DaVinci

The problems science tries to solve and the material, methods, and equipment it uses to solve them can be extremely complex, so it comes as no surprise that scientific writers need to use highly complex language to convey their ideas. As science advances along the frontiers of knowledge, new terms must be coined to allow us to deal with new concepts, phenomena, processes, and equipment. Words are often formed by combining pieces of root words from classical languages as prefixes, stems, and suffixes. When we know the roots, the meaning is often readily discernible. Some terms are so long and complicated to say that we nearly always refer to them in abbreviated form, as in deoxyribonucleic acid (DNA), electroencephalography (EEG), temporomandibular joint (TMJ), or tetrachlorodibenzoparadioxin (TCDD or dioxin). Indeed, there is no simpler way to say electrophoresis, fasciotomy, or rhabdomyolysis. Although each of these terms can be explained in relatively simpler terms, it would be absurd to do so every time we wanted to refer to the concept they represent: these terms were coined precisely to enable us to communicate more effectively and more efficiently. This complexity cannot and should not be eliminated from your texts.

However, there is another kind of complexity that hinders rather than helps our efforts to communicate. We often add unnecessary complexity to our texts, stringing together big, “sophisticated” words in long, convoluted sentences when shorter, simpler words arranged in short, straightforward sentences would convey our ideas better. Whether these practices arise from mistaken ideas about what good writing is, from a desire to appear sophisticated or a fear of looking simple, or just from unwillingness to work hard enough to

express our thoughts as clearly as possible, they can make it more difficult for readers to grasp our message (or sometimes even for them to finish our texts).

Throughout the world, students are often rewarded for demonstrating their linguistic prowess through rich vocabulary and grammatical sophistry when learning composition at school. Likewise, programs to teach English as a foreign language are expansive rather than reductive, and many of the same approaches that can enhance your performance in the Cambridge First Certificate and Proficiency examinations can actually compromise the clarity of your scientific writing. Moreover, Spanish is a baroque, flowery language that lends itself to ostentation. In the hands of a talented writer in the appropriate circumstances, this style can be sublime, expressing complex subtleties of transcendent thought. All too often though, style overwhelms content, obfuscating any appreciable message.

People who speak Spanish and other Romance languages as their mother tongue need to be especially careful not to weigh down their message with “sophistication” when writing in English. The Latinate English “equivalents” of words that would be the first or even the only choice in Spanish often sound pretentious to native speakers (e.g., utilize). Moreover, a series of long, complicated sentences with several prepositional phrases and subordinate clauses that might be acceptable in Romance languages can be tedious in English. The effects of unnecessary complexity are cumulative: readers may not be distracted when a writer occasionally uses an unnecessarily complex word or construction, but readers can easily be overwhelmed when a writer consistently adds unnecessary complexity to a text.

This section shows you various ways to eliminate unnecessary complexity from your writing. The two main strategies are using simple words and simple constructions (Fig. 4). Your readers will be grateful to you for eliminating the surrounding noise so they can hear your message loud and clear.

Unnecessarily complex words

Word choice has an important impact on the complexity of the text. Using simple words wherever possible can help make your text reader-friendly. Appendix VI lists some words that might be considered unnecessarily complex or pretentious in many contexts.

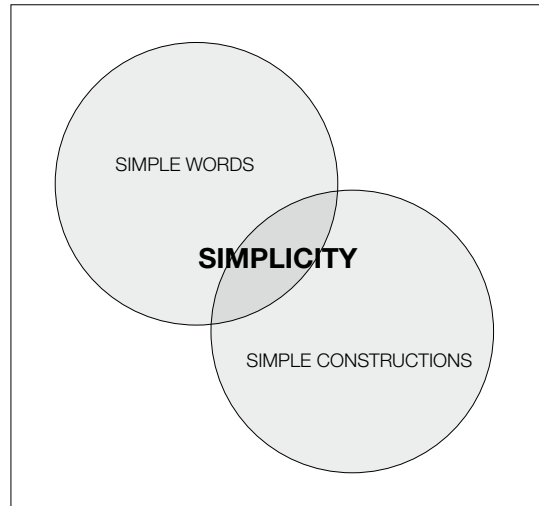


Figure 4. Major aspects related to simplicity.

