Chapter 4
Elements of style

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Abstract: This chapter outlines strategies to improve academic writing by enhancing clarity, impact, and flow. It emphasizes the importance of topic and stress positions in structuring sentences to organize information and guide readers' attention. Common issues, such as nominalizations in topic positions, prepositional phrases, or as objects and adjectives, are examined. The chapter also discusses techniques for smooth transitions by linking stress positions to subsequent topics and maintaining cohesion. Finally, the chapter offers methods for rewriting convoluted sentences, removing redundancies, and ensuring proper emphasis.

Some researchers procrastinate in writing their findings. They refuse to write down their ideas until they believe they know the topic sufficiently well [75, p. 29]. On other occasions, they procrastinate because of fear—having their writing scrutinized by peers scares them [75, p. 17]. However, procrastinating writing is a mistake, according to the author of [182, Sec. I]. As pointed out in [182, Sec. I], new ideas arise while we write. And finding new ideas and developing them represent a clear benefit of writing. As a result, writing is an active way of learning [6].

While writing, we might change our minds or find a different path to reach our destination: communicating a clear message. We can even evaluate whether our arguments make sense. Writing helps us clarify our thinking. And clear thinking helps our readers understand us better.

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1 Papers get rejected because of poor writing

Imagine a paper presenting brilliant ideas, solid evidence, and original insights. However, it is riddled with vague sentences, unclear expressions, typos, and grammatical errors.

What will happen to such a paper when it reaches the journal's Editorial desk? It will receive an outright rejection. Why? Because poor language sends a negative signal to Editors. It implies the authors either neglected to polish their text or lacked the resources to do so [95]. In either case, it creates the impression that the content itself is of low quality.

As highlighted in previous chapters, effective scientific writing requires logical organization and clear communication. Poorly written manuscripts not only fail to engage readers but also create unnecessary obstacles for Editors.

Given Editors' numerous responsibilities, which include managing an influx of submissions, they cannot afford to spend time correcting language issues. Therefore, authors should not expect Editors to edit or proofread their work. Be sure that Editors will reject papers written poorly.

Even if a manuscript passes the initial editorial screening, poor writing remains a significant barrier during peer review. Surprisingly, poor writing is cited as a more frequent cause of rejection than inadequate statistical analysis [112, p. 188]. Simply put, no one has the patience to read poorly written text.

Authors whose native language is not English bear the same responsibility as any native for producing high-quality writing. To overcome linguistic challenges, authors can utilize various resources as online editing services are ubiquitous, such as 'ChatGPT', 'Microsoft-BING,' and 'Grammarly.com.' As a strategy, authors can collaborate with English-speaking researchers by inviting them to join the research team [95].

Regardless of the tools or approaches used, the writers' goal remains the same: to produce clear, concise, and engaging writing that effectively communicates the research findings.

Readers, when faced with excessive difficulty, give up. As emphasized in [112, p. 192], "most prose creates trouble for the reader more than half the time." As such, clarity in writing is not only a matter of good taste; it reflects efficiency, respect for the audience, and a commitment to effective communication. Lack of clarity is not just confusing—it is selfish, inefficient, and ultimately detrimental to the dissemination of knowledge.

2 Structuring sentences and paragraphs

When the information within a section is logically organized, readers can process it more quickly and retain its contents more effectively. Experienced writers are well aware of this. They follow established principles to structure sentences and paragraphs.

A common practice in scientific writing is to divide a section into three distinct parts; see Fig. 9. These parts define how information is presented; this three-part structure contributes to the overall coherence of the text, as detailed next.

The first part corresponds to the introductory paragraph. Its goal is to provide an overview of the section. Indeed, this paragraph sets the stage by connecting the section to the previous one and outlining the section's objectives. For example, writers use this part to state the purpose of the section explicitly, resorting to common phrases like "*This section describes ...,*" "*This section shows ...,*" or "*In this section, we present ....*" The introductory paragraph is essential for preparing readers and guiding them toward the next part.

The second part forms the main body of the section. This is where ideas are developed, arguments are presented, reasoning is elaborated, evidence is discussed, and findings are detailed. The middle part must be coherent and cohesive, with sentences organized to maintain the reader's engagement and to reinforce the main points of the paper. Here, writers use logical transitions among sentences. Each sentence adds an idea that contributes to the overall argument.

The third part, while not always mandatory, is often a concluding paragraph. Its goal is to summarize the key points or the main contributions. This summary helps readers retain the most relevant information and reinforces the takeaway message.

Since the main body contains numerous details—such as claims, evidence, arguments, findings, and implications—the concluding paragraph serves as a signal of what is most important. It may also highlight the significance of the section's content within the broader context of the research. Common phrases for this part include "*In summary, this section ...,*" "*The findings of this section indicate that ...,*" and "*Finally, we have shown ....*"

By following this three-part structure, writers can present their ideas in a way that is both logical and reader-friendly.

In summary, a well-structured section improves the clarity and contributes to the whole manuscript.

3 On building sentences

Every composition begins with the careful selection of words, as each word carries its own meaning. Words like "cake," "ice," "peace," and "tree" have clear definitions, yet they do not convey anything significant when standing alone.

To communicate a meaningful message, words must be connected with others to form sentences. Thus, a word in a sentence carries much more meaning than when isolated. Still, a common complaint among authors is how to select the right words, as they know well-chosen words will result in a clear sentence.

Even accomplished writers acknowledge that they struggle with choosing the correct words to fit into sentences. They emphasize writing is an iterative process; revising and refining sentences multiple times is the norm to produce engaging and effective text (e.g., [77, Ch. 3], [162, Ch. 5], [177, Ch. 1]).
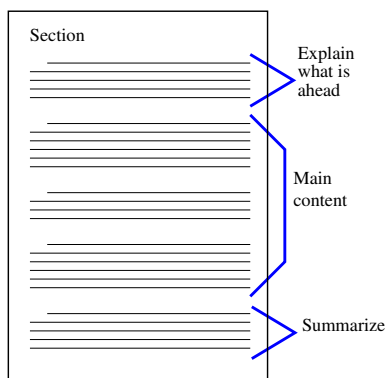
Fig. 9 Scheme of a section. The first paragraph states what readers will find ahead; the middle of the section shows the arguments, ideas, and evidence that support the writer's ideas stated in the first paragraph; and the last paragraph summarizes the whole section.

Accomplished writers keep repeating that their writing skills were not innate; rather, their skills were cultivated and honed through education and consistent practice [77, Sec. 1.6, p. 10]. They also stress the importance of mastering the formal structure that shapes standard English [100, 84].

English follows a set of rules and principles that dictate how language operates and how it should be used. Writing effectively then requires more than creativity and self-expression; writers have to abide by these rules rules and principles, laid out in grammar books.

Grammar serves as the structural foundation of language. Like any structured body of knowledge, grammar consists of specific elements, each with a defined name and purpose.

