



# Word for Word

## Using Words Wisely

### Updated Second Edition, 2011–2017

A Collection of Tips for Biomedical Writers  
from Scientific Publications

# **Word for Word**

Using Words Wisely

Updated Second Edition

Scientific Publications

The University of Texas MD Anderson Cancer Center

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# Preface

This volume is a collection of columns from *Word for Word*, a blog providing advice on correct, precise word usage and other tips for biomedical writers. The blog is written and edited by members of Scientific Publications at The University of Texas MD Anderson Cancer Center.

Each column represents the consensus of Scientific Publications' editors and their hundreds of collective years of editorial experience. Columns from 2011 through 2017 are included in this updated edition and are arranged alphabetically by title.

This is not intended to be a comprehensive grammar or style guide. For recommendations on comprehensive guides, or to subscribe to the *Word for Word* blog, visit the department's intranet site at [inside.mdanderson.org/departments/scipub](http://inside.mdanderson.org/departments/scipub) or email [scientificpublications@mdanderson.org](mailto:scientificpublications@mdanderson.org).

We hope you enjoy reading the columns in this collection.

# Absolute Terms

One indication of a deep and nuanced understanding of the English language is the proper use of absolute terms. Words such as *unique*, *equal*, *parallel*, *infinite*, *chief*, *complete*, *prime*, and *perfect* describe absolute conditions and, therefore, are “viewed apart from modifying influences or without comparison with other objects.”<sup>1</sup> Two equations are either equal or not equal, two lines are either parallel or not parallel, and a project is either complete or incomplete. These terms cannot be compared (e.g., *more equal*, *less parallel*, or *most complete*) or preceded by an intensifier such as *very* or *slightly* (e.g., *very perfect*).<sup>2</sup>

Take, for example, the word *unique*, which *Merriam-Webster’s Collegiate Dictionary* defines as “being the only one: sole” or “being without a like or equal.”<sup>3</sup> Something is either unique or not unique; there are no degrees of uniqueness.<sup>4</sup>

- ✓ We identified a unique abnormality in this case.
- ✗ This study is more unique than previous studies because it utilizes a new imaging technique.

However, some modifiers like *almost* and *partly* can be used with some absolutes when thinking of things as existing on a scale. For instance, a darkness can be *almost total*, and a story can be *partly true*.

## References

1. Online Dictionary. Datasegment.com. <http://onlinedictionary.datasegment.com/word/absolute+terms>. Accessed November 1, 2011.
2. The American Heritage Dictionary of the English Language. <https://ahdictionary.com/word/search.html?q=absolute>. Accessed November 1, 2011.
3. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:4, 5.
4. Strunk W Jr, White EB. *The Elements of Style*, 3rd ed. Needham Heights, MA: Allyn & Bacon; 1979:62.

# Absorb or Adsorb?

The words *absorb* and *adsorb* are easy to confuse. They differ by just one letter, they sound almost the same, and their meanings are closely related.

*Absorb* means to take in or integrate something. This word has slightly different definitions in the disciplines of chemistry, physiology, physics, radiology, psychology, and others, but what these definitions have in common is that something is crossing or penetrating a border.

- ✓ Murine tissues absorb isohemagglutinins.
- ✓ A lead layer was used to absorb the scattered radiation.

In contrast, *adsorb* applies to the attachment and retention of a very thin layer of one substance (for example, a gas, solute, or liquid) on the surface of another (such as a liquid or a solid body). In other words, *adsorb* means to attract without taking in. The adsorbed substance does not diffuse into or penetrate the other substance.

- ✓ Specially designed nanotubes adsorb specific molecules and antigens.
- ✓ Certain classes of steroid receptors adsorb to hydroxylapatite.

Note that an absorbate is something taken into something else, and an adsorbate is something attached to a surface. Also, an absorbent is a tissue, structure, or other substance that takes in other substances, and an adsorbent is a substance that attracts other substances to its surface.

## Bibliography

*Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier Saunders; 2012:7, 33.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:5, 18.

# Accept or Except?

The words *accept* and *except* sound similar and therefore are sometimes confused with one another in writing. However, their meanings are near antonyms, so exchanging one for the other can cause a writer to say almost exactly the opposite of what she or he intends.

*Accept* is a verb that means “to receive willingly;” “to give admittance or approval to;” “to regard as proper, normal, or inevitable;” or “to recognize as true.”<sup>1</sup>

- ✓ Once they can accept the diagnosis, the family can begin to plan for the patient’s end-of-life care.
- ✓ Only articles accepted for publication should appear in the reference list.
- ✓ If we accept that microenvironmental factors can affect angiogenesis, then we cannot exclude them from the analysis.

*Except* is most commonly used as a preposition or conjunction meaning “with the exclusion of,” “but not,” “not including,” “with this difference,” or “unless.”<sup>2,3</sup>

- ✓ In both leukemia cell subsets, all biomarkers except Myc lost significance as independent prognostic factors in multivariable analysis.

- ✓ Radiographic film was kept in a black envelope except during irradiation and reading.
- ✓ All patients with a diagnosis of stage III or IV colorectal carcinoma, except those who had previously received radiation to the pelvis or lower spine, were eligible for the study.
- ✓ All the apples except one were green.

As a general rule, if you are looking for a verb or a word that suggests inclusion or agreement, then *accept* is what you want. If you are describing something that might be excluded or not considered, however, then choose *except*.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:7.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:435.
3. Cambridge Dictionary, 2016. <http://dictionary.cambridge.org/us/dictionary/english/except>. Accessed September 16, 2016.



# Accurate or Precise?

*Accurate* and *precise* are often used interchangeably in everyday conversation, but in scientific writing, the two terms have distinct meanings. Whereas *accuracy* is the “ability of a test to produce results that are close to the true measure of the phenomenon,” *precision* is “the degree of reproducibility that an instrument produces when measuring the same event.”<sup>1</sup> Thus, one way to help determine which term is needed is to substitute *correct* for *accurate* and substitute *consistent* for *precise*.

One example often used to demonstrate the difference between *accurate* and *precise* involves a game of darts. The first player, whose three darts hit the same spot on the wall behind the target, is precise but not accurate. The second player’s darts hit the different parts of the target but not the bull’s-eye; she is accurate but not precise. The third player’s darts hit the wall, the target, and a different spot on the wall; he is neither accurate nor precise. The final player, whose darts all hit the bull’s-eye, is both accurate and precise.

In science and medicine, the concept of “hitting the target” applies to the use of a test or instrument: an effective one is both precise and accurate (i.e., consistently correct).

- ✗ The test was not precise; it repeatedly yielded the same incorrect data.
- ✓ The test was not accurate; it repeatedly yielded the same incorrect data.
- ✓ The test was not accurate, but it was precise: it repeatedly yielded the same incorrect data.

When using *accurate* or *precise* in scientific writing, be sure to be both accurate and precise.

## Reference

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:853, 857.



# Adapt or Adopt?

What's the difference between *adopt* and *adapt*? Although *adopt* and *adapt* look very similar and sometimes appear to be interchangeable, they mean different things.

*Adopt* means to take or accept something as your own, usually without changing it. *Adopt* also means to accept a formal personal relationship, as when a child is adopted into a family.

- ✓ He began to succeed when he adopted the teacher's methods.
- ✓ We adopted the Clinical Laboratory Improvement Amendments to improve our laboratory results.
- ✓ It makes sense to adopt the committee's recommendations.

*Adapt* means to modify or change to meet a specific need or requirement and can apply to an inanimate object or to a live creature.

- ✓ To survive, all living things must adapt to change.

- ✓ You can adapt the figures from your book chapter for your poster presentation.
- ✓ The patients adapted readily to the new clinic procedure.

Note that the two words might be used together:

- ✓ We adopted the method described by Jones et al. but adapted it to meet the needs of our more rapidly growing cells.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:383.

Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*. New York, NY: Atheneum; 1979:16, 17.

*Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:25.

# Adaptable or Adaptive?

Although the adjectives *adaptable* and *adaptive* are often used interchangeably, they have slightly different meanings. *Adaptable* describes something that can be changed or made suitable for new circumstances or someone who can adjust to such circumstances. *Adaptive* describes something that can change or tends to change. Whether *adaptable* or *adaptive* should be used usually depends on whether the thing described is being made to adapt by others or is itself adapting.

*Adaptable* is used to describe things that are being changed by others in response to a need; it can be a synonym for *flexible*, *adjustable*, or *modifiable*.

- ✓ The fellowship candidate had an adaptable interview persona; indeed, she really “clicked” with all the interviewers, even Terry. [The candidate changes her persona to get along with everyone.]
- ✓ Users can reconfigure this adaptable tool for cutting, hacking, sawing, or chopping. [Users change the tool to do different jobs.]
- ✓ The convention center provides several adaptable rooms for events as varied as regional conferences, small-group seminars, and one-on-one meetings. [People change the rooms to accommodate groups of different sizes.]