Exercise 58

Replace the unnecessary complex words and phrases in these sentences with simpler ones.

- 1) Firstly, communities need to take preventative measures.
- 2) We initiated the experiment on Monday morning and finalized it on Thursday evening.
- 3) This manuscript describes a new methodology for genome mining and biosynthesis of polyketides and peptides.
- 4) The majority of experts agree that this problem necessitates the optimization of our methodology.
- 5) Patients with lung cancer frequently have fatal outcome.
- 6) When it is executed befittingly, the technique has efficacious capabilities.
- 7) A catheter was collocated in close proximity to the dilatation.
- 8) Monitorization is indispensable to orientate therapeutic actions.
- 9) The adaptability of the device utilized facilitated the performance of the procedure.
- 10) Familiarization with the most commonly frequently visualized findings will facilitate the implementation of an efficient diagnostic protocol.

Unnecessary nominalization

One way we make writing more complex is to transform a concrete verb into an abstract noun, which requires the use of an “empty”, unspecific verb like *perform*, *carry out*, *be*, or *do*. This practice weakens our writing, diffusing and obscuring

our message. It also lengthens our sentences, wasting valuable words we might need to express other ideas. Appendix VII lists common examples of nominalizations.

Exercise 59

Rearrange these sentences so that the verb carries the message.

- 1) We made the arrangements for the patient to be transferred.

- 2) The pronator teres syndrome should be taken into consideration in patients with pain in the volar surface of the proximal forearm.

- 3) Serine proteases exhibit a tendency to be inhibited in this fashion.

- 4) You must make thorough preparations for the experiment.

- 5) We made a comparison of the two drugs and found no difference in clearance.

- 6) They place a major emphasis on the use of the technique in mechanically ventilated patients.

- 7) We performed the calibration of both thermometers.

- 8) Few authors make reference to aliasing artifacts.

- 9) The authors reach the conclusion that MRI is more cost effective than CT in these patients.

- 10) Immunoglobulin M determinations were performed by nephelometry.

- 11) The measurement of the concentration was made at baseline, 5 minutes after injection, and 2 hours after injection.

- 12) Henri et al. make the assumption that CT is a sufficient imaging method for ruling out pancreatic involvement.

Double negatives

Double-negative expressions add complexity and length to writing, making it harder for readers to grasp your message and wasting words. We sometimes think using a double negative can

add subtle nuances to meaning, but these nuances are nearly always lost on readers. More often we use double negatives to hedge (i.e., to avoid being direct to evade criticism).

Exercise 60

Rewrite these sentences to avoid using a double negative.

- 1) It is not unusual for radiologists to hold two jobs.

- 2) Sex enhances pair bonding through a pathway that involves reward centers in the brain, suggesting the formation of a strong social bond is not unlike an addiction.

- 3) These findings are not without meaningfulness.

- 4) Ignorance is an enduring subject, and it has not gone uninvestigated in sociology.

- 5) We not incorrectly surmised that it might be difficult to enroll enough patients.

- 6) Allergies to iodine are hardly uncommon.

- 7) We were not unencouraged by the results.

- 8) Heather is not unlikely to publish her article in a top quartile journal.

- 9) The authors were not unaware of a possible bias.

- 10) Dr. Sophisticatus' writing is not infrequently incomprehensible.

- 11) The role of MMP levels in inducing instability in carotid plaques is hardly uncontroversial.

- 12) We are not infrequently unable to express ourselves clearly and concisely.

- 13) The reviewers' comments were not entirely uncritical.

- 14) However, the reviewers were hardly impartial.

- 15) To say they would not alter their data to avoid a poor grade in the course is not the least bit unlikely.

The passive voice

In active sentences, the grammatical subject is the agent, the person or thing that acts. Only transitive active sentences (i.e., sentences that have objects) can be transformed into passive sentences.

In passive sentences, the object of the action (the object of the active sentence) is the grammatical subject and the action is expressed by the verb *to be* in the appropriate tense plus the past partici-

ple. The agent can be specified in a “byline” (i.e., a prepositional phrase consisting of by + the agent); however, it is not necessary to specify an agent.