Next, we will revisit the names and functions of some fundamental grammatical elements

3.1 Building a paragraph

A *paragraph* consists of a group of sentences that work together to present an idea or develop a specific thought [182, Ch. 3]. This idea or thought is commonly referred to as the *topic* of the paragraph. Linguists and researchers define a sentence containing this topic as the *topic sentence*. They recommend placing this sentence at the very beginning of the paragraph (e.g., [133, p. 38], [77, Ch. 6.2, p. 95], [137]).

These specialists recommend that each paragraph must focus on only one idea [110, Ch. 5, p. 109], [112, p. 205], which coincides with the idea introduced in the topic sentence [77, Sec. 6.2, p. 94].

The *topic sentence* states the paragraph's main idea. The topic sentence works as an introduction for the paragraph, giving readers a general idea of what will come next.

The middle of the paragraph should contain sentences that reinforce and expand upon the idea expressed in the topic sentence. Since the topic sentence creates an expectation in the reader's mind, the subsequent sentences should fulfill this expectation. These sentences present relevant information, such as facts, examples, arguments, evidence, and even a review of the literature [141]. In this part, writers can cite reliable sources, thus enhancing paragraph's credibility.

For instance, a paragraph discussing the complexity of scientific publications becomes more credible with a trusted source, as shown below:

✓ *According to a recent survey, 87% of professors in a specific field reported difficulties understanding articles published by their peers [174].*

When constructing sentences, it is important to consider their length. Writers should be mindful not to rely excessively on long and intricate sentences, as this could overwhelm readers (see further discussion in Section 3.7). While longer sentences can convey complex ideas effectively, they should be used selectively and thoughtfully. Many experienced writers suggest that paragraphs featuring a variety of sentence lengths are more engaging and reader-friendly (e.g., [58, p. 41], [70, p. 184], [137], [138, Ch. 5], [185, p. 36]).

After crafting the paragraph's middle section, the writer's next task is compose the final sentence. It can be used to summarize the paragraph's content, conclude the reasoning, emphasize the core idea, or build a connection to the subsequent paragraph. Writers can freely choose among these options, but the most common approaches include summarizing the paragraph's main idea or establishing a link to the next paragraph.

Concluding with a summary sentence is an interesting strategy, as it allows writers to distill what should be remembered from both the paragraph and the section.

Alternatively, the final sentence can serve as a bridge between paragraphs. Writer can utilize two techniques: (i)the stress-topic strategy (Section 6) and (ii) the transition-word strategy (Section **??**), A smooth flow of ideas follows. For method (i), the first sentence of a new paragraph incorporates information from the previous paragraph; for method (ii), the first sentence incorporates transition elements from the previous paragraph.

In summary, constructing a cohesive and engaging paragraph requires attention to the topic sentence, supporting middle sentences, and a concluding sentence that either summarizes or transitions. By mastering these elements, writers can craft well-structured paragraphs that enhance clarity and readability.

3.2 Grammatical elements

Let us recall the distinction between a *phrase* and a *sentence*. A *phrase* is a set of words that functions as a unit within a *sentence* [113, p. 6]. In other words, a phrase is part of a sentence. However, a phrase does not convey the full intended meaning because it lacks either a verb, a subject, or both. In contrast, a sentence is a complete unit of text, as it contains both a subject and a verb and expresses a complete thought [133, p. 11].

A *clause* is a group of words that includes both a subject and a verb [113, p. 7]. Clauses are categorized into two types: independent and dependent. An independent clause expresses a complete idea and can stand alone as a sentence (e.g., '*John enjoys studying*'). A dependent clause, on the other hand, does not convey a complete idea and relies on other parts of the text to provide meaning (e.g., '*Because John enjoys studying*'). Understanding these distinctions is essential for constructing a coherent sentence.

While phrases enhance the meaning of sentences by adding detail and nuance, clauses serve as the building blocks of sentences. Both clauses and sentences play a critical role in crafting meaningful and well-structured texts.

An example of a sentence and its internal structure is illustrated in Table 1.

3.3 Active or passive: which one should we use?

Every sentence can be classified into one of two modes based on its '*voice*,' namely, the *active voice* or the *passive voice*.

Active voice. A sentence is in the *active voice* when the subject performs the action. This requires a doer [113, p. 3]. For example, in the sentence '*The student wrote the report*', the subject '*the student*' performs the action, making the sentence active.

Passive voice. A sentence is in the *passive voice* when the subject receives the action [113, p. 145]. The passive voice generally includes the verb '*to be*' followed by the past participle of another verb. For instance, in the sentence '*The report was submitted by the student*', the subject '*the report*' receives the action. This sentence

Table 1 Example of a sentence's grammar structure.

Text	Definition
Mark cleans the house when John is studying at the library	sentence
when John is studying at the library	dependent clause
John is studying at the library	independent clause
studying at the library	verbal phrase
at the library	prepositional phrase

includes the verb '*to be*' and the past participle '*submitted*;' they together form the passive construction.

Experienced writers advise prioritizing the active voice over the passive voice (see [64, p. 107], [90], [110, Ch. 5, p. 110], [112, p. 213]). Their preference for the active voice stems from two important advantages. First, the active voice places the doer as the subject and the action as the verb, aligning with the pattern that readers naturally expect [110, p. 109]. Second, the active voice uses fewer words, leading to shorter and more fluid sentences. Shorter sentences enhance readability and improve the overall flow of text (see Section 3.5).

Because of these reasons, the active voice is typically preferred by writers. To further illustrate the advantages of active voice, consider the following examples.

✓ **Active voice.** The student prepared two experiments. (5 words)
✓ **Passive voice.** Two experiments were prepared by the student. (7 words)

The active voice is concise and straightforward, requiring fewer words than the passive voice. The active voice is typically less awkward, more engaging, and easier to comprehend.

On the other hand, the passive voice often demands more words and forces readers to reorganize the sentence mentally. In other words, readers must convert the backward-passive construction into the standard subject-verb order to fully grasp the meaning, as noted by [110, p. 109]. The passive voice often appears dull and stilted [137].

Confirming the difficulty readers have with passive voice, George Orwell recommended in his essay that "*Never use the passive where you can use the active*," [132, p. 176].

Despite criticism from many experts, the passive voice remains a valuable tool in specific contexts [161, p. 32]. For instance, the passive-voice example above emphasizes the noun '*two experiments*,' shifting focus away from the doer ('*the student*'). Moreover, the expression '*by the student*' can be omitted if the writer desires a shorter and more streamlined sentence. Such flexibility allows the passive voice to serve particular rhetorical purposes.

The following section delves into the selective use of passive voice and highlights its advantages when employed sparingly.