In contrast, *adaptive* is used to describe things that can themselves change in response to a need.

- ✓ The adaptive immune system protects against repeated infections by mounting an enhanced response to specific previously detected pathogens. [The immune system changes to protect the host.]
- ✓ Tardigrades’ highly adaptive physical features enable them to survive in the most extreme environmental conditions. [The physical features change to enable survival.]

In addition, whereas *adaptive* almost always precedes the noun it describes, *adaptable* can follow a noun and be followed by a preposition (most frequently *to*).

- ✗ This new jacket is adaptive to all kinds of weather.
- ✓ This new jacket is adaptable to all kinds of weather.

## Bibliography

*Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:14.

# Adduce, Deduce, or Induce?

*Adduce*, *deduce*, and *induce* sound similar but have different meanings.

*Adduce*, a legal term, means to cite something as evidence, typically in a courtroom setting.

- ✓ The evidence adduced in the case was inconclusive.

To *deduce* is to form an opinion or arrive at a conclusion through logical reasoning.

- ✓ This condition increases the risk of developing prostate cancer. All patients with the condition in our cohort were men who had not undergone any surgery. Therefore, we deduced that all patients in our cohort were at increased risk of developing prostate cancer.

*Induce* most commonly means to stimulate an action or to persuade or influence someone to do something.

- ✓ Because her pregnancy had lasted for more than 41 weeks, she was treated with oxytocin to induce labor.
- ✓ The doctor's explanation of the potential risks of forgoing treatment eventually induced the patient to proceed with the treatment as planned.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:15, 324, 637.

# Admission or Emission?

*Admission* and *emission* have similar spellings and pronunciation, but the two words, both nouns, have very different meanings.

An *admission* is “the act or process of admitting,” and *admit* means to allow scope for or permit; to concede or acknowledge something; to allow entry (e.g., to a place, organization, or event); or to accept as an inpatient in a hospital.<sup>1</sup>

- ✓ Signing a traffic ticket is an agreement to appear in court, not an admission of guilt.
- ✓ The patient reported having chest pain for 6 days before his hospital admission.

*Emission* is defined as “an act or instance of emitting” or “something sent forth by emitting,” and *emit* means to give off or send out or eject (e.g., a substance or quality).<sup>1</sup> In medicine, *emission* can also refer to a discharge (e.g., of semen) or to sounds produced in the cochlea (i.e., otoacoustic emissions).<sup>2</sup>

- ✓ Cardiovascular disease and asthma are among the conditions linked to emissions from coal-fired power plants.

- ✓ The study showed that transient evoked otoacoustic emissions were suppressed to a greater degree in professional musicians than in nonmusicians.<sup>3</sup>

It may help to remember that *admission* usually refers to something coming in or entering (e.g., admission to a hospital), whereas *emission* usually refers to something going out (e.g., automobile emissions).

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:17, 408.
2. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:609.
3. Brashears SM, Morlet TG, Berlin CI, Hood LJ. Olivocochlear efferent suppression in classical musicians. *J Am Acad Audiol*. 2003;14:314–324.

# Adverse or Averse?

The words *adverse* and *averse* are easily confused because they look and sound similar and both have negative connotations.

*Adverse* means harmful or hostile. In medical writing, the terms *adverse effect*, *adverse reaction*, and *adverse event* are used to describe harmful effects of treatment. *Adverse effect* is considered a more precise term for describing a harmful event than is *side effect* because some side effects are beneficial.

More generally, a writer might use the term *adverse conditions* to describe circumstances likely to produce discomfort (e.g., extreme weather) or interfere with achievement of a goal (e.g., a lack of necessary equipment).

*Averse* means disinclined; it describes reluctance or distaste. Typically, one is said to be *averse to* doing something (e.g., driving in rush-hour traffic, cleaning the house, or running a marathon in August).

- ✓ The physician was averse to prescribing the drug because of its adverse effects.
- ✓ Knowing that adverse weather conditions were forecast, Robin was averse to going outside.

You can remember the distinction between *adverse* and *averse* by remembering that *adverse* effects are *side* effects and that both terms contain the letter **d**.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:384.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:19, 85.

# Affect or Effect?

*Effect* and *affect* are easy to confuse; they look almost the same and sound almost the same, and either one can be used as a noun or a verb. Most of the time, however, *effect* is a noun and *affect* is a verb.

Used as a noun, *effect* typically means a result or outcome:

- ✓ Conformal proton therapy limits the radiation dose to normal tissues, reducing the toxic effects.
- ✓ The Doppler effect can be observed when the pitch of a siren changes as an ambulance moves toward and away from you.

As a verb, the basic meaning of *affect* (with the emphasis on the second syllable) is influence:

- ✓ Smoking behavior and certain genetic variations both affect the risk of lung cancer.
- ✓ The advanced supraglottic carcinoma began to affect other tissues of the neck.

Note that *affect* can sometimes be replaced by a stronger, more specific verb:

- ✓ Smoking behavior and certain genetic variations both increase the risk of lung cancer.
- ✓ The advanced supraglottic carcinoma began to invade other tissues of the neck.

In its rarely used verb form, *effect* means bring about:

- ✓ The combination of surgery and adjuvant chemotherapy effected a cure.
- ✓ The new legislation effected a change in practice.

Finally, in the behavioral sciences, *affect* (with the emphasis on the first syllable) is occasionally used as a noun meaning an observable emotional state; for instance, someone who displays a narrow range of emotions is said to have a “flat affect.”

## Bibliography

Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*, 9th ed. New York, NY: Atheneum; 1984:29.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:21, 397.



# Affect, Effect, or Impact? Look for a More Precise Alternative

On Harold Varmus's first day as director of the National Cancer Institute in 2010, he told his staff, "Never use *impact* as a verb."<sup>1</sup> *Impact* can mean "to strike forcefully" or "to fix firmly by or as if by packing or wedging,"<sup>2</sup> but often a non-physical, less forceful meaning is actually intended. When used in the sense of "to have a direct effect,"<sup>2</sup> *impact* should be changed to *affect* or *influence* in most cases.<sup>3</sup>

- ✗ The size of the wound will impact the size of the graft.
- ✓ The size of the wound will affect the size of the graft.

However, there are many cases where *affect*, *effect*, and *impact* should *all* be avoided in favor of more precise or specific wording. For example, when you say "X affects Y," do you mean that X increases Y or X decreases Y? Does X strengthen or weaken Y? Does X stimulate or inhibit Y?

- ✗ Such symptoms can have a profound impact on patients' quality of life. [What type of impact?]
- ✗ Such symptoms can have a profound effect on patients' quality of life. [What type of effect?]
- ✗ Such symptoms can profoundly affect patients' quality of life. [In what way?]
- ✓ Such symptoms can profoundly diminish patients' quality of life.

- ✗ This method will impact the length of hospital stay.
- ✗ This method will affect the length of hospital stay.
- ✓ This method will decrease the length of hospital stay.
- ✗ Detecting disease earlier would affect survival outcomes.
- ✓ Detecting disease earlier would improve survival outcomes.

Use words like *affect*, *effect*, and *impact* only when the relationship between two variables is not known.

- ✓ We conducted a randomized controlled trial to investigate the effect of the vaccine on the rate of recurrence.

## References

1. Kaiser J. Varmus targets "dysfunction," scientific barriers in cancer research. Science magazine web site. <http://news.sciencemag.org/scienceinsider/2010/07/varmus-targets-dysfunction.html>. Accessed December 17, 2012.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:622.
3. *The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:285.



# Afflict or Inflict?

*Afflict* and *inflict* are similar not only in spelling but also in meaning. Both words refer to causing harm or unpleasantness to someone or something. The difference between these two verbs is in the focus of the action—whether on the recipient of harm or the cause (or initiator) of harm.

In most cases, *afflict* emphasizes those on the receiving end of harm. In biomedical writing, *afflict* is typically used to describe a patient or animal suffering from a disease. Note that *afflict* often is followed by the preposition *with*.

- ✓ Many obese individuals are afflicted with diabetes.
- ✓ Lung cancer can afflict smokers and nonsmokers alike.

In contrast, *inflict* is focused on the cause (or initiator) of harm rather than on the recipient. Note that *inflict* often is followed by the preposition *on*.

- ✓ Phlebotomists are well trained to keep from inflicting pain when obtaining blood samples.
- ✓ Because they adhere to all animal care guidelines, researchers do not inflict suffering on study mice.

In your writing, keeping the cause (or initiator) and recipient in mind will help prevent confusion between *afflict* and *inflict*.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:469, 702.

# Afterward or Afterword? Forward or Foreword?

*Afterward* sounds the same as *afterword*, and *forward* sounds the same as *foreword*—but the words have completely different meanings.

*Foreword* and *afterword* refer to specific parts of a book. The *foreword* is a preface, or introductory comment, in a book—usually written by someone other than the author. The *afterword* is an epilogue, a final comment or follow-up at the end of a book.<sup>1</sup>

- ✓ In the foreword of this edition, a historian describes the cultural context of the novel; in the afterword, the author describes how the events in the book differed from true historical events.