Transitive active sentences have the form: SUBJECT (the agent)+VERB (the action)+DIRECT OBJECT (the person or thing that is acted on):

ACTIVE:	<i>Dr. White intubated the patient.</i>		
	SUBJECT	+ VERB	+ DIRECT OBJECT
	(the agent)	action	(the object of the action)
PASSIVE:	<i>The patient was intubated by Dr. White.</i>		
	SUBJECT	+ TO BE	+ BYLINE
	(the object of the action)	+ PAST PARTICIPLE action	(the agent — <i>optional</i>)

Although the direct object of the active sentence is usually the subject of the passive sentence, the indirect object of the active sentence can also become the subject of the passive sentence:

ACTIVE:	<i>The Spanish Society gave Sarah an award.</i>			
	SUBJECT	+ VERB	+ INDIRECT OBJECT	+ DIRECT OBJECT
	(the agent)	action	(the recipient of the object)	(the object of the action)
PASSIVE:	<i>Sarah was given an award by the Spanish Society.</i>			
	SUBJECT	+ TO BE	+ OBJECT	+ BYLINE
	(the recipient of the object)	+ PAST PARTICIPLE action	(the object of the action)	(the agent — <i>optional</i>)

In a few cases, the preposition complement can also become the subject of the passive sentence:

ACTIVE:	<i>Dr. Black operated on my 15-year-old son yesterday.</i>			
	SUBJECT	+ VERB	+ PREPOSITION	+ OBJECT
	(the agent)	action	(the object of the action)	
PASSIVE:	<i>My 15-year-old son was operated on by Dr. Black yesterday.</i>			
	SUBJECT	+ TO BE	+ BYLINE	
	(the object of the action)	+ PAST PARTICIPLE action	(the agent — <i>optional</i>)	

The passive voice is often used in scientific writing, although not as much as it used to be. Thirty or forty years ago, science was written almost exclusively in the passive voice. It was thought that removing the subject (the scientist) somehow made the writing more objective. Today, most journals consider the active voice not only

appropriate but even preferable in most cases. The instructions to authors advise using the active whenever natural, even if it means using the pronouns “we” or “I”. The active voice is more direct; the passive voice takes longer for our brains to process. I recommend using the active voice whenever it seems natural.

The passive voice is best reserved for cases in which:

- a) The agent is unknown or unimportant. In these cases, we never include the agent in a byline (*by somebody, by them, by people in general, etc.* or when the agent is obvious).

Her left foot was amputated. We don't care who amputated her foot.

Incorrect usage:

Her left foot was amputated by somebody.
(The byline adds no useful information.)

Her left foot was amputated by a surgeon.
(The agent is obvious, so the byline adds no useful information.)

Correct usage:

Her left foot was amputated by a sadistic psychopath. (The agent is NOT obvious, so the byline adds useful information.)

Her left foot was amputated by Dr. Kiraly. (The byline adds useful information; the passive voice shifts the emphasis.)

- b) We want to emphasize the recipient of the action or the action itself rather than the agent.

Dr. Hill was appointed to the expert advisory board.

- c) We do not want to name the agent (often to evade responsibility).

The patient's records were lost or misplaced. A terrible mistake was made.

- d) The noun phrase that specifies the agent contains many modifiers that would require an excessive delay before reaching the verb.

The operation was performed by Foreman and Tierney, two highly specialized surgeons from University Hospital in London.

Finally, the passive voice can make it difficult to keep modifiers close to what they modify. For example:

Three endoscopes were reported stolen by the chief of the digestive disease department. (Did the chief steal them or report them?)

The chief of the digestive disease department reported three endoscopes stolen.

A final word of advice: do not be afraid to use the passive voice judiciously. The passive voice can be useful to help you make transitions and present known information before unknown information (see Familiar-before-new principle, p. 87).

Exercise 61

Change these sentences to the active voice where desirable.

- 1) Casein peptones are made from an insoluble precipitate from acidified milk.

- 2) None of the new approaches was found to be more effective than the standard.

- 3) According to Matthay et al., this restricted, relatively nonrecruitable pulmonary vascular bed with inordinate high pulmonary arterial pressure is considered to be the most likely mechanism of abnormal right ventricular response to exercise.