3.4 Benefits of passive voice

Despite criticism from some writers who consider the passive voice weak or evasive, it can still serve an important purpose when the emphasis is on a specific action that has occurred, or when the doer is unnecessary or unknown. The passive voice is most effective when used sparingly, as detailed below.

Consider the sentence '*The report was submitted yesterday*.' This sentence does not specify *who* submitted the report; the identity of the doer is omitted because it is either irrelevant or unknown. This demonstrates how the passive voice can be

used effectively. Another example is the sentence '*Samples were collected ...*,' which avoids mentioning the '*who*' and focuses on the occurrence of a specific action [79]. Let us analyze one more example:

✓ **Passive voice.** The Editor accepted the paper since it showed novelty. It is being published this month.

In this example, the second sentence '*It is being published this month*' employs the passive voice. Together, the two sentences are coherent and well-connected. The topic of the first sentence (e.g., *paper*) becomes the subject of the second sentence (e.g., *it*), creating a logical flow of ideas (see Section 6).

Now, consider rewriting the last example using the active voice:

✗ **Active voice.** The Editor accepted the paper since it showed novelty. The Editor is publishing the paper this month.

In this example, the active voice disrupts the cohesion between the two sentences. It breaks the sequence of stress-topic information, as the repetition of '*the Editor*' interrupts the flow of ideas (see Section 5). Furthermore, the active voice introduces redundancy by unnecessarily repeating the subject, '*Editor.*' By contrast, the passive construction avoids these issues, offering a smoother and more cohesive flow. This illustrates how the passive voice can improve clarity and coherence in certain contexts.

As a final note, selecting the appropriate voice in scientific writing is ultimately a matter of style. According to [72], between 10 and 20% of sentences in scientific magazines published in the UK are written in the passive voice. However, the last few decades have witnessed a steady decline in the use of passive voice in scientific writing [9, 87].

In summary, when deciding which voice to use, consider what aspect of the sentence you wish to emphasize. Use the active voice to highlight the doer and the passive voice to emphasize the action. Regardless of your choice, incorporate both voices judiciously to add variety and improve the quality of your writing [64, p. 111].

3.5 *Embrace short sentences*

Any scientific paper is composed of a certain number of *sentences*, and these sentences must be arranged systematically to express a meaningful thought.

Studies on improving scientific writing consistently highlight the importance of short sentences in facilitating reading and comprehension (e.g., [8], [36, Ch. 5, p. 115], [77, p. 38], [177, Ch. 1], [185, p. 36]). Mark Twain once remarked that writing brief sentences is '*the modern way and the best way*' to write English [64, p. 65]. Twain's wisdom is supported by a recent study demonstrating that as more objects enter a person's visual scene, their attention decreases [114]. Drawing a parallel

with reading, these findings imply that our brains' attention diminishes as sentence length increases. More words, less attention.

This phenomenon is corroborated by research in linguistics and psychology. These disciplines have developed numerous formulas to measure text comprehensibility. While the practicality of these formulas remains debatable (e.g., [7, 51, 71, 183]), there is a consensus that shorter sentences definitely improve comprehension—the shorter, the better [13].

One clear advantage of short sentences is that they reduce the likelihood of losing readers along the way. Indeed, readers are less likely to struggle with lengthy, convoluted sentences. Longer sentences may cause them to lose focus or interest. As Peter Elbow wisely noted, '*every word omitted keeps another reader with you*' [40, p. 41].

Another benefit of short sentences is the reduction of grammatical errors. Long sentences invite errors, such as incorrect verb tense, unclear pronoun references, comma splices, misplaced modifiers, and dangling modifiers [77, Sec. 1.7]. By simplifying sentence structure, writers can minimize these errors, enhance clarity, and communicate more efficiently [101].

Historically, newspaper editors have instructed writers to use shorter sentences in press publications [103]. This practice has made articles more reader friendly, with sentences typically containing 15 to 20 words (e.g., [77, Sec. 4.5], [157]). Beyond journalism, the benefits of shorter sentences extend to social justice, as they promote accessibility and inclusiveness [111].

Strunk and White also emphasize brevity in their advice to '*omit needless words*,' as this creates better sentences and avoids distracting readers [159, Ch. 17]. Eliminating unnecessary words results in clearer, more impactful text. To illustrate this, consider the following example:

✕ It is well established in the literature that a capacitor is a device that can store energy.

In this sentence, the phrase '*It is well established in the literature that*' adds no value to the message. By removing these unnecessary words, the sentence becomes more concise:

✓ A capacitor is a device that can store energy.

This revision highlights the core message and makes it easier to grasp. Consider another example:

✕ *Experiments performed to evaluate when the temperature started increasing showed that the resistor heated beyond a safe limit once electrical current flowed through the resistor's terminals.*

A simplified sentence makes the meaning clear, as follows.

✓ *Experiments showed the resistor heated excessively when its current increased.*

These examples demonstrate how shorter sentences improve clarity and readability. Cutting unnecessary words results in a text that is easier to understand.

Given that the primary goal of academic writing is to spread knowledge, writing shorter sentences is a wise move [118]. However, complex ideas sometimes require longer sentences. Writers are free to use more words when needed, provided that they do so for clarity, to be discussed in the next section.

3.6 Short sentences may not always be the best option

Short sentences can convey clear and simple ideas; however, they should be used with care. Consider the following paragraph:

✕ *The device was turned on. It worked. It became hot. Heat could damage the device. The device was turned off.*

This paragraph relies exclusively on short sentences, which makes it choppy and monotonous. The ideas in each sentence appear disconnected from one another, resulting in a lack of logical flow. Furthermore, the sentences fail to provide details or descriptions that could engage the reader's interest, leaving little motivation to continue reading. Now consider the improved version below:

✓ *While the device was turned on, the operator noticed that it got hotter and hotter. To protect it from overheating damage, the operator turned it off.*

This revised paragraph combines sentences of varying lengths, creating a natural rhythm and cadence. Note that we included new words in the final sentence. With that, the text raises curiosity about the cause of overheating, perhaps leaving readers thinking.

In many cases, conveying an idea effectively requires supplementary information, which is better expressed through longer, more detailed sentences. Such sentences may incorporate punctuation marks, parentheses, hyphens, and dashes (e.g., [125, Ch. 6]), while others contain phrases beginning with '*which*,' '*that*,' and '*who*' (e.g., [15, Sec. 3]).

An important grammatical structure in longer sentences is the *dependent clause* (e.g., [17, Sec. 3.10, p. 192]). A dependent clause contains both a subject and a verb but cannot stand alone as a complete thought. For example, in the phrase '*While the device was turned on*,' the word '*While*' prevents this clause from being independent. A complete sentence requires the *main clause*, such as '*the operator noticed that it got hotter and hotter*.' This demonstrates how dependent clauses clarify reasoning and contribute to the overall writing coherence [133, p. 101].

