7

ASSURING QUALITY WRITING

I swear that there are more exceptions than rules in the English grammar.
—Gautam Rao, American Desi (2001)

7.1 IN THIS CHAPTER

The title of this section is somewhat misleading. If you find yourself in the position to need this book, odds are pretty good that you've already learned everything in this chapter. Most of this chapter's contents should be a review of basic grammar and mechanics, things that you would have studied in English classes year after year.

However, do not take grammar and mechanics lightly. You've probably heard something similar to this at one point or another: "If you can't communicate your ideas, then you might as well not have them." Of course this overstates the point, but if your team writes well using some of the strategies outlined in this chapter, your proposals will be more persuasive, your journal articles will require fewer revisions, and your readers will understand your ideas better. Think about grammar and mechanics as the final demonstration of your team's attention to detail and precise thinking.

Your team has worked very hard to plan and execute a document, and quality grammar and mechanics help strengthen the credibility of your points because it shows readers that your team has paid careful attention even to superficial items like proper grammar. In fact, studies show that an audience will rate proper grammatical writing as "smarter" than poor writing—even if the ideas in the proper document are not as sophisticated. By contrast, why would readers believe the claims your documents make if those documents are plagued by small mistakes? If your document has errors and weak presentation, it's an easy step for a reader to assume that the reasoning behind the claims presented is also weak. So, rather than thinking about proper grammar as a burdensome set of rules to follow, think about proper writing as establishing your credibility.

Don't let poor grammar and mechanics undermine your team's hard work. Instead, utilize the topics in this chapter to help your team put the competitive edge on its documents by:

- Choosing the most appropriate words
- Writing sentences that clearly communicate your ideas to your audience
- Punctuating for clarity

7.2   CHOOSING THE BEST WORDS

Technical writing aims to convey ideas as clearly and concisely as possible. When your team chooses strong words, the ideas appear vividly and without confusion. If, however, your document contains vague language or words that force a reader to work hard to understand your points, then the document will not have a strong impact. Technical writing teams should strive to choose strong words and to avoid weak words.

7.2.1   Choose Strong Words

Strong words convey meaning precisely and compactly. One writing researcher, Richard Lanham, argues that most writers can eliminate up to one third of their document's length while significantly increasing the document's clarity by choosing good words and eliminating unnecessary ones. The key principles for technical writing teams appear below with examples of each concept.

7.2.1.1   Use Strong Nouns and Verbs.   First, let's quickly review nouns and verbs. *Nouns refer* to a specific person, place, or thing and most often indicate something completing an action. Nouns have many functions, like subjects in sentences, or objects of prepositions. *Verbs express* action or a state of being, so they tell readers what is happening or what something is. Of course it's more complicated than this, but if your team can remember just these two things—*nouns refer and verbs express*—choosing strong nouns and verbs becomes easier. As you write, ask "Who is doing what to whom," and clearly refer to a specific person, place, or thing and clearly indicate what action or state of being occurred.

In other words, *a strong noun refers to one—and only one—thing and can therefore be distinguished from all other things in its class*. Strong nouns can refer to a single concrete object that can be identified by the senses, or they can refer to nonmaterial things such as ideas or values. In both cases, material and immaterial, a strong noun enables readers to exclude other possible references or meanings.

Similarly, *strong verbs vividly describe actions or states in a way that others could visualize the action or state*. Usually, writers find it more difficult to compose with strong verbs than to compose with strong nouns. However, as every good writer will attest, verbs express the core meaning of a sentence. Therefore, as your team revises, attempt to include verbs that clearly describe the action or state of being. Finally, writers should try to avoid passive voice as much as possible because the "to be" forms of verbs do not clearly show who completes what action and, therefore, passive verbs usually require more explanatory words, which results in longer sentences, increasing the likelihood of misunderstanding.

Below, we show two simple examples of weak noun and verb choices followed by a sample revision. The nouns are in **bold italics** and the verbs are <u>underlined</u>.

The ***machine*** <u>was running</u> the samples. The ***centrifuge*** <u>rotated</u> the samples.	"Machine" is a vague noun while "centrifuge" refers to a particular piece of equipment. "Was running" does not indicate the actual action.

It <u>is</u> because of rising fuel ***costs*** that this research <u>is</u> necessary. Rising fuel ***costs*** <u>provide</u> the reason for this research.	"It"—a pronoun—has no referent and therefore requires the strings of "to be" verbs that follow. Asking "who kicks whom" provides an easy revision since the fuel costs provide the reason for the research.