Note that these terms referring to parts of a book contain “word.”

*Afterward*, in contrast, is an adverb that locates an action in a time sequence: “at a later time.”<sup>2</sup>

- ✓ Jessica finished the reverse phase protein array. *Afterward*, she went out for ice cream.

*Forward* is an adjective or adverb that locates an object or event in space: “near, being at, or belonging to the forepart”<sup>2</sup>; in the front. *Forward* can also indicate “getting ready for the future.”<sup>2</sup>

- ✓ Sanjeev stood on the forward part of the boat’s deck, looking forward to the moment when he would arrive on shore.

## References

1. *The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003: 265.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003: 23.

# Aggravate, Irritate, or Exacerbate?

A common theme in *Word for Word* is the distinction between the casual, conversational use of words and their use in formal writing. Many words and phrases are used imprecisely in informal settings, where the speaker's meaning can be understood from context, custom, clarification, or even, in some cases, gestures or facial expressions. Such imprecise usage is out of place in scientific writing, where the reader does not have these clues and might misunderstand the writer's meaning or intention.

An example of this is the use of the terms *aggravate* and *irritate*. Although they are often used interchangeably in casual speech, they have distinct meanings and connotations. *Aggravate* means to make a condition worse, more serious, or more severe.

- ✓ The smoke in the air aggravated her asthma.
- ✓ The street repairs aggravate the morning traffic congestion.

*Irritate* means to annoy someone or to provoke anger, displeasure, or impatience in someone. In biomedical contexts, *irritate* means to cause a new reaction (for example, inflammation). In contrast, *aggravate* is used to describe the worsening of an existing physical or medical condition.

- ✓ The woman was irritated by her neighbor's loud music.
- ✓ The frequent delays have begun to irritate the staff.
- ✓ Many airborne allergens irritate the eyes and upper respiratory tract.

*Aggravate* and *irritate* are often switched in informal settings, as in "his scratching irritated the rash" or "she was aggravated by the policy." We recommend that these uses be avoided in formal writing.

*Exacerbate* is a synonym for *aggravate*.

- ✓ The smoke in the air exacerbated her asthma.
- ✓ The extreme heat and wind only exacerbated the wildfires.

*Exacerbate* should not be confused with *exasperate*, a completely different word, which coincidentally means "to irritate."

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:385.

Council of Science Editors, Style Manual Subcommittee. *Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 8th ed. Chicago, IL: University of Chicago Press; 2014:101.

Garner BA. *Garner's Modern English Usage*, 4th ed. New York, NY: Oxford University Press; 2016:31.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:24, 663.

# Aide or Aid?

*Aide* and *aid* are pronounced the same, differ by only one letter, and are related to the concept of help or assistance. However, the two terms cannot be used interchangeably.

*Aide* is always a noun—and more specifically, a person. *Aide* is short for *aide-de-camp* and refers to “a military officer who acts as an assistant to a superior officer.”<sup>1</sup> Outside the military, *aide* is sometimes used to refer to the assistant to an executive. In addition, *aide* is generally preferred when referring to medical assistants (e.g., nurse’s aide).

- ✓ Lieutenant Jones is General Nguyen’s aide.
- ✓ Bob Green is the aide to Susan Ramirez, the president of our university.
- ✓ Jan works as a home health aide.

In all other instances, *aid*, which can be a verb or a noun, is the correct word. *Aid* means to help or assist, the act of helping, the help that is given, a person or group who assists (other than the narrow situations in which *aide* is used), or a device that assists (e.g., a hearing aid).<sup>1</sup>

- ✓ I applied for financial aid for college.
- ✓ He gave first aid to the victim until paramedics arrived.
- ✓ The data aided my understanding of the agent’s mechanisms of action.
- ✓ Filgrastim aids in the recovery of neutrophil counts.

Tip: If you are tempted to use *aide*, try replacing it with *aide-de-camp*—if the result sounds odd, use *aid* instead.

## Reference

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:26.

# All Ready or Already?

Although very similar in spelling and sound, *all ready* and *already* are distinct terms. They have very different meanings and functions.

Separately, *all* and *ready* can modify countless nouns and pronouns. When used together, however, they have a specific meaning: to be fully prepared. Although *ready* alone will suffice in most cases, *all* is used for emphasis.

- ✓ The mice are all ready for their treatment.
- ✓ The students smiled, all ready for their group portrait.

*Already* has a different meaning: before or by a specified or implied time, which may be past, present, or future. Some examples may help clarify its usage.

- ✓ We already obtained permission to use these figures in our paper. [already = before now]
- ✓ By the time we found the room, the meeting was already over. [already = before a time in the past]
- ✓ The study has already met its recruitment goal, even though enrollment is open for another two months. [already = before an expected time in the future]

In U.S. English, *already* is also used in some slang expressions to intensify a statement or convey mild impatience.

- ✓ All right, already!
- ✓ Enough, already!
- ✓ Just give me the bad news, already!

If you are uncertain about whether to use *all ready* or *already*, try saying the sentence without the *all*. If the sentence makes sense without *all*, then *all ready* is the correct choice. If it does not make sense without *all*, *already* is the correct choice.

## Bibliography

Burchfield RW. *The New Fowler's Modern English Usage*, revised 3rd ed. New York: Oxford University Press; 1998:45.

Hodges JC, Horner WB, Webb SS, Miller RK. *Harbrace College Handbook*, revised 13th ed. Fort Worth, TX: Harcourt Brace College Publishers; 1998:G-2.

*Merriam Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:35.

# All Together or Altogether?

Although they look almost exactly the same, the phrase *all together* and the word *altogether* have different meanings and should not be used interchangeably.<sup>1</sup>

*All together* means “in one place” or “all at once.”<sup>2</sup>

- ✓ Several specimens were collected and stored all together.
- ✓ The colleagues arrived for the meeting all together.

In contrast, *altogether* means “in all (in total),” “entirely,” or “on the whole.”<sup>3</sup>

- ✓ The study had three treatment arms and 120 participants altogether.

- ✓ To reduce the risk of cancer, one should avoid tobacco altogether.

## References

1. Merriam-Webster's Collegiate Dictionary, 11th ed. Springfield, MA: Merriam-Webster; 2003:37.
2. Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*. New York: Atheneum; 1965:35.
3. Fowler HW. *A Dictionary of Modern English Usage*, 2nd ed. New York: Oxford University Press; 1965:20.



# Allude or Elude, Delusion or Illusion?

The Latin term *lusi*, which means “to play” or “to trick,” appears in many English words as *lus*. The words *allusion*, *elusion*, *illusion*, and *delusion* are similar in that they all refer to an undefined reality or a mistaken or deceiving perception of reality. However, the meaning of each of these terms is unique.

*Allude* (and its noun form *allusion*) and *elude* (and its noun form *elusion*) are often confused with one another because they look and sound so similar.

To *allude* is to suggest something else; an allusion is not a specific reference.

- ✓ The results of our study on the STU pathway allude to patterns that occur in the ERT pathway.
- ✓ Our study results allude to work conducted in the 1980s on canine pancreatic cancer.

To *elude* is to escape or avoid.

- ✓ Gliomas can elude the apoptotic effect of radiotherapy by becoming resistant to irradiation.
- ✓ The answer to this question has eluded us.

An *illusion* is a false understanding of something that is actually occurring.

- ✓ Using a *P* value sometimes gives an illusion of the certainty of associations.
- ✓ The nearly simultaneous activation of A and the increased expression level of B gave the illusion that A caused B; however, C directly caused both A and B.

More severe than an illusion, a *delusion* is a result of persistent false thinking.

- ✓ The mad scientist had the delusion that he could travel through time.
- ✓ During treatment, the patient became delusional and thought the hospital staff were trying to harm her.

## Bibliography

*The Chicago Manual of Style*, 16th ed. Chicago, IL: The University of Chicago Press; 2003:265.

Garner BA. *Garner's Modern American Usage: The Authority on Grammar, Usage, and Style*. New York, NY: Oxford University Press; 2009:36.

*Merriam Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:34, 330, 405, 619.



# Alter or Altar?

*Alter* and *altar* share four of five letters and have the same pronunciation, so the two words are sometimes confused. However, these words have nothing else in common: they differ in grammatical usage and in meaning.

*Alter* is a verb that means to change or adjust something so that it is different but not changed to the extent that it becomes something else. *Alter* can also mean to make a change to (e.g., tailor or customize) clothing so that it will fit better. Use *alter* when you want to convey that something is being modified, revised, refashioned, or reworked.

- ✓ The text of the case report was altered so that the order of events would be clearer to the reader. [The document was revised but did not become fundamentally different.]
- ✓ After surgery, the woman lost weight and had to have her dresses altered to fit her newly slender frame. [The garments were tailored to fit better.]