In conclusion, while short sentences can enhance communication, relying exclusively on them can create issues such as monotony, lack of detail, and diminished cohesion. A balanced approach that incorporates both short and longer sentences, along with dependent clauses and varied grammatical structures, is essential for effective and engaging writing.

3.7 Strategies for balancing short and long sentences

There is no ideal length for a sentence in academic writing [137], [149, Ch. 12.6]. A common rule of thumb, widely documented in scientific-writing manuals, suggests that sentences should be short. However, no one defines what is a short sentence.

An experienced scientific writer suggests that a sentence should ideally contain around 20 words and should never exceed 40 words [36, Ch. 5, p. 115]. Sentences longer than 40 words should be split into shorter ones; and when forced to write shorter sentences, writers will detect unnecessary words and will cut them off [64, p. 62].

A study advocates that authors should aim for an average sentence length from 20 to 22 words [77, Sec. 4.5]. Instead of focusing on word counts, the author of [185, p. 36] prefers sentences that span one or two lines. In news media and popular magazines, writers are requested to keep sentences concise, typically not exceeding 20 words [64, p. 51].

Interestingly, popular and successful works of authors such as Charles Dickens and J. K. Rowling, as well as scientific bloggers, exhibit an average sentence length of fewer than 20 words [118]. Similarly, magazines like *Reader's Digest* and *Time* feature sentences that are predominantly under 20 words [64, p. 36]. Taken together, these examples reinforce the view that writing shorter sentences is a wise strategy.

The prevalence of sentences with 20 words or fewer in successful literature may encourage scientific writers to adopt this approach. To some extent, adhering to shorter sentences can facilitate comprehension (see Section 3.5).

While long sentences can be useful for conveying intricate ideas, they should be used sparingly [35, p. 148]. Writers should avoid introducing unnecessary complexity, as excessive complexity negatively impacts text comprehension [129]. The goal of academic writing is not to be overly complex and dull but to craft clear and concise sentences. Common sense suggests that embracing shorter sentences is a practical step toward achieving this goal [118].

When communicating scientific discoveries, writers should find a balance between long and short sentences, with a preference for shorter ones. Writers can also leverage the rich grammatical structures available to enhance clarity and flow [136]. For instance, breaking a compound sentence into two shorter sentences and starting the second with '*In addition*' or '*Moreover*' often improves clarity.

Regardless of sentence length, writers are encouraged to adhere to the principle, *'Do not say too much all at once'* [185, p. 36].

4 One idea per sentence

Experienced writers emphasize that a sentence should ideally convey only one idea [77, Sec. 4.5]. When a single sentence attempts to express two or more ideas, it often requires additional words, punctuation, conjunctions, dependent clauses, or nominalizations. These elements contribute to longer and more complex sentences,

which can increase the cognitive load upon readers. This heightened load makes it more likely that readers will lose track of the sentence's meaning or, worse, give up the text completely [8].

Despite this, some scientific writers insist on combining multiple ideas into a single sentence [8]. They assume that merging ideas into fewer sentences saves space and enhances communication. However, this assumption is wrong. For most cases, such sentences become convoluted, making them harder to understand, and leaving room for ambiguity or misinterpretation [8].

To improve readability and ensure effective communication, simplicity should be a priority. An effective way to achieve simplicity is to adhere to the '*one idea per sentence*' rule. By limiting each sentence to a single idea, writers help ensure that their thoughts are presented clearly and logically. This practice not only helps clarify complex ideas but also reduces the likelihood of miscommunication.

In conclusion, the practice of expressing only one idea per sentence is effective in scientific writing. It promotes clarity, reduces cognitive load, and makes the information easier to grasp.

5 Key positions within a sentence: topic and stress

Language experts have identified two key positions within a sentence that carry greater emphasis: the beginning and the end. These positions are referred to as *topic* and *stress*, respectively (e.g., [149, Ch. 12.6]).

Consider the following example:

$$\underbrace{\text{Scientific writers}}_{\text{topic}} \text{ remain indifferent to requests to avoid } \underbrace{\text{convoluted sentences}}_{\text{stress}}.$$

The *topic* position appears at the beginning of a sentence and is where writers provide familiar or previously mentioned information. This position acts as a foundation, guiding readers through the text by establishing context. In the above example, the term '*scientific writers*' serves as the topic. It introduces a concept that is likely already known to the reader, requiring no further explanation.

The *stress* position, located at the end of the sentence, introduces new or significant information. This is the most impactful part of a sentence, as it draws readers' attention [77, Ch. 6.2], [59, p. 552]. In the given example, the term '*convoluted sentences*' occupies the stress position. This phrase introduces novel information that prompts curiosity and creates a logical connection to subsequent sentences. The writer will likely elaborate on the concept of convoluted sentences in the following parts of the text.

The strategic use of these positions enhances the effectiveness of communication. Placing familiar information in the topic position prepares readers for what follows; using the stress position for new or critical ideas ensures that they receive

the attention they deserve. Together, these positions create a natural flow within a sentence.

Writers should consider placing less important information in the middle of a sentence, between the topic and stress positions. Structuring sentences in this way allows writers to guide readers through their arguments with clarity and precision.

5.1 Bring the most critical information to the stress position

A sentence can lose its impact when unnecessary words gravitate in and around or occupy the stress position, diluting the importance of the core information. To resolve this, writers can either remove redundant words or reposition them toward the middle of the sentence. This restructuring allows the key information to occupy the stress position.

Consider the following example of a sentence with imprecise information in the stress position:

✕ *The experiment failed to confirm our prediction, as no consistent change in temperature was measured.*

The issue with this sentence lies in the second clause, where '*was measured*' occupies the stress position. This phrase is not the key piece of information that deserves emphasis. The most important detail—'*no consistent change in temperature*'—is diluted and lacks emphasis. By revising the sentence, we can effectively address this issue, as shown below:

✓ *The experiment failed to confirm our prediction, as there was no consistent change in temperature.*
✓ *The experiment failed to confirm our prediction, as we did not measure a consistent change in temperature.*

These revised sentences achieve clarity and impact through two key improvements. First, the critical information ('*no consistent change in temperature*') now occupies the stress position, giving it the emphasis it deserves. Second, both sentences establish subject-verb connections early in the clause. In the first sentence, the verb '*there was*' is brought to the forefront, creating a clear and direct statement. In the second sentence, the subject '*we*' is explicitly linked to the verb '*measure*,' improving readability and engagement.

By placing the most important information in the stress position, the writer enhances the logical flow of ideas and sets up the sentence for greater impact. This practice also makes it easier for readers to follow the progression of arguments.

In conclusion, prioritizing the stress position for key information enhances sentence clarity, engagement, and impact, improving overall coherence and readability.

6 Creating a flow of ideas

Skilled writers use various methods to establish the so-called *flow of ideas*. This flow is essential in crafting texts that are clear and easy to read. The concept is simple: when a text promotes a flow of ideas, it becomes smooth and pleasant to read. Readers, under these conditions, do not struggle with convoluted or fragmented sentences but instead engage effortlessly with the material.