- 4) Foreman's conclusions are not supported by his findings.

- 5) When respiratory failure seemed likely, the patient was transferred to the ICU.

- 6) Our results are compared with those of previous studies in Table 2.
- 7) Treatment with topical antifungal preparations is usually sufficient.
- 8) Similar experiments were done by Oakes and colleagues.
- 9) The patient's body temperature was monitored by a nurse for two days.
- 10) Appendicitis was confirmed at laparoscopy.

Long sentences

Sometimes we try to cram too many ideas into a sentence, and this results in long, complex sentences that can be difficult for readers to follow.

Keeping sentences short also helps avoid making grammatical or stylistic mistakes.

Exercise 62

Break up these long, complex sentences to make a more intelligible text.

- 1) Certain kinds of mammalian cell lines that express very few endogenous ion channels have been exploited for the heterogeneous expression of ion channels by mixing cells in a tissue culture dish with the cDNA that encodes the ion channel under conditions that permit many of the cells to take up the cDNA, thereby avoiding the need for transcribing messenger RNA, which is fragile and difficult to manipulate in vitro.
- 2) Anemia due to an abnormal increase in the rate of destruction of circulating red blood cells, called hemolytic anemia, can result from the presence of antibodies against the red blood cells, as occurs in hemolytic disease of the newborn, or to autoantibodies or from overactivity of mononuclear phagocytes in association with hypersplenism or from metabolic abnormalities in the red blood cells such as glucose-6-phosphatase deficiency, which is aggravated by some drugs.
- 3) Because hormones that are catecholamines, such as epinephrine and norepinephrine, glycoproteins, and polypeptides are unable to pass through the lipid barrier of the target cell membrane, although some of them can enter the cell through pinocytosis, most of their effects result from their binding to receptor proteins on the outer surface of the target cell membrane.
- 4) Pneumothorax is lung collapse that occurs when air enters the pleural cavity through any breach in the chest wall or in the lung membrane whether resulting from trauma (traumatic pneumothorax), from unknown causes in an apparently healthy individual (spontaneous pneumothorax), or, in the past, from deliberate injection to treat tuberculosis (artificial pneumothorax).
- 5) The common fibular nerve, the smaller of the two terminal branches of the sciatic nerve, arises in the lower third of the thigh and runs downward through the popliteal fossa, closely following the medial border of the biceps muscle and superficially crossing the lateral head of the gastrocnemius muscle as it leaves the fossa to pass behind the head of the fibula and winding laterally around the neck of the bone and pierce the peroneus longus muscle, where it divides into two terminal branches.

Stacked modifiers

English words can be easily combined to make concise units of meanings, helping to keep texts within word limits. However, stringing together

too many modifiers can make it difficult for readers to know what you want to say.

Exercise 63

Expand these noun strings to make their meaning clearer.

- 1) transrectal ultrasound-guided prostate biopsy false-negative prevention protocol
- 2) interventional procedures review evaluation task force
- 3) X-ray beam adjustment calibration manual
- 4) hospital information system access protocol
- 5) a fortified fat-free protein-enriched vitamin C-supplemented pellet-based diet

Exercise 64

Eliminate the unnecessary complexity from these sentences.

- 1) The catalysts utilized are listed in Table 2.

- 2) The analysis that we performed after conducting our investigation offers confirmation that blood glucose levels show a peak within an hour after the administration of the drug.

- 3) The comparison that was made by Jones et al.³ showed that the control rats were not infrequently restless if you take into consideration that their cage was less crowded.

- 4) We were cognizant that we had to take additional measures to assess our methodology.

- 5) This preventative measure was not shown to be ineffective.

- 6) Although he had imbibed a considerable amount of alcohol, when he undertook to ambulate, he proved to have the capability of maintaining his equilibrium.

- 7) The separation of the conjoined twins was done by a surgical team.

- 8) Preparations were made to have the patient transferred to another hospital where more complex assessments could be done.

- 9) From the inception, their methodology of dilatating the stenosis was insufficient to bring about the recanalization of the vessel.

- 10) Not only had we failed to perform the determinations, but we also proved to be incapable of carrying out the calibration of the device.