7.2.1.2 *Choose Words with the Right Level of Formality.* In documents composed by technical writing teams the diction, or level of formality, will be relatively serious. Face-to-face communication styles usually possess lower levels of formality than written forms of communication; for this reason, many writers make the mistake of "writing like they speak" and degrade their credibility in doing so. Very few readers of technical documents expect colloquial style and so writing with a "conversational" style will upset the expectations that readers have about technical documents. Finally, slang should never be used in formal written documents unless it demonstrates a particular point.

However, choosing a formal style doesn't mean that documents have to be "stuffy." Take this book's style, for example. We have written in a relatively formal style, yet have retained a level of informality to enhance interest and improve clarity. Had we chosen to write in a more formal manner, we wouldn't use contractions, for example, and we would have chosen to use technical terms—like "diction"—in place of more

commonly accepted ones, like "level of formality." Choosing the right level of formality can be difficult, so when in doubt, choose the more formal style for technical documents since readers expect technical documents to be more serious. If, however, your audience analysis indicates that your audience would respond well to a less formal document, don't be afraid of writing in a more friendly way, so long as you retain your seriousness toward the subject.

7.2.2   Avoid Weak Words

Anytime a reader asks, "What do you mean by that?", you have used a weak word. Weak words create problems because they require readers to interpret what authors mean, and in doing so, readers might arrive at a different meaning than that intended. When your team writes with weak words, then, audiences find your documents far less persuasive, and unpersuasive documents seldom achieve the goals that authors intend. Below, we illustrate several different ways that weak words can enter your technical documents.

7.2.2.1   Check for Confusing or Frequently Misused Words.   Obviously, you don't want to use the wrong word: noting that a measurement was in millimeters rather than centimeters would simply be wrong. Similarly, using incorrect words that sound alike (e.g., "it's" and "its" or "their" and "there") is simply wrong. Pay special attention to the groups of words below, and when in doubt about any proper word choice, consult a grammar handbook or online resource like those listed at the end of the chapter.

Accept/Except. Accept means to receive something; *except* means to exclude.
> I accept the award.
> All of the assays are complete except the final one.

Affect/Effect. Affect is usually a verb that means to influence (although it can be a noun that means superficial appearance but would be much less common in technical prose); *effect* is usually a noun that refers to results, although it can mean to cause something or to bring about a result.
> How did changing the temperature affect the microbe?
> Effects of the temperature change appear in the surface structure.

Amount/Number. *Amount* refers to things that cannot be counted or are considered as a collective unit; *number* refers to things that can be counted individually.
> We have a large amount of work to do on this proposal.
> We have a large number of samples to process.

Between/Among. Between indicates a relationship between only two items; *among* indicates relationships among three or more items.
> Significant difference exists between the two populations.
> We observed 15 instances among all the assays.

Discover/Invent. *Discover* means to find something that exists already; *invent* means to bring something into existence.

We <u>discovered</u> that heat changes the surface structure of the microbes.

Our team <u>invented</u> a new method for testing module inter-compatibility.

Fewer/Less. *Fewer* is used with singular nouns, or things that can be individually counted; *less* refers to collective nouns or things that cannot be individually counted.

We have <u>fewer</u> opportunities for funding this year than last year.

This proposal required <u>less</u> attention than the prior one.

Good/Well. *Good* is always an adjective that modifies nouns; *well* can be either an adverb or adjective, but more often is an adverb modifying a verb.

The results were <u>good</u> for demonstrating our hypothesis (modifies "results").

The test went <u>well</u> (modifies "went").

Its/It's. *Its* expresses ownership or possession; *it's* is the contraction form of *it is*.

<u>Its</u> characteristics include increased conductivity and luminescence.

<u>It's</u> well known that gold conducts well in this application.

There/Their/They're. *There* usually refers to a place unless it's used to refer to a nonspecific noun; *their* represents possession by a group of people; *they're* is the contraction form of *they are*.

<u>There</u> are many people over <u>there</u> (the first is nonspecific and the second refers to a place).

<u>Their</u> work proved invaluable for helping us predict the outcomes.

<u>They're</u> attempting to replicate the phenomenon in different materials.

Your/You're. *Your* expresses possession; *you're* is the contraction form of *you are*.

<u>Your</u> lab has demonstrated outstanding success with that method.

<u>You're</u> going to be required to submit results by the end of the month.

7.2.2.2 Avoid Double Negatives, and Change Negatives to Affirmatives. A double negative occurs when two negative words appear together, creating significant confusion about the meaning. Any word that expresses a negative might cause writers problems, but some of the more common negative words include:

- Can't
- Didn't
- No
- Nothing
- None

Here are some examples:

Incorrect:	We *didn't* have *no* time to run all the samples.
Correct:	We *didn't* have time to run all the samples.
Incorrect:	The temperature change *didn't* have *nothing* to do with the result.
Correct:	The temperature change *didn't* have anything to do with the result.