One fundamental strategy for creating this flow is the *topic-stress strategy* [77, Sec. 6.3]. This approach involves connecting the topic of one sentence to the stress of the preceding sentence [149, Ch. 13, p. 126]. By aligning these elements, writers can create continuity and ensure that ideas flow seamlessly. Consider the following example:

Scientific writers remain indifferent to requests to avoid **convoluted sentences.**

stress

Yet a **convoluted sentence** introduces unnecessary complexity,

topic

such as pompous words, jargon, nominalization, and overly long clauses.

In this case, the stress of the first sentence (i.e., '*convoluted sentences*') transitions naturally to the topic of the second sentence. This logical connection keeps readers engaged and ensures coherence. Using this stress-to-topic flow builds logical bridges between ideas, making the text easier to follow.

Another way to create a flow of ideas is to write paragraphs where information introduced in the topic position recurs throughout the paragraph, as documented in [133, Ch. 3.3, p. 37] and [161, p. 31]. This technique allows writers to reinforce the main idea while adding depth. Let us consider an example:

Table 2 List of pronouns.

Type of pronouns	Pronouns
Personal	I, we, you, he, she, it, they
Object	me, us, you, him, her, it, them
Possessive	mine, ours, yours, his, hers, theirs
Demonstrative	this, that, these, those
Relative	who, whom, which, that
Indefinite	all, another, any, anybody, anyone, anything, both, each, either, everybody, everyone, everything, few, many, nobody, none, no one, nothing, one, several, some, somebody, someone
Interrogative	who, whom, which, what
Reflexive	myself, yourself, himself, herself, itself, ourselves, yourselves, themselves
Reciprocal	each other, one another

✓ **Being a researcher** offers numerous advantages. One primary benefit is that **researchers** contribute to advancing knowledge. Not only can **they** share their findings with peers and the public, but **they** also develop critical thinking and analytical skills by working with data. Additionally, **being a researcher** opens up diverse career opportunities. **Researchers** can thrive in academia, industry, or government, broadening **their** expertise across various fields.

In the above example, the phrase '*being a researcher*' serves as the topic of the paragraph. Through repetition and references ('*researchers*', '*they*', '*their*'), the topic is consistently reinforced, creating cohesion. Pronouns such as '*they*', '*it*', or '*this*' (see Table 2) also play a key role in maintaining flow and linking ideas across sentences.

However, cohesion alone is not sufficient. A cohesive paragraph must also demonstrate coherence. Coherence arises from two critical elements: (i) maintaining a logical link to the initial topic, and (ii) introducing fresh, relevant information in subsequent sentences. In the example above, coherence is achieved as every sentence expands upon or complements the topic '*being a researcher*' while providing novel insights.

To summarize, writers can promote a flow of ideas by employing two effective strategies. First, ensure that the stress position of one sentence connects logically to the topic position of the following sentence, creating a seamless transition. Second, maintain a consistent topic throughout the paragraph while introducing new and relevant information. These techniques allow writers to craft engaging, well-structured texts that keep readers focused and engaged.

7 Be careful with nominalization

Nominalization refers to the transformation of a verb into a noun. For instance, the verb '*verify*' becomes the noun '*verification*' when nominalized. This transformation often involves modifying the main verb by adding specific suffixes, such as '*ion*,' as shown in Table 3.

Interestingly, some words function as both verbs and nouns without any changes in form; for example, the word '*increase*' can serve either role.

Nominalization is frequently used in academic writing due to its ability to express abstract concepts. However, some experts argue that it can weaken writing by transforming vivid, concrete actions with static abstractions [180, p. 49]. This transformation often reduces the dynamic quality of a sentence, making the text feel less engaging.

Readers generally expect verbs to convey actions, and deviations from this norm can lead to confusion. For example, the sentence '*Two gears were extracted from the machine*' is clear and dynamic because the verb '*extracted*' directly conveys the action. Compare this to its nominalized counterpart: '*The extraction of two gears from the machine was performed*.' Here, the nominalization '*extraction*' dilutes the sentence's energy, resulting in a cumbersome and less direct statement.

Despite these criticisms, nominalization has its place, particularly when the focus of a sentence is on a concept rather than an action. In such cases, nominalization can provide emphasis and precision. For example, in a discussion about measurement accuracy, the phrase '*the verification of results*' may be more suitable than '*verifying results*' if the intention is to highlight the process as a key concept rather than an action.

In summary, while nominalization is a valuable linguistic tool in academic writing, its use requires careful judgment. Writers should prioritize clarity and engagement by using verbs to depict actions whenever possible. Nominalization is most effective when it serves to emphasize ideas or concepts, rather than simply complicating sentence structures. Striking a balance between nominalizations and action-oriented verbs ensures both readability and precision in scientific communication.

7.1 Be careful with nominalization in the topic position

Recall that the topic position works well when it carries information familiar to readers (Section 5). However, using nominalization in the topic position often leads

Table 3 Examples of nominalization.

Suffix	Verb	Noun
—ion	explain	explanation
—tion	confirm	confirmation
—sion	conclude	conclusion
—ment	develop	development
—ance	resist	resistance
—ence	prefer	preference
—ism	criticize	criticism
—al	renew	renewal
—er	teach	teacher
—or	inspect	inspector
—ee	train	trainee
—ing	write	writing
—age	link	linkage
—ant	assist	assistant
—y	recover	recovery

Table 4 List of colorless verbs (list borrowed from [110, p. 141]).

Colorless verbs
accomplished, achieved, attained, carried out, conducted, done, effected, experienced, facilitated, given, implemented, indicated, involved, made, occurred, obtained, required, performed, proceeded, produced.

to awkward phrasing and diminished clarity. Consider the following example:

$$\underbrace{\text{An acceptance}}_{\text{topic}} \text{ of the student's paper occurred.}$$

In this sentence, the verb '*occurred*' fails to convey action effectively. Instead, the noun '*acceptance*' carries the action but is placed awkwardly in the topic position—a choice that weakens the sentence [105, p. 541]. This lack of clarity draws vitality, making the sentence awkward.

In scientific writing, nominalization often coexists with what we call *colorless verbs*—verbs that lead to vague, ambiguous, or uninspiring sentences. These verbs, often in past participle form, should be replaced with vivid action verbs [110, p. 141]. To illustrate, consider the following improved sentence:

✓ The Editor accepted the student's paper.

This sentence is in the active voice. It is clear and concise. It removes the weak verb '*occurred*', replaces it with the action-oriented verb '*accepted*', and places a doer ('*Editor*') in the topic position. The sentence flows naturally due to two key features: (i) the noun '*Editor*' anchors the topic position, and (ii) the verb '*accepted*' expresses direct action.