*Alter* also means to castrate or spay (i.e., to remove the sex organs of an animal so that it cannot reproduce). However, it is better to use a more specific term than *alter* in biomedical writing.

- ✓ At 10 weeks of age, female dogs in group 1 of the study were spayed according to the established protocol and guidelines of the Institutional Animal Care and Use Committee.

In contrast to *alter*, *altar* is a noun that describes a usually raised structure or place on which sacrifices and gifts are offered or incense is burned in some religions.

*Altar* also can mean the table on which the Eucharistic elements are consecrated or the table that serves as a center of worship or ritual.

Additionally, *altar* is often used figuratively to describe something that is given great (or undue) precedence or value, particularly at the cost (sacrifice) of something else.

- ✓ The forest, which had remained untouched for years, was sacrificed on the altar of progress to build needed research facilities. [Figuratively speaking, the need for new facilities took precedence at the expense of preservation of the forest.]

*Altar* is rarely used in scientific writing.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:35.

# Alternate or Alternative?

In biomedical writing, *alternative* is intended more often than *alternate*. *Alternative* means offering a choice; *alternate* means occurring by turns or every other. When you're looking for a noun, *alternative* is more likely to be correct than *alternate*. When you're looking for a verb, only *alternate* can be correct. Both terms can serve as adjectives, and both words have adverb forms (ending in *-ly*).

- ✗ Radiation therapy is an effective alternate to surgery in some patients.
- ✓ Radiation therapy is an effective alternative to surgery in some patients.
- ✗ Mary was chosen as an alternative for the jury.
- ✓ Mary was chosen as an alternate for the jury.

- ✗ We sought an alternate explanation.
- ✓ We sought an alternative explanation.
- ✗ Regimens X and Y were given alternatively.
- ✓ Regimens X and Y were given alternately.
- ✓ We gave the patients regimen X alternating with regimen Y.
- ✓ We alternated regimen X and regimen Y.

## Bibliography

Garner BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:38.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:37.

# Although, Whereas, or While?

It's generally acceptable to use *while*, *although*, and *whereas* interchangeably; however, doing so may not always be appropriate.

Most dictionaries now agree that *while* and *although* are synonyms for “despite the fact that”; these words are used to introduce “a phrase or clause that might be expected to preclude the action of the main clause but does not.”<sup>1</sup>

- ✓ While [although or despite the fact that] the agent can be successfully administered orally, most patients prefer to receive it transdermally.

*While* also means “during the time that” or “at the same time.” For example,

- ✓ The patient was sedated while [during the time that] magnetic resonance imaging was performed.

Thus, using *while* and *although* interchangeably is acceptable only when doing so leads to no ambiguity.<sup>2,3</sup> Either is acceptable in this sentence:

- ✓ Although [while or despite the fact that] the current study included only patients with estrogen receptor–positive breast cancer, we expect our findings to be applicable to patients with progesterone receptor–positive breast cancer as well.

However, replacing *while* with *although* in the earlier example would completely alter the intended message:

- ✗ The patient was sedated although magnetic resonance imaging was performed.

*Whereas* is sometimes used interchangeably with *although* and *while*, but to avoid confusion, *whereas* should be reserved to mean “in contrast.”<sup>3,4</sup> For example,

- ✗ “Western blotting with antibody A showed..., while Western blotting with antibody B showed...” suggests the results were revealed at the same time.
- ✓ “Western blotting with antibody A showed..., whereas Western blotting with antibody B showed...” suggests the results are being contrasted.

## References

1. *Oxford Dictionary of Current English*. [http://www.oxforddictionaries.com/us/definition/american\\_english/concessive](http://www.oxforddictionaries.com/us/definition/american_english/concessive). Published 2009. Accessed February 25, 2014.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:37.
3. Fowler HW. *A Dictionary of Modern English Usage*, 2nd ed. New York, NY: Oxford University Press; 1965:637, 695, 706–707.
4. Strunk W, White EB. *The Elements of Style*, 3rd ed. New York, NY: MacMillan Publishing; 1979:63–64.

# Ambiguous or Ambivalent?

Although *ambiguous* and *ambivalent* both involve uncertainty, these words have different meanings. *Ambiguous* is an adjective that refers to uncertainty owing to lack of clarity, and *ambivalent* is an adjective that refers to uncertainty owing to conflict between contradictory views or ideas.

*Ambiguous* describes something that can be interpreted in multiple ways or refers to uncertainty caused by some “obscurity or indistinctness.”<sup>1</sup> A study’s results might be ambiguous because they are unclear or can be interpreted in more than one way.

- ✓ Because her genetic test results were ambiguous, we must perform more tests to confirm or rule out a diagnosis.
- ✓ After a series of tests, we could not determine the cells’ progenitors; therefore, we classified the cell lineage as ambiguous.

*Ambivalent* describes “simultaneous and contradictory attitudes or feelings...toward an object, person, or action.”<sup>1</sup> *Ambivalent* is often used to describe a person’s conflicting feelings. *Ambivalent* is sometimes used in scientific writing to describe something having simultaneous conflicting characteristics,<sup>2</sup> such as an ambivalent molecule, which might fluctuate between two opposite properties depending on conditions.

- ✓ After learning about the severe side effects of this highly effective drug, most patients were ambivalent about receiving this treatment.
- ✓ Without more data, the surgeon was ambivalent about whether new robotic methods are superior to traditional methods.
- ✓ Ethanol is considered an ambivalent molecule because it can dissolve in both water and hydrophobic solvents.

As a quick rule of thumb, *ambivalent* usually describes people’s feelings or attitudes (e.g., an ambivalent patient might simultaneously want to quit smoking and to smoke a cigarette), whereas *ambiguous* usually describes statements (e.g., an ambiguous sentence is confusing or difficult to interpret).

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:39.
2. *Dorland’s Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:57.

# Amend or Emend?

*Amend* and *emend* differ by only one letter, sound similar, and have overlapping meanings. So when should you use each word, or does it matter?

*Amend* means to put right, alter (or modify), or correct.<sup>1</sup> *Emend* also means to correct, but its use is generally restricted to correcting something (such as a manuscript) by altering text.<sup>2</sup> In short, *amend* is never a wrong choice, but *emend* should be used only when writing about text.

- ✓ After several patients experienced grade 3 and 4 side effects, we amended the chemotherapy regimen to include a dose reduction plan. [modified the regimen]
- ✓ The U.S. Constitution has been amended 27 times. [modified or altered a set of principles or laws; could also be emend if U.S. Constitution refers to written text that is corrected]

- ✓ The editors in Scientific Publications emend more than 1,000 manuscripts each year. [correct the text]
- ✓ I emended the report to incorporate the revised data. [corrected the text]

Tip: *Emend* and *edit* both begin with the letter e. If you can substitute the word *edit* in your sentence, then *emend* is probably a correct choice; if the substitution sounds odd, then use *amend*.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:39.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:407.



# America and American as Ambiguous Terms

People often assume that *America* and *American* refer to the United States and its people, respectively, but these terms can be ambiguous. North, Central, and South America and the Caribbean are collectively considered the Americas, and all their peoples, including the indigenous population, may count themselves among Americans.<sup>1</sup> When, then, should you use *America* and *American*, and how can you use them unambiguously and inclusively?

Whether you are referring to a place (location) or a group of people, it's best to be as specific as possible: for instance, South America, southeast Canada, the Midwest, or Pennsylvania; and Jamaicans, Hopis, or Houstonians.

- ✗ The first outbreak of the Zika virus in America took place in 2015.
- ✓ The first outbreak of the Zika virus in the Americas took place in Brazil in 2015.

Using *United States* as a noun in place of *America* or its abbreviation *US* as an adjective in place of *American* can help avert any ambiguity.<sup>2</sup>

- ✗ Many Americans have misconceptions about mental illness.
- ✓ Many people in the United States have misconceptions about mental illness.

- ✗ The purpose of this study was to investigate incidence and causes of tooth decay in American children.
- ✓ The purpose of this study was to investigate incidence and causes of tooth decay in US children.

Remember that because English lacks an acceptable alternative that works in all cases, it is not considered incorrect to use *America* or *American* to describe the United States or its people<sup>3</sup>; however, using a more specific term will avoid confusion and will accurately distinguish groups of people.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:39.
2. *The Chicago Manual of Style*, 16th ed. Chicago: University of Chicago Press; 2010:500.
3. Garner BA. *Garner's Modern American Usage*, 3rd ed. New York: Oxford University Press; 2009:41.

# Among or Between?

Many people have been taught to use *between* to talk about two things and *among* to talk about three or more things. But the correct use of *between* and *among* follows a more nuanced rule.