In general, if your team phrases their sentences positively, double negatives won't be a problem. For example, to rephrase the sentences above in the positive:

Because we had limited time, we ran only a few samples.
The result was unrelated to the temperature change.

7.2.2.3 Avoid Changing Verbs to Nouns. Technically called "nominalization," this problem occurs when writers turn verbs into nouns, which results in nouns becoming the focus of the sentence rather than the verb. Nominalization represents perhaps one of the most significant problems for clarity in documents so we encourage your team to pay special attention to it. Study the sentences that follow to see how much confusion nominalizations introduce into a document.

It is our <u>conclusion</u> that the surface <u>deformation</u> was caused by the heat change.

can be revised to

We conclude that the heat change caused the surface to deform.

The second sentence presents the same information far more clearly and with fewer words.

Often in English, nominalizations end in *–tion*, so every word that ends this way should be a suspect. In fact, the word "nominalization" is itself a nominalization since it comes from the verb "nominalize." Some other common examples include:

Conclusion—from conclude
Decision—from decide
Destruction—from destroy
Examination—from examine
Investigation—from investigate
Participation—from participate
Reaction—from react
Suggestion—from suggest

The words above represent only a few possible nominalized words, and the *–tion* form is just one of many ways to nominalize. However, just about any time a noun can be changed to a verb and the sentence made shorter, a nominalization has appeared.

7.2.2.4 *Delete Meaningless Words and Modifiers.* Technical writers should seek to express ideas as clearly, concisely, and completely as possible. However, all writers occasionally include meaningless words, modifiers, and colloquial phrases that inhibit the clarity of what we write. In general, any word that can be eliminated should be eliminated, including most adjectives. For example, the last sentence originally ended "… including a great many adjectives." The phrase "a great many" became "most." As your team writes and edits, pay attention to these general concepts:

- Check all adjectives and adverbs to confirm their necessity; for example, must it read "really fast" or will "fast" do by itself?
- Avoid superlatives like "most" or "least" because these words are seldom specific.
- Transform verb phrases into solid verbs; for example, "ran into" becomes "hit."
- Eliminate redundant word pairs; for example, "past history" becomes simply "history" since all history is past.
- Eliminate colloquial phrases that add extra words. For example:

Colloquial Phrase	becomes	Revision
The reason is because		Since (or because)
Due to the fact that		Because (or since)
For the most part		Usually
With regard to		About
In the event that		If (or when)

7.2.2.5 *Avoid Jargon.* Technical writers must often include technical terms: engineers writing to other engineers will use very specific language for specialists that nonspecialists will not necessarily understand. This specialized language is often called "jargon." But jargon becomes a problem when writers rely too heavily on specialized terms, since all the jargon in the world won't cover sloppy reasoning. Most readers can see through the tactic of using jargon to cover poor thinking and, in fact, will find an overly jargon-filled document less persuasive than one that simply "says what it means." Whenever possible, steer clear of jargon because it makes documents difficult to read; trying to "sound smart" causes writers to produce text that uses far too many words and confounds readers. For example:

> *In spite of the fact that Homeland Security agency heads were not in agreement with respect to central causes of the security breech at the Canadian border, officials determined that immediate interventions were required and the foreign nationals were expelled.*

can be revised as:

> *Even though representatives of Homeland Security couldn't identify the causes of the security breech at the Canadian border, they decided to deport the foreign nationals immediately.*

In the revision, not only has the word count been reduced from 40 words to 26, the meaning is far clearer because the second sentence simply "says what it means." Revising your own sentences to eliminate unnecessary jargon can be difficult because the very problem is that the jargon *does* make sense to you. The best way to revise for jargon is to imagine that a general reader is constantly asking "What do you mean by that?" A careful audience analysis will tell you what your audience will or will not understand and when in doubt, err on the side of clarity for a nonspecialist audience.

   7.2.2.6   Avoid Sexist or Discriminatory Language. Sexist and discriminatory language enters documents quite innocently. In fact, many writers learned that masculine forms of pronouns should be used when the gender of the subject is unknown or when the pronoun refers to a group that contains both men and women. For example, many writers were trained that this sentence is correct:

   Whenever an engineer writes, he attempts to use precise language.

The problem with this sentence is quite clear: there are plenty of female engineers and using the masculine pronoun "he" presents an assumption that engineers are all male. Note that if writers simply make the sentence plural, the problem disappears:

   Whenever engineers write, they attempt to use precise language.