While nominalization is often criticized, it cannot always be avoided. In specific contexts, nominalization can enhance clarity and conciseness. Consider the following sentences:

✓ The Editor is introducing new journal policies that should attract more papers.
✓ The introduction of new journal policies should attract more papers.

Both sentences are correct, but the second flows better and is more concise. Including the phrase '*by the Editor*' after '*policies*' would unnecessarily lengthen the sentence. Because readers typically understand that editors manage journals, this information can be omitted. This example illustrates how nominalization can produce shorter, more streamlined sentences while retaining the original meaning.

Another benefit of using nominalization arises when connecting consecutive sentences. Specifically, a nominalization in the second sentence can refer back to a verb in the first. This technique often uses a pronoun like '*this*' or '*that*' followed by the nominalization. For instance:

✓ Scientific writers **prefer** the active voice over the passive one. **This preference** comes from knowing that the active voice produces shorter, concise sentences.

Here, the nominalization '*preference*' links back to the verb '*prefer*' through the pronoun '*this*.' This connection creates a logical flow, bridging ideas between sentences and supporting the overall coherence of the text (see also Section 6).

In conclusion, while nominalization should be used cautiously—particularly in the topic position—it is a valuable tool for conciseness and cohesion when employed judiciously. Writers must balance nominalization and active verbs to maintain clarity and ensure the flow of ideas throughout their work.

This example shows that the verb '*prefer*' links meaning to the nominalization '*preference*' through the pronoun '*this*'. To sum up, nominalization allows us to bridge ideas between sentences, which supports the flow of ideas (see also Section 6)

7.2 Be careful with nominalization as an object

An *object* in a sentence represents a noun that receives action from a verb. For instance, in the sentence '*Students write essays*,' the word '*essays*' is the object, as it receives the action from the verb '*write*.' However, when the object of a sentence is a nominalization, it may result in an unclear or complex sentence.

Consider the following example:

The diligent student achieved $\underbrace{\text{an improvement}}_{\text{object}}$ in writing skills.

Here, the nominalization '*an improvement*' serves as the object. However, this phrasing is less effective because the term '*in writing skills*' is more central to the sentence's meaning. To improve clarity, we can eliminate the weak verb '*achieved*' and convert the nominalization '*improvement*' into an active verb:

✓ The diligent student improved in writing skills.

This revised sentence is shorter and clearer, placing the action in the verb '*improved*.' Rather than relying on nominalization as the object, using an active verb makes the sentence more direct and efficient.

Let us examine another example:

The function of this department is the $\underbrace{\text{registration}}_{\text{object}}$ of accounts.

In this case, the nominalization '*registration*' can be replaced with its verb form. The improved sentence reads:

✓ This department registers accounts.

This revision removes both the nominalization '*function*' and the weak verb '*is*,' resulting in an easy-to-read sentence. Eliminating the verb '*is*' often improves the quality of writing (Section 8). Consider another example:

✗ This book is explanatory of the main writing principles.

This sentence lacks vigor due to the presence of both the nominalization '*explanatory*' and the verb '*is*.' The improved version replaces these with an action-oriented verb:

✓ This book explains the main writing principles.

These examples demonstrate that converting a nominalization, when used as the object of a sentence, into an active verb significantly enhances clarity and improves the reader's understanding.

7.3 Be careful with nominalization as a prepositional phrase

A *preposition* refers to a set of specific words such as *'at,' 'by,' 'for,' 'from,' 'in,' 'of,' 'on,' 'to,' 'with'*, and others (see Table 5 for a list of common prepositions). A *prepositional phrase* is a group of words that begins with a preposition [113, p. 85]. Issues can arise when prepositional phrases contain nominalization. When a noun derived from a verb (nominalization) is embedded in a prepositional phrase, readers may struggle to comprehend the sentence. This difficulty occurs because readers expect actions to be expressed through verbs, not nouns.

Consider the following example:

✗ **With** serial battery **failure**, the capacity of the batteries decreased significantly.

In this sentence, the first part is a prepositional phrase beginning with the preposition '*with*' and containing the nominalization '*failure*' to express an action. This construction is unclear and adds complexity to the sentence. To improve clarity while retaining the nominalization, the preposition '*with*' could be replaced with a more precise word, such as '*during.*'

However, since readers generally expect verbs to convey actions, the sentence can be improved further by eliminating the nominalization '*failure*' and rephrasing with an active verb. Additionally, the vague preposition '*with*' can be replaced with a conjunction like '*when*,' '*while*,' or '*as*.' Consider the revised version below:

✓ **When** the batteries **failed**, the capacity of the batteries decreased significantly.

This revised sentence uses '*when*' to introduce a clause with a subject and a verb. The verb '*failed*' clearly expresses the action, making the sentence more direct and understandable. Moreover, the word '*serial*' was omitted, as it is unnecessary in this context.

Table 5 List of the most common prepositions (borrowed from [113, p. 65]).

Prepositions
aboard, about, above, according to, across, after, against, ahead of, along, alongside, amid, among, around, as, as for, as well as, at, before, behind, below, beneath, beside, besides, between, beyond, but, by, concerning, considering, despite (or in spite of), down, during, except (or except for), for, following, from, in, in addition to, inside (or inside of), into, like, near (or near to), of, off, on (or onto), on account of, opposite (or opposite of), out (or out of), outside (or outside of), over, past, per, plus, round, since, than, through, throughout, to, toward (or towards), under (or underneath), unlike, until (or till), up (or upon), versus (or vs), with, within, without.

These adjustments demonstrate that avoiding nominalization within prepositional phrases leads to clearer, more concise sentences. Prioritizing verbs to express actions creates stronger and more impactful writing, improving overall readability and coherence.

7.4 Be careful with nominalization in the role of adjective

Readers generally expect nouns or verbs to carry the emphasis in a sentence. However, writers sometimes emphasize adjectives, which can divert focus from the intended meaning. Consider the following sentence:

The experiment shows the crucial function of heat in temperature regulation.
adjective

Here, the adjective '*crucial*' modifies the nominalization '*function*' and receives strong emphasis due to its placement immediately after the verb '*shows*'. However, the writer intended to emphasize '*heat*', not '*crucial*'. To clarify the meaning and shift the emphasis appropriately, the sentence can be revised using a *that*-clause:

✓ The experiment shows **that** heat plays a crucial function in temperature regulation.

In the revised version, the *that*-clause places '*heat*' as the subject and '*plays*' as the verb, adhering to the common subject-verb structure (e.g., [110, p. 109]). This modification ensures the sentence flows naturally, with the action clearly expressed in the verb '*plays*'.

Let us examine another example:

adjective
Studies on carbon sensors revealed the key governing mechanism of
nanostructures for the efficiency of gas detection.