The *Chicago Manual of Style* explains the difference between the two words:

*Between* indicates one-to-one relationships [between you and me]. *Among* indicates undefined or collective relationships [honor among thieves]. *Between* has long been recognized as being perfectly appropriate for more than two objects if multiple one-to-one relationships are understood from the context [trade between members of the European Union].<sup>1</sup>

In other words, *between* indicates a relationship involving two or more things in which each thing is considered in relation to each of the other things, whereas *among* indicates a vague or group (i.e., not one-to-one) relationship.<sup>2</sup>

Therefore, *among* is not the correct choice in the following sentence:

- ✗ EGFR expression varied among patients.

In this sentence, the EGFR expression of each patient is being compared with that of each other patient, so *between* is the better choice:

- ✓ EGFR expression varied between patients.

The following example also uses *among* incorrectly:

- ✗ The median survival time was compared among the groups.

In this sentence, the median survival time of each group is likely being compared with the median survival time of each other group:

- ✓ The median survival time was compared between the groups.

Here are more examples:

- ✗ Radiotracer uptake differed significantly among cancer cell types.
- ✗ The duck stood between 100 pigeons.
- ✓ The needle was lost among the stalks of hay.
- ✓ Telephone lines were installed between all the houses in the neighborhood.

## References

1. *The Chicago Manual of Style*, 15th ed. Chicago, IL: University of Chicago Press; 2003:203.
2. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:385



# Antecedents and Pronouns

Antecedents and pronouns are a significant source of confusion in biomedical writing. Pronouns are words that can be substituted for nouns. Among the pronouns most commonly used in scientific writing are *I*, *we*, *she*, *he*, *it*, *they*, *them*, *their*, *that*, and *this*. The noun that a pronoun refers to is called the *antecedent*.

- ✓ The researchers discovered what they initially believed to be a sign of recurrent disease.

In the example above, *they* is a pronoun that refers to the antecedent *researchers*.

If the antecedent of the pronoun is not clear, the meaning of the text becomes ambiguous.

- ✗ *PTEN* mutations were associated with more liver metastases and shorter survival duration. This could be due to the increase in cell migration and invasion.

In this example, the antecedent of the pronoun *this* is unclear. Does *this* replace “more liver metastases,” “shorter survival duration,” or “more liver metastases and shorter survival

duration”? Repeating or rephrasing the relevant noun (rather than using a pronoun) produces a clearer sentence.

- ✓ *PTEN* mutations were associated with more liver metastases and shorter survival duration. The higher number of liver metastases could be due to the increase in cell migration and invasion.

Pronouns must also agree with their antecedents in number.

- ✗ Each patient was treated with chemotherapy, and their creatinine levels were monitored.
- ✓ The patients were treated with chemotherapy, and their creatinine levels were monitored.

In the second sentence, the plural pronoun *their* agrees with the plural noun *patients*.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:317.

# Apostrophes in Disease and Test Names

Medical terms derived from the name of a person or place are called *eponyms*. Many names for diseases and tests are eponyms and were originally formatted in a possessive form (such as *Alzheimer's disease* and *Fisher's exact test*). Today, however, these names frequently appear in a nonpossessive form (*Alzheimer disease* and *Fisher exact test*).

Although the use of the apostrophe in eponyms is still being debated, medical dictionaries and style manuals are increasingly recommending the nonpossessive form. *Dorland's Illustrated Medical Dictionary*, for example, took an intermediate position on this issue and included a mixture of both possessive and nonpossessive eponyms until very recently. In its current edition, however, *Dorland's* omits the 's from each of these disease and test names for consistency. The *AMA Manual of Style* also recommends the use of the nonpossessive form to enhance clarity and consistency.

Generally, simply dropping the 's is all that is needed to change the eponym from the possessive to the nonpossessive form:

| Old                 | New               |
|---------------------|-------------------|
| Addison's disease   | Addison disease   |
| Parkinson's disease | Parkinson disease |
| Crohn's disease     | Crohn disease     |
| Korotkoff's test    | Korotkoff test    |

When a disease has multiple names, one of which is an eponym and another of which describes the condition, the latter name is preferable:

| Eponym                | Descriptive replacement   |
|-----------------------|---------------------------|
| Paget disease of bone | osteitis deformans        |
| Gasser syndrome       | hemolytic uremic syndrome |

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:778.

*Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:xx.

*Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 7th ed. Birmingham, AL: The Rockefeller University Press; 2006:94.

# Appose or Oppose?

*Appose* and *oppose* sound similar, but they have different meanings. These differences in meaning can be critical, especially in medical writing. Generally speaking, *oppose* is much more common; *appose* is often a typographical error but is used in some medical contexts. Unfortunately, spell checkers will not recognize the misuse of these words as an error.

*Appose*, a rarely used word, means to place things next to each other.<sup>1</sup>

- ✓ The patient was unable to appose her legs.
- ✓ The transplanted kidney was placed in apposition to the iliac fossa.

Conversely, *oppose* is a common word that means “to go against.”<sup>2</sup>

- ✓ We oppose the adoption of this technique as a standard of care because it is difficult to perform and often results in significant morbidity.

- ✓ The transplanted muscle was placed in the posterior compartment of the leg so as to oppose the action of the quadriceps.

It is especially important to carefully review surgical texts and procedures to ensure the correct forms of these words are used because their meanings are almost in direct opposition to each other.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:61.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:870.

# Appraise or Apprise?

*Appraise* and *apprise* are often confused with each other even though the meanings of these two verbs differ substantially. To *apprise* means to inform or tell someone about something.<sup>1</sup>

- ✓ The doctor apprised his patient of the side effects of cisplatin.
- ✓ She felt happy when her oncologist apprised her of her promising prognosis.

On the other hand, to *appraise* is to estimate or “to evaluate the worth, significance, or status” of something or someone.<sup>1</sup> *Appraise* implies an “expert judgment.”<sup>1</sup>

- ✓ In his review of the literature, Dr. Anderson appraised the current state of cancer research.
- ✓ The jeweler appraised the value of the necklace at \$1000.

## Reference

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:61.

# Are Control Subjects Healthy?

In case-control studies, the control subjects ideally match the case subjects in all parameters except the condition being studied. Frequently, the control subjects are referred to as *healthy* or *normal*. Both of these terms should be used with care.

The term *healthy* is sometimes problematic because even control subjects who have not been diagnosed with the condition being studied may have other serious health problems. Thus, some description of the control cohort—other than the fact that the members of this cohort do not have condition *X*—should be provided.

- ✓ The control subjects did not test positive for tuberculosis. In addition, they had no history of cancer, diabetes, or respiratory failure; and their complete blood counts all fell within the normal ranges.

Control subjects who are considered healthy generally should not be referred to as *patients*. They could be referred

to as *participants*, *volunteers*, *donors*, *subjects*, *individuals*, or *persons* (men/women), as appropriate.

Conversely, not all patients are unhealthy. A patient may visit a health care provider for a flu vaccination, or a person who has completed a treatment regimen may be considered cured at a follow-up visit.

*Normal* should also be used sparingly. Note that *normal* can be applied to test results and parameters. However, a person or a group of persons should never be defined as *normal* because it implies that the other group of persons is *abnormal*, which is a dehumanizing term.

In summary, *healthy* and *normal* should be defined explicitly and used carefully.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:388, 389.

# Are There Alternatives to *There Are*?

Whenever you come across the word *there* with a form of the verb *to be*, take a second look at the sentence. It is likely that it contains unnecessary words and that a revision could produce a more interesting sentence. Often you will find that with some simple editing, you can make the sentence not only more active but also more concise.

Sometimes the extra words can just be deleted:

- ✗ Wordy: Although there have been many studies that have documented this phenomenon, there have been none that have investigated its persistence over time.
- ✓ Concise: Although many studies have documented this phenomenon, none have investigated its persistence over time.
- ✗ Wordy: There are many challenges that must be met before this assay can reach its full potential.
- ✓ Concise: Many challenges must be met before this assay can reach its full potential.

Other sentences can be rewritten to become more active or direct:

- ✗ Wordy: There are no absolute contraindications for this therapy except for uncorrected coagulopathy.
- ✓ Concise: The only absolute contraindication for this therapy is uncorrected coagulopathy.

Sometimes, however, there is no simpler way to write a sentence beginning with *there*.

- ✓ Concise: There are three hypertension grading systems.
- ✓ Concise: There are several reasons for the increased incidence.

Rewording these examples to be more active would produce awkward results: “Three hypertension grading systems exist” and “Several reasons for the increased incidence exist.”

Finally, a wordy construction may be justified to avoid starting a sentence with a number. A number at the beginning of a sentence would need to be spelled out in words, which is less clear than using a numeral.

- ✗ 295 patients had stage III disease.
- ✓ Two hundred ninety-five patients had stage III disease.
- ✓ There were 295 patients with stage III disease.

## Bibliography

Garner BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:811.



# As Such

In the phrase *as such*, the pronoun *such* refers to an earlier noun or noun phrase.

- ✓ Social Security numbers are identifying information and must be handled as such. [*Such* refers to *identifying information*.]

Sometimes, writers use *as such* to mean *therefore* or *thus*. Although that usage is increasingly common, it is not yet widely considered correct.