In the prior case, the meaning stays the same and yet the sexist overtones have been erased.
The opposite case can be true as well:

   When a nurse charts patient progress, she must carefully document all vitals.

While nursing is historically a female occupation, men certainly choose the profession, too. Again, simply making the sentence plural solves the problem:

   When nurses chart patient progress, they must carefully document all vitals.

   There are countless other ways that writers can unconsciously introduce sexist language into their documents, but the most important concept is that writers need to be aware when they include gender, nationality, religious, race, etc., references in their writing. Unless the sentence refers to a particular group for a specific reason, each time writers include something that refers to an entire group of people, that sentence should be revised or at least carefully reviewed for sexist or discriminatory language.

7.3   WRITING STRONG SENTENCES

In writing, our sentences carry the thoughts and concerns we hope that others will understand, and writing strong sentences increases the impact of the documents we publish. As your team writes, consider three main concepts:

- Write economically
- Include a variety of sentence types
- Avoid common pitfalls that lead to weak sentences

7.3.1   Write Economically

In his much-cited book *Revising Prose*, Richard Lanham proposes a revision method, called the "Paramedic Method," which equips writers with techniques to craft economical—and powerful—sentences. Rather than repeat the entire method here, we want to focus on a few key points that will enable your team to write economically:

1. *Circle the prepositions.* Prepositions require readers to connect actions to nouns, which means that readers must hold much of the sentence in their mind for long periods of reading. Confusion often results. Instead, eliminate prepositions and include active verbs.

   Original: In this test is an example of the use of the method of heating samples in the test device. (20 words)

   Revised: This test shows how samples can be heated with the test device. (12 words)

2. *Circle the "is" forms.* As discussed earlier, "is" verbs generally do not show the real meaning of a sentence and require authors to write far more words to explain the real meaning. Replace as many "to be" verbs (*am, is, are, were, was, be)* as possible with action verbs.

   Original: The most significant point is that the test device heats more evenly than other equipment. (15 words)

   Revised: The test device heats more evenly than other equipment. (9 words).

3. *Ask, "Where's the action?" and "Who's kicking whom?"* Technical writers sometimes use passive voice to disguise who completes actions. The quintessential form of the passive voice is the famous sentence "Mistakes were made." Passive voice obscures who completes the action and in doing so forces readers to interpret more of the sentence. Whenever a search for the "is" forms reveal a passive sentence, ask "Who is doing what to whom?" and rephrase with an active verb.

   Original: John was kicked by Mary. (5 words)

   Revised: Mary kicked John. (3 words)

   Original: The first assays were completed by a technician. (8 words)

   Revised: The technician completed the first assays. (6 words)

   Quite often readers of scientific prose have no problem when writers don't clearly state who is completing what actions; however, "active" sentences present content more clearly most of the time. Whenever possible, use active voice for its precision and efficiency.

4. *Start fast—no slow windups.* As noted before, colloquial phrases detract from clarity and introduce unnecessary words into a document. Eliminate all phrases that don't express meaning in the sentences.

   Original: It is my opinion that using a new frequency will have great impact. (13 words)

   Revised: Using a new frequency will have great impact. (8 words).

While writers cannot always use these techniques, the concepts of eliminating prepositional phrases, using active verbs, appropriately assigning action, and eliminating start-up phrases should generally be practiced by technical writing teams who wish to produce strong, concise sentences.

7.3.2   Include a Variety of Sentence Types

You probably remember lessons about sentence types called "simple," "compound," "complex," and "compound-complex" from your English classes. Technically, these titles represent different ways of presenting ideas that involve how complicated a sentence is, and style manuals often suggest that writers move among the different sentence types. However, instead of worrying about the types of sentences, your team might choose to think about sentence variety in terms of length of sentences.

Let's examine the sentences in the paragraph above as an example of varying sentence length. The first sentence (a "simple" sentence) contains 17 words. The second sentence ("a compound-complex" sentence) contains 30 words. The third sentence (a "complex" sentence) contains 24 words.

Now, compare the sentence variety in the opening paragraph (which contains variety) to the sentences of the second paragraph just above. In the opening paragraph, we have good sentence variety while in the second paragraph three simple sentences appear, one following the other, in rapid succession. The first paragraph reads much more easily and maintains readers' interest because it contains variety. The second paragraph, however, reads more like a bulleted list because each of the three simple sentences contains exactly nine words.