In this sentence, the adjective phrase '*key governing*' receives undue emphasis, whereas the focus should be on '*nanostructures*'. Rewriting the sentence with a *that*-clause resolves this issue:

✓ Studies on carbon sensors revealed **that** nanostructures govern the efficiency of gas detection.

This revision places the subject '*nanostructures*' and the verb '*govern*' in the conventional subject-verb structure. Additionally, the nominalization '*mechanism*' is eliminated, further streamlining the sentence. The revised version is clearer, more concise, and easier to understand.

These examples illustrate that emphasizing adjectives, particularly when paired with nominalizations, can obscure the intended meaning. By restructuring sentences and prioritizing subjects and verbs, writers can ensure their meaning is conveyed effectively and their writing flows smoothly.

8 Weakener of sentences: to be

The verb '*is*' and its variations ('*are, was, were*') may appear harmless, but they can weaken writing significantly. Linguists have studied their impact and proposed a movement called *E-Prime* [23, 38, 127, 179]. This strategy abolishes '*to be*' and its forms ('*am, is, are, was, were, been*,' and '*being*') from communication. Advocates claim E-Prime enhances clarity and improves thinking, with evidence supporting its potential cognitive benefits [127].

E-Prime encourages writers to take responsibility for their statements. For instance, instead of "*The book is great*," one could say, "*The book helps me learn calculus*." The latter provides a concrete fact rather than a vague opinion. Similarly, "*Mark is a farmer*" becomes "*Mark owns a piece of land and cultivates spinach*," offering clarity and specificity. Using vivid verbs fosters better thinking and enhances credibility [127].

We know that reducing the use of '*to be*' benefits scientific writing, as the '*to be*' often appears alongside nominalizations. Nominalizations frequently obscure the actor, creating vague sentences. For example, "*A calibration was performed*" uses the nominalization '*calibration*' and passive voice, omitting who performed the action. Rewriting this sentence actively as "*The technician calibrated the instrument*" introduces an actor and dynamic verb, yielding a more engaging result (see Section 7).

Not all authors support the E-Prime movement [46], as the E-Prime purists demand the complete elimination of '*to be*' from vocabulary [23, p. xiv], [115]. While E-Prime principles can enhance clarity, the verb '*to be*' still has valid uses.

For example, "*Glass is primarily made of silica*" effectively states a fact. Similarly, "*I am hungry*" feels more natural than "*I feel hungry*," despite ongoing debate [23, p. xv]. Great writers like F. Scott Fitzgerald, Mark Twain, and George Orwell effectively employed '*to be*' in their works, showing '*to be*' has a place in quality writing.

Eliminating '*is*' without care can harm writing clarity. For instance, consider:

✕ The resistor was heated, current measured through a short wire made of carbon, and temperature controlled by adjusting the voltage.

This sentence creates ambiguity. Does it imply "*current measured through a short wire was made of carbon*" or something else? Adding '*was*' for clarification resolves this:

✓ The resistor was heated, current **was** measured through a short wire made of carbon, and temperature **was** controlled by adjusting the voltage.

Experienced writers recommend reviewing every instance of '*is*' and removing it where possible to strengthen sentences [112, p. 213]. However, thoughtful use of '*to be*' can add value when expressing facts or identities, demonstrating that balance, rather than elimination, leads to effective writing.

9 Be careful with 'It is ... / It ... that'

Writers often utilize constructions like '*It is ...* ' and '*It ... that*' to introduce general evaluations or assertions. The effect of such constructions is concealing the source of the evaluation. Namely, while these constructions might appear neutral or objective, they can dilute precision and make sentences less engaging. This practice is commonly associated with extraposition, where dummy subjects such as '*It*' are employed to shift focus or lend an air of universality to a statement.

In many cases, these constructions allow authors to generalize their claims while distancing the evaluation from themselves. For instance, consider the following examples:

✕ **It is** generally accepted **that** inflation hurts the economy.
✕ **It is** known **that** batteries have a limited lifetime.
✕ **It** seems clear **that** teamwork enhances productivity.

In these sentences, the use of '*It is*' and '*It ... that*' creates an impression of objectivity by presenting the statements as widely accepted or uncontested facts. However, this strategy obscures the agent responsible for the evaluation. Readers find it harder to assess whether the source of the claim is reliable, as the author's role is concealed. This distancing effect makes the statement appear as an established state of affairs rather than an argument open to discussion.

To enhance clarity and accountability, writers should strive to specify the source of the evaluation and avoid unnecessary abstraction. For instance, the sentences above could be rewritten as follows:

✓ **Economists** generally accept **that** inflation hurts the economy.
✓ **Studies** known **that** batteries have a limited lifetime.
✓ **Bill Gates** believes **that** teamwork enhances productivity.

These revisions replace the dummy subject '*It*' with a concrete actor (e.g., '*Economists*,' '*Studies*,' or '*Bill Gates*'), lending clarity and specificity to the sentence. Readers are better equipped to evaluate the claim when the source is explicit.

While '*It is ...* ' structures may sometimes serve a useful purpose, such as emphasizing the importance of a subsequent clause, they should be employed sparingly and with a clear intent. Overusing '*It is ...* ' can lead to monotony and vagueness in writing. *It is* better to use active constructions.

10 Be careful with 'There is'

Writers use the term '*there is*' to convey the idea of existence or occurrence [17, Sec. 11.4, p. 943].

Variations such as '*there are, there was, there were*' are commonly used in writing; however, their frequency in scientific papers has been declining for over a century. By 2005, the use of '*there is*' had decreased to half of its prevalence in 1900 [16, p. 122]. This trend reflects the preference of many scientific writers to avoid '*there is*' because of its tendency to produce longer, less direct sentences [101, 154]. Let us examine an example:

✕ **There is** a sharp increase in the layer of carbon.

This sentence can be improved by removing '*there is*' and converting the noun '*increase*' into its verb counterpart:

✓ The layer of carbon increased sharply.

The revised sentence is shorter and flows more effectively. This demonstrates how eliminating '*there is*' enhances clarity and reduces wordiness. Additional examples follow the same principle. For instance:

✕ There was a team meeting on Friday.
✓ The team met on Friday.

This example illustrates that a sentence without '*there is*' is concise and easier to read; the term '*there is*' often results in less engaging constructions. In addition, by replacing '*there is*' with direct action verbs or rephrasing sentences, authors create a more compelling narrative. Consider the following example:

✕ There is evidence that suggests a new treatment is effective.
✓ Evidence suggests that a new treatment is effective.

In the revised sentence, the active verb '*suggests*' replaces the '*there is*' construction, making the sentence more direct. The same principle applies in technical writing where precision and clarity are critical.

Moreover, when '*there is*' introduces a concept or fact, it can obscure the agent responsible for the action. For example:

✕ There is a significant reduction in error rates due to the new algorithm.
✓ The new algorithm significantly reduces error rates.