- ✗ Our laboratory has already developed the transgenic mice needed for the proposed work; as such, we do not expect any problems.
- ✓ Our laboratory has already developed the transgenic mice needed for the proposed work; therefore, we do not expect any problems.

In some sentences, both *as such* and *therefore* or *thus* are correct.

- ✓ MD Anderson is a comprehensive cancer center and, as such, treats patients with all kinds of cancers. [*Such* refers to a *comprehensive cancer center*.]

- ✓ MD Anderson is a comprehensive cancer center and thus treats patients with all kinds of cancers.

To determine whether *as such* is used correctly, replace *such* with the noun or noun phrase to which *such* refers, and check whether the sentence still makes sense. If *such* does not refer to a noun or noun phrase or if replacing *such* with a noun or noun phrase results in a nonsensical sentence, use *thus* or *therefore* instead.

- ✗ Our laboratory has already developed the transgenic mice needed for the proposed work; as such, we do not expect any problems. [None of the noun phrases (*our laboratory*, *transgenic mice*, *proposed work*) make sense when substituted for *such*. Use *thus* or *therefore*.]

## Bibliography

Garner BA. *Garner's Modern English Usage*, 4th ed. New York: Oxford University Press; 2016:78.



# As, Because, or Since?

In casual speech or writing, *as*, *since*, or *because* can be used to mean “for the reason that.” However, both *as* and *since* can be confusing when used with that meaning because *as* can also mean “while” and *since* can also mean “from the time of” or “from the time that.” With these alternative meanings in mind, consider the following sentences:

- ✗ The patient developed an infection as she recently underwent bone marrow transplantation. [This may mean that she developed an infection while she underwent transplantation or that she developed an infection because she underwent transplantation.]
- ✗ The patient developed an infection since she recently underwent bone marrow transplantation. [This may mean that she developed an infection starting from the time that she underwent transplantation or that she developed an infection because she underwent transplantation.]

- ✓ The patient developed an infection because she recently underwent bone marrow transplantation.

All these interpretations may describe the same situation; indeed, the infection may have begun during the bone marrow transplantation, continued since the transplantation was completed, and occurred as a result of the transplantation. However, it is also possible that the infection did not occur until several weeks after the transplantation; in that case, the use of *as* or *since* is potentially misleading. Thus, the best way to convey causation in such sentences, especially in writing in which precision is important, is to use *because*.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:386.

# Ascribe or Subscribe?

*Ascribe* and *subscribe* are two verbs that are sometimes confused in writing—they look and sound similar but differ in meaning.

*Subscribe* is the more commonly used of the two words, although it is not often used in scientific writing. The older and literal meaning of *subscribe*, “to write beneath” (to sign one’s name to a document), is rarely used.<sup>1</sup> Instead, *subscribe* more commonly refers to agreeing to the delivery of a publication or service (such as signing up for a mailing list) or feeling favorably disposed to something (such as agreeing with a theory or belief).

- ✓ With the growth of online media, fewer and fewer people are subscribing to their local newspaper.
- ✓ She didn’t subscribe to the belief that women have it easier than men.

To *ascribe*, on the other hand, is to refer to “a supposed cause, source, or author.”<sup>2</sup>

- ✓ Several popular sayings have been incorrectly ascribed to Mark Twain.
- ✓ Because the patients had multiple opportunistic infections, we cannot ascribe their deaths to adenovirus infection alone.
- ✓ The drug’s antitumoral effects were partly ascribed to its ability to inhibit topoisomerase I and II.

The words *attribute* and *credit* are useful synonyms for *ascribe* that can help you determine whether you are using the correct verb.

- ✗ Some people ascribe to a belief in the existence of the chupacabra, a legendary cryptid that is said to attack livestock. [Replacing ascribe with *credit* or *attribute* in this sentence would not make sense.]
- ✓ Some people subscribe to a belief in the existence of the chupacabra, a legendary cryptid that is said to attack livestock.
- ✗ Others subscribe these attacks to coyotes or dogs suffering from mange.
- ✓ Others ascribe these attacks to coyotes or dogs suffering from mange. [Here, *credit* or *attribute* would make sense, as “coyotes or dogs” are being referred to as the cause.]

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1244.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:71.

# Assure, Ensure, or Insure?

The verbs *assure*, *ensure*, and *insure* are often used synonymously because, in a general sense, they all mean “to make secure or certain.”<sup>1</sup> However, they should not be used interchangeably because they have distinct meanings, which are illustrated in the following sentence:

- ✓ I assure you that the best way to ensure that you don’t experience financial loss is to insure your possessions.

*Assure* means to inform a person or persons that something is true, and it implies the removal of doubt.

- ✓ He assured me that he would arrive on time.
- ✓ Before interviewing the patients, we assured them that their personal health information would remain confidential.

Tip: Remember that *assure* (with an **a**) can be used only with a person or persons as the object and that people are alive (and *alive* also starts with an **a**).<sup>2</sup>

*Ensure* means to make certain or to guarantee that something will (or will not) happen. *Ensure* is used more often than *assure* or *insure* in biomedical writing.<sup>3</sup>

- ✓ Patients should continue their treatment for the recommended amount of time to ensure optimal efficacy.

Tip: Remember that *guarantee* has two **e**’s on the end and that to *ensure* (with an **e**) is to guarantee something.<sup>2</sup>

*Insure* means to provide or arrange financial coverage against loss, injury, or death. *Insure* is not commonly used in biomedical writing.

- ✓ We insured our house against fire, floods, and hurricane damage.
- ✓ The laboratory equipment was insured, but the specimens stored in the freezer were not.

Tip: Remember that we have insurance to protect our income if we lose something valuable or get hurt and that both *insure* and *income* begin with **in**.<sup>2</sup>

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:75.
2. “Assure Versus Ensure Versus Insure,” *Grammar Girl*. <http://grammar.quickanddirtytips.com/assure-ensure-insure.aspx>. Accessed August 2, 2012.
3. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:386.

# Avoiding Business Jargon

Biomedical writing intended to persuade the reader to use a new technique or fund a project can sometimes drift into jargon most often seen in business settings. These terms are not helpful to readers who need precise information.

The business jargon terms most likely to appear in biomedical writing are words that mean *new* or *great*, such as *ground-breaking*, *cutting-edge*, and *game-changing*. To avoid these vague terms, the writer should describe exactly what is innovative about something or exactly how something will advance the field.

- ✗ This cutting-edge imaging technique provides very high spatial resolution.
- ✓ This new imaging technique provides substantially higher spatial resolution than previous methods.
- ✗ This drug could lead to ground-breaking progress in multiple myeloma treatment.
- ✓ This drug could significantly prolong remission and cause less severe adverse effects compared with current multiple myeloma treatments.

Another type of business jargon to avoid in effective writing is

clichés. These terms should be replaced with more informative language.

- ✗ This approach for preventing human papillomavirus infections is a low-hanging fruit.
- ✓ This understudied approach shows significant potential to prevent human papillomavirus infections.
- ✗ Once we have reached a critical mass of preclinical evidence, we will begin clinical trials.
- ✓ Once we have established that this agent significantly shrinks tumors and prolongs survival in a murine model, we will begin clinical trials.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:408.

Garner BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:157, 158.

# Avoiding Dangling Modifiers

A modifier is a word or phrase that describes another word or phrase. Adjectives and adverbs are the most well-known modifiers, but verbal phrases (such as gerunds, participial phrases, and infinitives) can also be used as modifiers.

- ✓ To determine the patient's diagnosis, the physician ordered a series of tests.
- ✓ Using a purse-string suture, the surgeon closed the wound.

In the first example, the infinitive phrase “to determine the patient's diagnosis” modifies, or describes, the subject and verb “the physician ordered” and tells why the physician did it; the infinitive has an adverbial function. In the second example, the participial phrase “using a purse-string suture” is describing “the surgeon” by telling us what she did; the participial phrase is acting as an adjective in this sentence. As these two examples show, verbal phrases modify nouns and should be situated close to the word, phrase, or clause being modified.

In the case of a dangling modifier, however, the connection between the verbal phrase and the word being modified is not clear or logical. Often, dangling modifiers result from too much separation between the modifying phrase and the word being modified.

- ✗ After reviewing the medical records of 190 patients, the patients' demographic information was recorded by the investigators.

- ✓ After reviewing the medical records of 190 patients, the investigators recorded the patients' demographic information.

In the incorrect example above, it appears at first glance that the patients' demographic information reviewed the medical records. When the sentence is rearranged in the correct example, it becomes clear that “After reviewing the medical records” modifies “the investigators.”

In some cases, the implied subject of the phrase is missing from the main clause.

- ✗ To calculate the tumor volume, measurements based on computed tomography images were used.
- ✓ To calculate the tumor volume, we used measurements based on computed tomography images.

## Bibliography

Hodges JC, Horner WB, Webb SS, Miller RK. *Harbrace College Handbook*, 12th ed. Fort Worth, TX: Harcourt Brace College Publishers; 1994:56, 57.