Writing with a variety of sentence types has its perils, like writing run-on sentences; but in general, writing that demonstrates variety sounds more sophisticated than the staccato form of repeated short sentences. Likewise, consistently writing long sentences might also have a negative impact as readers lose track of their place (at best) or become lulled to sleep (at worst). Write with a variety of sentence lengths and your team will avoid the traps of "machine gun" writing on one hand, and "long river" writing on the other.

7.4   AVOIDING WEAK SENTENCE CONSTRUCTION

Commonly referred to as "awkward sentences," weak sentence construction can result from any number of things ranging from poor verbs to nominalizations to incorrect

grammar. Writers do make some common mistakes, though, that result in awkward-sounding sentences and most of these can easily be corrected to make the sentence more precise and less confusing. Below, we present a number of common mistakes, complete with the technical rule and an example both of the error and of a potential correction for each mistake. Hopefully, by seeing these common mistakes and comparing your own team's writing to them, your documents will avoid the traps of weak sentences.

7.4.1.1 Comma Splices. When writers join two complete sentences with a comma, this error is called a "comma splice." Comma splices are one of the most common errors and usually result from careless punctuation rather than a lack of under-standing. To correct the error, writers can simply add punctuation between the two sentences or subordinate one to the other.

Comma Splice Sentence:
The choice of materials was easy, only two demonstrate proper conductivity.

Corrected Sentence Choices:
1. *Written as two sentences:* The choice of materials was easy. Only two demon-strate proper conductivity.
2. *Joined by a conjunction:* The choice of materials was easy <u>and</u> only two dem-onstrate proper conductivity.
3. *Joined by subordination:* The choice of materials was easy <u>because</u> only two demonstrate proper conductivity.
4. *Separated by a semicolon:* The choice of materials was easy<u>;</u> only two dem-onstrate proper conductivity.

7.4.1.2 Fragments. Fragments occur when writers do not include both a subject and a verb in a sentence. Consequently, the group of words cannot be considered a complete thought because the fragment requires something else to complete the action. To correct the error, confirm that your sentence has both a subject and a verb (something/somebody doing something or describing something/somebody in a specific way). Endless ways exist to create fragments, but one example demonstrates the idea where the second "sentence" is the fragment:

Fragment:
We observed the reaction. Watching from across the room.

Corrected Sentence Choices:
We observed the reaction, watching from across the room.
We observed the reaction from across the room.

7.4.1.3 Fused or Run-on Sentences. Fused or run-on sentences occur when writers chain two complete sentences—or more—together without proper punctuation or separation. Comma splices represent the most common type of run-on sentence, but any sentence with multiple "ands" or "buts" might be a fused sentence. To correct this

error, writers can divide the single sentence into multiple, shorter sentences, or follow the recommendations above for comma splices.

Fused Sentence:
We tested the materials and we observed how they conducted heat but we were not able to repeat the reaction after the initial attempt.

Corrected Sentence Choices:
We tested the materials <u>and</u> we observed how they conducted heat. <u>However</u>, we were not able to repeat the reaction after the initial attempt.

We tested the materials <u>and</u> observed how they conducted heat<u>;</u> we were not able to repeat the reaction after the initial attempt.

7.4.1.4   Misplaced, Dangling, or Two-way Modifiers. Sometimes sentences are unclear because writers have placed modifiers too far from the words they modify. Readers become confused as they try to understand which modifiers go with which words and might misinterpret your sentences. To correct this error, simply place the modifiers as close as possible to the words they modify:

Misplaced Modifier:
The technician decided to initiate the fire alarm when he saw the smoke leaving the lab and entering the stairwell. (*Is the smoke in the lab or in the stairwell? Where is the technician*?)

Corrected Sentence Choices:
Leaving the lab and entering the stairwell, the technician decided to initiate the fire alarm when he saw the smoke. (*The technician saw the smoke outside of the lab.*)

By comparison, dangling modifiers occur when a sentence includes a phrase that cannot modify something in the sentence. To correct this error, confirm that the descriptions in the sentence can sensibly occur.

Dangling Modifier:
Carrying the tray of samples, John's jacket caught the door handle. (*Jackets cannot carry trays.*)

Corrected Sentence Choices:
While carrying the tray of samples, John caught his jacket on the door handle.
John caught his jacket on the door handle while carrying the tray of samples.

Finally, two-way modifiers can modify multiple words in the sentence and confuse readers because they don't know which words the phrase modifies. To correct this error, place the modifier either at the end or the beginning of the sentence, depending upon which makes the meaning clearer.