Here, the revised version highlights the agent ('*the new algorithm*') and makes the sentence active and informative. This approach ensures the focus remains on the subject performing the action, which is especially important in scientific writing.

That said, there are occasions where the use of '*there is*' brings stylistic or contextual benefits. For example, consider:

✓ There are two laptops in the laboratory.

This sentence feels more natural than alternatives such as '*Two laptops are in the laboratory*' or '*The laboratory contained two laptops.*' Similarly, the sentence

✓ There are times when removing adverbs can enhance comprehension.

provides a smoother flow compared to its shorter version: '*Removing adverbs can enhance comprehension in certain instances.*' The choice between these options depends on the writer's intended tone and style. In some cases, '*there is*' can help emphasize certain elements or improve readability.

To summarize, writers should carefully evaluate the use of '*there is*' in their sentences. Removing or replacing it often results in more concise and direct expressions, which improves sentence flow and clarity. However, its occasional use may be justified based on the context, audience, and stylistic preferences. Writers should prioritize clarity, conciseness, and engagement.

11 Be careful with 'This . . . '

The word '*this*' is commonly used to refer back to ideas mentioned in the preceding sentence. For example, consider the following:

✕ In recent years, the number of new graduates has increased steadily, while the number of job positions available has remained fairly constant. **This** has resulted in higher unemployment rates.

In this sentence, '*this*' is unsupported, leaving the reader to infer what it refers to. Without a clear noun, the reference may be unclear, especially in complex arguments or paragraphs where multiple ideas are presented. Writers should avoid using '*this*' on its own if there is any possibility of confusion.

Now consider the next example:

✓ In recent years, the number of new graduates has increased steadily, while the number of job positions available has remained fairly constant. **This situation** has resulted in higher unemployment rates.

In this example, the phrase '*this situation*' summarizes the idea presented in the preceding sentence. Specifically, it refers to the combination of a steady increase in graduates and a limited number of job positions. The use of '*this*' followed by a summary noun ('*situation*') helps the reader understand what is being referred to.

To ensure clarity, writers must follow '*this*' with a specific noun, especially in academic writing. Doing so eliminates ambiguity and helps readers understand what '*this*' is all about.

Another consideration is the choice between '*this*' and '*that*.' Both can function as pointers to summarize preceding content, but their use conveys subtle differences in meaning. '*This*' suggests closeness or direct continuation, while '*that*' implies more distance, either in time or emphasis. For example:

✓ **This situation** has resulted in higher unemployment rates.

✓ **That** situation highlights the challenges new graduates face when seeking job positions.

In these examples, '*this*' directly ties to the previous sentence, signaling a closer connection, whereas '*that*' creates a slight separation, often used to introduce further elaboration or a shift in focus.

12 Dangling modifiers

Dangling modifiers are a recurring challenge in scientific writing, as they create ambiguity and misinterpretation. A modifier is described as "dangling" when its intended subject is absent or not clearly stated. Readers feel uncertain about what is being referenced.

Consider the next example.

✕ Using a microscope, the cells were observed.

In this case, the sentence implies that the cells, rather than the researcher, used the microscope. Another example.

✕ Decreasing sharply, the experiment showed unexpected results.

Here, *the experiment* seems alive.

Occasionally, the dangling modifier creates unintended humor: "*After reading the study, the hypothesis was discarded.*" This implies that the hypothesis, a conceptual entity, somehow engaged in the reading.

Dangling modifier issues can be solved by adding a 'doer', a subject, in the main clause. Let us illustrate this point through some examples.

✕ Upon entering the room, the beakers were seen on the table.
✓ Upon entering the room, the researcher saw the beakers on the table.

The correction explicitly clarifies the subject performing the action, i.e., *the researcher*.

✕ While analyzing the data, unexpected trends were identified.
✓ While analyzing the data, the scientists identified unexpected trends.

This version specifies the individuals responsible for the analysis, i.e., *the scientists*.

✕ Following the experiment, significant errors were found.
✓ Following the experiment, the researchers found significant errors.

By adding the subject, the sentence avoids ambiguity.

In conclusion, dangling modifiers are more than a matter of style—they are obstacles to precision and clarity in scholarly writing. To address dangling modifiers, identify the subject of every modifier, and bring this subject in the main clause.

13 Break any cluster with three or more nouns or adjectives

Writers frequently employ a noun or an adjective following a noun [110, Ch. 5]. For instance, the term "*wedding cake*" (a two-noun cluster) and "*ceremonial cake*" (an adjective and a noun) convey specific meanings for the noun '*cake*'.

A cluster containing two nouns or an adjective and a noun adds clarity, helping in effective communication. However, challenges arise when this linguistic feature goes to a extreme.

For example, scientists have a tendency to stack multiple nouns (and adjectives) in a sequence, each modifying the final noun in the chain [110, Ch. 5]. This construction—where several modifiers precede a single noun—result in convoluted and barely comprehensible sentences.

Consider the following example:

"*Three freshly painted vintage wooden toy cars were displayed in the gallery.*"

Which terms here act as primary nouns, and which serve as descriptive modifiers?

Strings of nouns or adjectives arise from the writer's intention to be brief. However, clarity is crucial and it cannot be sacrificed for the sake of conciseness. Using more words, mixed with punctuation, avoids ambiguous interpretations.

Consider, for example, the phrase "*old book restoration processes*." It could convey multiple meanings: the processes for restoring old books, restoration processes for books that are old, or old processes used for book restoration. While this example may seen trivial, similar occurrences are ubiquitous in scientific texts.

A phrase like "*dry flower harvesting techniques*" might lead to confusion too: are the techniques being described for harvesting dry flowers, or are dry techniques harvesting flowers? Ensuring clarity in these cases requires writer's vigilance.

Breaking down such strings is not as daunting as it may seem. The goal is to simplify these clusters into pairs or to introduce words that clarify their meaning. To achieve this, apply tools such as hyphens, prepositions, or commas to clarify relationships between words.

Here are some strategies:

1. **Insert prepositions or conjunctions.** Use connecting words to articulate relationships explicitly. For example:

   "Field soil moisture content measurements" becomes "Measurements of soil moisture content in the field."

2. **Employ punctuation or hyphenation.** Hyphens can clarify modifiers by grouping related words:

   "High energy particle physics experiment" becomes "High-energy particle-physics experiment."

3. **Reorder and rephrase.** Rewrite sentences for greater clarity without sacrificing precision:

> "Long-term greenhouse gas emission reduction strategies" becomes "Strategies for re-ducing greenhouse gas emissions over the long term."

4. **Review for unintended meanings.** Noun and adjective forms often have subtly different implications. Avoid unintentional shifts in meaning. For example:

> "Parasitic treatment" refers to treating parasites, while "parasitological treatment" per-tains to the study or science of parasitology.

In summary, avoid creating a string of words with more than two or three con-secutive nouns or adjectives.