# Avoiding Sexism in Pronouns

We write to influence what others believe. However, sometimes we inadvertently cause others to interpret our writing in ways other than we intended. Such is the case when we use only male or female pronouns to refer to people in particular groups. For example, when only male pronouns are used when referring to people in positions of authority, power, or prestige, readers may believe that the writer thinks only men are or should be members of such groups.

To avoid using so-called sexist language, sometimes the writer can simply avoid mentioning gender-related words when talking about the group. For example, instead of *policemen* we can say *police officers*. And instead of *congressmen* we can say *congressional representatives* or *members of Congress*.

In fact, if we say simply *physicians, surgeons, scientists, CEOs*, or any other plural noun that doesn't contain the words *man, men, woman, or women*, we can be assumed to be referring to a group of both men and women. But if we need to refer to a member of that group with a pronoun, things get sticky. In these instances, writers have a few options at their disposal.

The phrase *his or her* (or *he or she*) may be used instead of just *his* (or just *he*), but the result tends to be awkward and wordy. In many cases, we can avoid referring to a single person of unknown sex entirely by using the plural and its pronoun, *they* and *their*, which are gender neutral. And sometimes we can avoid using a pronoun entirely by substituting an article (*a, an, or the*).

- ✗ Sexist: A doctor must pass *his* board examination to be considered board-certified in a specialty.
- ✗ Not sexist but awkward/wordy: A doctor must pass *his or her* board examination to be considered board-certified in a specialty.
- ✓ Not sexist (using plurals): Doctors must pass *their* board examinations to be considered board-certified in a specialty.
- ✓ Not sexist (substituting an article): A doctor must pass *a* board examination to be considered board-certified in a specialty.

Similar solutions work when referring back to an indefinite pronoun (examples of indefinite pronouns are *every* [followed by a noun], *each* [followed by a noun], *everyone, anyone, and somebody*); these are normally referred to subsequently using a singular pronoun:

- ✗ Sexist: *Every* principal investigator should meet with *his* research group at least once per week.
- ✗ Not sexist but awkward/wordy: *Every* principal investigator should meet with *his or her* research group at least once per week.
- ✓ Not sexist (using plurals): *All* principal investigators should meet with *their* research groups at least once per week.



- ✓ Not sexist (substituting an article): *Every* principal investigator should meet with *the* research group at least once per week.
- ✗ Sexist: *Everyone* has *his* opinion.
- ✗ Not sexist but awkward/wordy: *Everyone* has *his or her* opinion.
- ✓ Not sexist (using plurals): *All people* have *their* opinions.
- ✓ Not sexist (substituting an article): *Everyone* has *an* opinion.

Switching from singular to plural is often the easiest way to avoid sexist pronoun use. And when that option doesn't sound right, avoiding pronouns entirely will usually work.

### **Bibliography**

Einsohn A. *The Copyeditor's Handbook*. Berkeley, CA: University of California Press; 2000:411–414.

Lunsford A, Connors R. *The St. Martin's Handbook*. New York: St Martin's; 1989:222, 223, 405, 406.

# Azygos or Azygous?

*Azygos* and *azygous* look similar, sound the same, and mean almost the same thing, but in many situations, *azygos* is the better choice.

According to *Dorland's Illustrated Medical Dictionary*, both *azygous* and *azygos* mean “unpaired,” or, as the definition for *azygous* reads, “having no fellow.”<sup>1</sup> However, only *azygos* should be used in the following anatomical terms and their variations: *azygos vein*, *azygos artery*, *azygos fissure*, and *azygos lobe*. *Azygos* is also used alone as an adjective to indicate a relation to the *azygos vein*. Using *azygos* in these terms is consistent with common medical usage.

- ✓ Half of the patients had their azygos vein preserved, and the other half had their azygos vein ligated.
- ✓ Computed tomography showed an azygos lobe in the patient's lung.

However, when a writer is referring to things other than anatomical structures, it is acceptable to use either *azygous* or *azygos* to mean “unpaired” (as long as the same spelling is used consistently).

- ✓ The structure that comprises the bilateral anterior cerebral arteries in humans corresponds to a single, azygous vessel in macaques.

## Bibliography

*Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:188.

# Back-formation, or Verbing

If a computer can compute, why doesn't a butler butle or an usher ush?

The change of a noun into its assumed verb form is called a back-formation. *Merriam-Webster's Collegiate Dictionary* defines a back-formation as "a word formed by subtraction of a real or supposed affix from an already existing longer word (as *burgle* from *burglar*)."<sup>1</sup> Thus, a "verbed" noun appears when a writer mistakenly assumes that a noun he or she is familiar with is actually derived from a verb when in fact the noun arose *de novo*. Any writer can make this kind of mistake, from a participant in an informal Internet chat forum to the author of a technical document.

Sometimes a "verbed" noun eventually enters accepted usage: *diagnose* is a back-formation of *diagnosis* that dates back to the mid-19th century.<sup>2</sup> Likewise, doctors may now anesthetize patients, whereas they used to merely administer an anesthetic.

But can one angiograph a patient? How about dialyze? According to *Merriam-Webster*, *dialyze* is a word,<sup>1</sup> but *angiograph* is not.

*Dorland's Illustrated Medical Dictionary* lists *angiograph* as a noun, although the more common term is *angiogram*.<sup>3</sup>

Written English, even in the relatively conservative setting of formal research papers, is constantly evolving. It can be confusing to distinguish between what is jargon and what is accepted field-specific terminology. If you are unsure if the word you are using is really a word, check with a trusted source, such as *Merriam-Webster*.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:90.
2. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:407, 408.
3. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:84.

# Based on or On the Basis Of?

In formal writing, phrases beginning with *based on* should be used only to modify nouns.

- ✓ We tested a prognostic nomogram based on 4 prognostic factors. [modifying the noun *nomogram*]
- ✓ Finally, we present recommendations based on our review of the literature. [modifying the noun *recommendations*]

Using *based on* to modify a verb is considered incorrect.

- ✗ Outcomes varied based on year of enrollment. [modifying the verb *varied*]
- ✗ The treatment groups were stratified based on tumor stage. [modifying the verb phrase *were stratified*]

In these examples, *based on* should be replaced with *on the basis of* to modify the verbs *varied* and *were stratified*.

- ✓ Outcomes varied on the basis of year of enrollment.
- ✓ The treatment groups were stratified on the basis of tumor stage.

Alternatively, the sentences could be revised as follows: “Outcomes varied by year of enrollment” and “The treatment groups were stratified according to tumor stage.”

Sentences that begin with the phrase *based on* can also be problematic.

- ✗ Based on our extensive experience, we were chosen to lead this collaboration. [modifying *were chosen*]

Here, *based on* is again being used incorrectly to modify a verb phrase, *were chosen*. Thus, a revised sentence is needed. Once again, the best way to modify a verb in this context is to use a phrase beginning with *on the basis of*.

- ✓ On the basis of our extensive experience, we were chosen to lead this collaboration.

Finally, when *based on* is used, what is being modified should be obvious to the reader.

- ✗ Based on our review of the literature, conservative surgery produces survival outcomes equivalent to those after radical surgery in patients with stage I disease.

Because it is not clear what *based on* modifies, this sentence is considered incorrect. *Based on* does not modify the noun *surgery*, and it does not modify the verb *produces*. A revised sentence is needed—for example, “Findings from our review of the literature indicate that conservative surgery produces....”

## Bibliography

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:269.

# Bi- or Semi-?

The prefixes *bi-* and *semi-* can mean either half or twice a given amount, so it is important to distinguish between the two for accuracy.

*Bi-* means two. For example, a *bilateral* procedure is one that involves two sides, and *bifocal* lenses have two parts, one for proximate vision and one for remote vision.

*Semi-*, on the other hand, means half. For example, a *seminormal* solution is one that has half the strength of a normal solution, and a patient in a *semisupine* position is partly but not completely supine.

When dealing with time, however, these prefixes can be a little confusing. In general, *bi-* and *semi-* describe the interval between events rather than the number of events. Thus, *biweekly* is every 2 weeks and *bimonthly* is every 2 months, whereas *semiweekly* is every half week and *semimonthly* is every half month (i.e., twice per week and twice per month, respectively).

- ✓ The patient received biweekly injections of erythropoietin [injections of erythropoietin every 2 weeks].
- ✓ Fluorouracil and leucovorin were administered semimonthly [administered twice per month].

Note, however, that *biannually* and *semiannually* both mean twice per year and that *biennially* means every other year. To ensure that readers understand exactly what time interval you mean, avoid terms such as *biweekly* and *semimonthly* altogether in favor of more descriptive phrases, such as “every 2 weeks,” “twice per month,” or “the first and fifteenth days of each month.”

## Bibliography

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:269.

*Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:212, 1690.