Two-Way Modifier:
The technician said during the meeting John was unable to make a sound argument for his approach. (*Did the technician speak during the meeting or is the technician recounting John's inability during another meeting?*)

Corrected Sentence Choices:
During the meeting, the technician said that John was unable to make a sound argument for his approach. (*The technician reporting at the **current** meeting about John's **prior** actions.*)

The technician said that John was unable to make a sound argument for his approach during the meeting. (*The technician reporting on a **prior** meeting that John attended.*)

7.4.1.5 Faulty Parallelism. Two classes of faulty parallelism are most common. The first refers to errors where ideas of the same importance are not expressed in the same grammatical form. To correct this error, simply repeat the structure.

Faulty Expression:
The grant reviewer praised the proposal more for how it was written than what it actually said.

Corrected Sentence Choices:
The grant reviewer praised the proposal more <u>for</u> how it was written than <u>for</u> what it actually said.

The second refers to errors where items are not successfully compared. These comparisons are formed with "correlative conjunctions" such as *both…and, either…or, not only…but also.*

Faulty Comparison:
To generate the reaction, they tried both heat and to combine the materials in different ratios.

Corrected Sentence Choices:
To generate the reaction, they tried <u>not only applying</u> heat <u>but also combining</u> the materials in different ratios.

7.5 PUNCTUATING FOR CLARITY

Many writers think of punctuation as a nicety, something that doesn't really have much impact on a document. In reality, nothing could be further from the truth! Punctuation not only tells readers *how* to read a document, it also expresses *meaning*. Take something as apparently insignificant as a period. It tells readers to stop; it tells them that they have reached the end of an idea; it tells readers that *this* is not *that*. A little dot

does all that, and can do more. In fact, there's an approach to grammar known as "rhetorical grammar" that differentiates, for example, between the meanings that evolve from using a semicolon between closely related sentences rather than periods (as we did just two sentences before this one). Punctuation can greatly assist your readers by making a document more clear and precise because it reveals, in a way, the patterns of spoken speech that convey as much meaning as the words themselves. Without these cues, our sentences would either confuse readers or carry much less meaning. Finally, even though punctuation holds great value for precise writing, do not over-punctuate. Too much punctuation is just as bad as none at all. Generally, your team should add punctuation only if the meaning or conventional usage requires it.

To help your team as it revises and proofreads, we have outlined below some of the major concerns facing technical writers.

7.5.1   End Punctuation

We all know that sentences need punctuation at the end. But all marks are not the same, and so it pays to know the differences.

7.5.1.1   Periods. Periods generally have two uses: they end a sentence that makes a statement and they form abbreviations:

1. I wrote the grant.
2. Mr.; St.; etc.

Periods can also have other specialized uses such as in table or figure titles (e.g., Figure 1. Corona Electrode Voltage), but this use represents a style choice more than a grammatical choice.

7.5.1.2   Question Marks. Question marks have just one use: to end a question. For example:

1. Have you separated the materials?
2. Can you separate the materials?

Different types of questions exist, such as indirect questions and polite requests/ commands, but each type of a question ends with a question mark.

7.5.1.3   Exclamation Points. An exclamation point also has only one function: to express strong emotion or emphasis in a sentence. For example:

1. The test was a success!
2. Ah! I cannot believe it!
3. Separate the materials!

While these examples technically show different types of exclamation (interjection vs. imperative), they all express a strong emotion that emphasizes the content. Technical

writing doesn't often contain exclamation points, so be careful if you chose to insert one because in a technical document, the exclamation will stand out!

7.5.2   Commas

Commas cause many writers distress because commas are so common, yet they are the most frequently misunderstood punctuation marks. Commas generally separate items that are not related (as in a list) or separate a subordinate clause from the independent clause. Commas also operate in many conventional ways, like separating items in dates, for example. Some specific times when writers should use commas appear below.

1. *Commas separate items in a series.* The material was dry, brittle, warm, and green.
2. *Commas separate two adjectives preceding a noun.* We utilized a long, tedious set of procedures.
3. *Commas separate complete thoughts when used with* and, but, or, not, for, *or* yet. We utilized a difficult procedure, but the process is very thorough.
4. *Commas set apart nonessential clauses and phrases.* The test, which utilizes high acid levels, is the most thorough test known. *(The reference to acid levels could be removed without changing the sentence's meaning.)*
5. *Commas follow introductory elements like* well *or* yes *and follow introductory phrases like* in the meantime *or any introductory prepositional phrase.* After we completed the test, we cleaned the equipment.
6. *Commas set apart interrupting elements.* The material was dry and warm, which indicated that, despite the difficult instructions, we had done the test correctly.

Commas can give writers trouble because they are used in many situations for many purposes, both stylistic and grammatical. However, when in doubt, stick with the "pause rule." If you would have paused while reading the sentence aloud, odds are that inserting a comma would be acceptable (exceptions to this guideline would be run-on sentences or comma splices).

7.5.3   Semicolons

Semicolons confound writers more than commas and, therefore, most writers tend to avoid them. However, semicolons are predictable and when used correctly, they add sophistication to a document. Readers often interpret that sophistication with language into sophisticated thoughts. Below we present some common uses of semicolons with examples to help your team write documents that sound just a little smarter.

1. *Semicolons separate clauses without conjunctions like* and, but, or, nor, for, *or* yet. We tested the materials according to the established procedure; the results were inconclusive.

2. _Semicolons separate items in a list if individual items within the list contain commas_. We tested gold, which was the best conductor; aluminum, which conducted second best; and nickel, which finished a distant third as we had predicted.

7.5.4   Colons

Colons signal to readers that they should pay close attention to what follows. Colons also appear when the second part of a sentence explains, restates, or describes the first part of the sentence. An example of each of these appears below.

1. _Colons signal the importance of what follows_. In your test you must address these concerns: long-term impacts, short-term costs, and time-to-market.
2. _Colons introduce a second part of a sentence that explains the first_. These drugs proved the best: they showed low long-term side effects and had low cost of production.

One special thing to note about colons is that writers frequently—and incorrectly—place a colon after a verb or preposition and just before a list even though the list items follow grammatically. Study these sentences:

Incorrect: We were able to isolate the microbe by: heat, color and activity level.
Correct: We were able to isolate the microbe by heat, color, and activity level.

In this example, the elements following "by" should not be preceded by a colon because the list fits grammatically with the remainder of the sentence. Notice, though, that there is a colon above following "study these sentences." In that case, the items that follow provide demonstrations of the concept in the paragraph.

7.5.5   Apostrophes

In principle, the rules about apostrophes are straightforward. Apostrophes signal possession and contractions. That's all. However, in spite of these simple rules, writers chronically and erroneously place apostrophes at the end of just about any word that ends in "s." Three correct examples appear below, with the first two demonstrating the same rule in singular and plural.

1. _Possession-singular._ The _technician's_ coat caught on the door. (The coat belongs to the technician.)
2. _Possession-plural._ The technicians' coats fell when the rack broke. (Multiple coats that belong to multiple people fell off the rack.)
3. _Contraction._ We weren't able to retest the sample. (Were not becomes weren't.)

It's really that easy. Unless the word expresses ownership of something or unless the word omits letters to form a contraction, there is no need for an apostrophe. Finally, be aware that apostrophes _never_ appear in a simple pluralization. For example:

| *Incorrect* | The sample's were tainted. |
| *Correct* | The samples were tainted. |

This mistake appears *very* commonly so be sure to ask yourself whether the word with an apostrophe expresses ownership or whether it is a contraction; if it does neither of those things, remove the apostrophe.

7.5.6   Dashes and Hyphens

Dashes and hyphens are not interchangeable; each has specific functions. Dashes generally have two functions, one to indicate an interruption or break in thought and the other to indicate an explanation, much like a colon. For example:

1. The test—if we could call it that—was negative.
2. The method we used represented the latest technology—a substitute for all older procedures.

In the first case, the words between the dashes represent an interruption in thought while the second case shows how the words following the dash modify what comes before. (To form a dash in Microsoft Word, type two hyphens, which are on the key next to the zero on the keyboard, and the two hyphens will automatically become a dash after completing the next word.)

Hyphens, on the other hand, have several specific uses:

1. *Hyphens divide words at the end of a line.* With today's word processing software, this is seldom a problem because Microsoft Word automatically moves words around to avoid hyphenation or automatically hyphenates, depending upon your settings.
2. *Hyphens form compound numbers.* Eighty-one subjects; twenty-seven examples.
3. *Hyphens form compound adjectives.* Dark-colored residue; gold-plated watch.
4. *Hyphens clarify awkward formations.* Re-examine; semi-intense.

While the subtlety of dashes and hyphens might appear to be fussy, remember that readers judge your document both by the ideas it contains and by the container. If the container—the grammar and mechanics—shows close attention to detail, readers are more likely to believe the ideas represented in the document were developed with attention to detail too.

7.6   FINAL CONSIDERATIONS

In this last section, we present some selected issues that writers frequently encounter. The list is not exhaustive; these issues simply represent those that are most common. Below we present the issues, using examples when appropriate.

7.6.1   Abbreviations and Acronyms

In general, writers should avoid abbreviations in technical writing unless the abbreviation is generally accepted, such as in the case of *Mr.*, *Dr.*, or *Ph.D*. Units of measure are also often abbreviated: mL., mcg., cm., etc. Note that abbreviations are almost always followed by a period, although it's quite common for units of measure to omit the period.

Acronyms represent a slightly different case where the first letters of multiple words are combined to form another word or shortened form of the word. For example:

NSF (National Science Foundation)

DoD (Department of Defense)

SME (Subject Matter Expert)

Sometimes, acronyms become generally acceptable words, as in SCUBA, which are technically called "acrostics." Your organization almost certainly has its own set of internal acronyms and/or acrostics with their own conventions, in addition to internal abbreviations that mean little outside of your organization. As with all writing, consider who will be reading the document and whether or not the audience will understand the abbreviation, acronym, or acrostic. If there is a chance they won't understand, simply don't use them; even if they will be understood, use them sparingly. In any case, it's best to spell out each term completely the first time it appears, unless it is universally known and commonly used like "*Dr.*"

7.6.2   Capitalization

Capitalization gives writers few problems with one exception: inconsistent use. Most writers in English know the general rules, but writers often randomly capitalize words simply because they appear to be important. Avoid over-capitalizing, but do follow these common rules:

1. *Capitalize the beginning of sentences.* We completed the test.
2. *Capitalize proper nouns and their derivative adjectives.* Proper nouns name a specific person, place, or thing and usually represent one-of-a-kind items such as organizations, places, published works, deities, and people: National Science Foundation, Spain, Pearson's, The Great Gatsby, Alfred Nobel are all nouns, while French, Lutheran, and Dickensian are adjectives derived from proper nouns.
3. *Capitalize titles.* Titles used with a person's name should be capitalized, particularly if the title precedes the name: Professor Mamishev, Doctor Williams, President Lincoln.

7.6.3   Numbers

Technical documents usually include a lot of numbers, and following a few key rules will make your document more clear:

1. *Do not begin a sentence with a numeral. Eighty-one* subjects completed the experiment. (not "81 subjects….")
2. *Numbers with more than two words should be written as numerals* (unless they appear at the beginning of a sentence). The sample had 1,000,567 parts per liter.
3. *Use numbers for all specific measurements in scientific and mathematical contexts.* We measured 1.7 g of solution.

When in doubt with numbers, use the construction that will most precisely and clearly state the purpose of the number within accepted conventions.

7.6.4   Dates

Different countries present dates in different ways, so knowing your target audience is important for determining how to present dates correctly. For example, in the United States, both *June 25, 2008*, and *6/25/08* are correct. However, in most European countries, the preferred format is *25 June 2008* and *2008.06.25*. Since almost all date schemes present day, month, and year in a particular order, be sure that your dates contain all three parts in the order acceptable to your audience.

7.6.5   Fractions and Percentages

Technical and scientific writers most often present fractions in numerical form because they represent specific data. However, just as with numbers, fractions at the beginning of a sentence should be spelled out. For example:

The new processors consume 1/6 less energy than the previous generation.
One-fourth of all chips processed by the company were flawed.

Fractions and percentages are interchangeable and the rules for percentages are the same as for fractions:

The new processors consume 16.7% less energy than the previous generation.
Twenty-five percent of all chips processed by the company were flawed.

7.6.6   Units of Measure

Globally, at least three measurement systems are used: the International System of Units (also called the metric system and abbreviated SI), the United States Customary System, and the British Imperial System. Most scientific and technical writing will utilize SI and its associated abbreviations for specific units of measure including length, mass, time, temperature, and power. The metric system has a sophistocated set of units based upon its system of deriving new measurement units from the fundamental ones; accordingly, your team should be very familiar with the units specific to the type of work you write about. For example, the fundamental unit of mass, *kilogram* (*kg*) can

become *grams* (*g*) or *micrograms* (*μg*, sometimes spelled *mcg* in clinical settings). There are at least 20 other derivations using specific prefixes such as *deca-, deci-, giga-, or nano-*.

7.7   A FINAL NOTE ON GRAMMAR

Because grammar and mechanics in English—like all languages—are complicated and take years to learn, the full range of grammar issues is really beyond the scope of this book. In any case, so many good grammar books exist that we couldn't hope to cover all of the issues as deeply as those sources do. However, the issues we've addressed in this chapter seem to be those that concern writing teams most frequently. Focusing on just the things we present here will improve your documents immensely.

ADDITIONAL RESOURCES

Lanham, Richard. (1999). *Revising Prose*. 4th Edition. New York: Longman.

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