# Biweekly or Semiweekly?

The words *biweekly* and *semiweekly* are often confused because the prefixes *bi-* and *semi-* have similar, sometimes even interchangeable, meanings.

*Semiweekly* always means that something happens twice a week; *biweekly*, however, means that something happens either twice a week or every two weeks. The problematic word is therefore *biweekly* because of its two different meanings.

✗ The patient underwent biweekly radiation therapy.

In this example, it is unclear whether the patient received radiotherapy twice a week or every two weeks. *Semiweekly radiotherapy* would clearly denote that the patient underwent radiotherapy twice a week.

Even the most seasoned writers acknowledge that confusion about the prefix *bi-* is impossible to resolve. Thus, it is better to avoid all

ambiguity and use expressions with equivalent and much clearer meanings, such as *every two weeks* or *every other week* instead of *biweekly*.

✓ *Word for Word* will now be published every other week.

## Bibliography

*Fowler's Modern English Usage*, revised 3rd ed. Oxford: Oxford University Press; 2004:107.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:127, 1132.



# Blot Names: To Capitalize or Not to Capitalize?

When writing about the techniques used to detect proteins, RNA, and DNA, biomedical writers are often unsure which words in the names need to be capitalized.

In general, if a laboratory technique includes a proper name—e.g., that of the inventor—the proper name should be capitalized. For example, the Gram stain is named after its inventor, Hans Christian Gram. Therefore, the proper name *Gram* is capitalized in *Gram stain*. *Stain* is not capitalized because it is not part of the proper name.

Similarly, the Southern blot is named after its inventor, Edwin Mellor Southern, and thus the proper name *Southern* is capitalized and the word *blot* is not. However, the decision about whether to capitalize the first word in *Western blot*, *Southwestern blot*, and *Northern blot* is more complex. These blots were not named after anyone; rather, they were conceived as humorous spin-offs from the name of the Southern blot. So should we

capitalize *Western*, *Southwestern*, and *Northern* or not? For the sake of simplicity and by tradition, even though *Western blot*, *Southwestern blot*, and *Northern blot* do not include a true proper name, the first word of each is capitalized. (The word *far* should also be capitalized in *Far Western blot*.) As in *Southern blot*, *blot* is not capitalized.

- ✗ Protein A was identified using western blot analysis.
- ✗ Protein A was identified using Western Blot analysis.
- ✓ Protein A was identified using Western blot analysis.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:601.

*Dorland's Illustrated Medical Dictionary*, 32nd edition. Philadelphia, PA: Elsevier; 2012:230.

# Born or Borne?

*Born* and *borne* sound alike and differ by only one letter, but the two words have distinct meanings.

*Born* should be used when you are referring to the birth, origin, or source of something.

- ✓ The child was born on March 27, 2014.
- ✓ Mary is a born doctor.
- ✓ Louis Pasteur was a French-born scientist.
- ✓ The idea was born of desperation.

In contrast, *borne* should be used when you are referring to transporting, transmitting, accepting, supporting, or tolerating something.

- ✓ He was borne on a stretcher through the hallway.
- ✓ Her suffering was borne in silence.
- ✓ The additional weight could not be borne.
- ✓ Fortunately, the pathogen is not airborne.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:106, 144.

# Breach or Breech?

*Breach* and *breech* sound exactly alike, but their meanings are very different. A *breach* is “an infraction or violation of the law, obligation, tie, or standard” or “a broken, ruptured, or torn condition or area.”<sup>1</sup>

- ✓ Unauthorized access to patients’ medical records is a breach in [a violation of] patient privacy.
- ✓ If a security mechanism is bypassed, a breach [a break or interruption] in security results.
- ✓ Military and law enforcement units use various methods to breach [break down] doors and barricades.

*Breech*, on the other hand, refers to the rear end of the body.<sup>2</sup> In biomedical writing, *breech presentation* and *breech birth* describe a birth of a baby in which the baby’s bottom or feet are delivered first.

- ✓ The baby was born via breech delivery.
- ✓ A breechcloth is a type of loincloth that covers the area between the abdomen and mid-thigh.

An easy way to distinguish the two words is to replace the **ch** in *breach* with a **k** to remember that *breach* is related to *break*.<sup>1</sup> Also, *breach* can be used as a verb, unlike *breech*.

In some instances, the part of speech can be used as a clue to determine the correct spelling of these words.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:151.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:153.

# Breath or Breathe?

The words *breath* and *breathe* have distinct meanings. But because they have similar spellings, these words are sometimes used incorrectly in writing.

*Breathe* (which rhymes with seethe) is a verb that means to draw air into and expel it from the lungs (to inhale and exhale).

- ✓ Tibetan yoga, which encourages practitioners to breathe in a controlled manner and to use mindfulness techniques, can help patients fall asleep faster and stay asleep longer.
- ✓ Movement caused when patients breathe must be accounted for in the treatment plans of all lung cancer patients undergoing proton therapy.
- ✓ If you experience sudden dizziness or find it hard to breathe, notify your nurse immediately.

*Breath* (which rhymes with death) is a noun that refers to the air that is inhaled and exhaled during respiration. When people have difficulty breathing, as after physical exertion, you may hear them say that they are “out of breath”; in medicine, this is usually referred to as “shortness of breath” (or dyspnea).

- ✓ We assessed pain, fatigue, nausea, depression, anxiety, drowsiness, shortness of breath, appetite, sleep, and well-being using a numeric rating scale.
- ✓ She was out of breath by the time she had finished climbing the last flight of stairs.

- ✓ When it is cold outside, you can see your breath in the air.

You may also hear *breath* used colloquially in phrases such as “don’t hold your breath” (something is unlikely to happen soon), “under your breath” (to speak very quietly), “take your breath away” (to be surprised or in awe), and “save your breath” (to avoid becoming involved in a futile discussion).

- ✓ My neighbor asked if the city would widen this freeway soon. I laughed and replied, “Don’t hold your breath!”
- ✓ The receptionist said something very rude under her breath as soon as the difficult client walked away.
- ✓ The view from the top of the Matterhorn took my breath away.
- ✓ Save your breath. I’ve argued about it with him several times already, and nothing is going to change his mind.

## Bibliography

*Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:153.

# Bring or Take?

*Bring* and *take* do not look or sound similar, but they have similar meanings and are often used incorrectly in place of one another. Both words describe the same action—the transportation of a person, animal, or object—but from different perspectives.

*Bring* means “to convey, lead, carry, or cause to come along with one toward the place from which the action is being regarded”<sup>1</sup>; *take* means “to lead, carry, or cause to go along to another place.”<sup>2</sup> Thus, *bring* is used when referring to something that is being carried to the location of the speaker, and *take* is used when referring to something that is being carried away from the speaker.

- ✓ The nurse instructed the patient to bring a list of his current medications to his upcoming appointment.

- ✓ “Bring your English books tomorrow,” the teacher told his students.
- ✓ The hostess gave her guests leftovers to take with them when they left the party.
- ✓ The pediatrician gives her patients books to take home after their checkups.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:155.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1273.

# Callous or Callus?

The words *callous* and *callus* sound the same and have related definitions, but they should not be used interchangeably.

*Callus* refers to an area of skin that has thickened as a result of pressure or friction. *Callus* is most commonly used as a noun; it can also be a verb, but it cannot be an adjective.

- ✓ These shoes, which are too small, created calluses on my heels.

*Callous* describes an object that has calluses (a *callous* heel, for example) or, more commonly, something that (like a callus) is insensitive. The term may be used to refer to a physical or an emotional trait. For example, a *callous* person is unkind. *Callous* is most commonly used as an adjective; it can also be a verb, but it cannot be a noun.

- ✗ The patient's callouses were caused by his new running shoes.
- ✗ Your callus behavior hurt my feelings.
- ✓ The callous manager did not notice the calluses on the employee's hands.
- ✓ She wrung her callous hands at his callous remarks.

## Bibliography

Garner, BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:126.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:176.



# Can or May?

Can *can* be used interchangeably with *may*? Careful writers say no.

*Can* indicates ability:

- ✓ The two words cannot [are not able to] be used interchangeably.
- ✓ Participants are eligible for the study if they can [are able to] complete a written survey and attend two in-person counseling sessions.
- ✓ Mice can [are able to] be trained to run through a maze.

*May* indicates permissibility:

- ✓ May I [am I allowed to] pet your dog?
- ✓ Participants may [are allowed to] enroll in the study if they are 18 years or older.

*May* also indicates possibility or probability:

- ✓ Patients undergoing radiotherapy may experience nausea or fatigue.
- ✓ The diagnosis may be incorrect.

Although *can* and *may* are often used interchangeably in spoken English and informal writing, careful writers will continue to maintain the distinctions in formal writing.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:388.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:178, 767.

# Capital or Capitol?

*Capital* and *capitol* are homophones: they have similar pronunciations but different meanings.

Simply put, *capitol* refers to a government building or group of buildings.

- ✓ We took a tour of the capitol building.
- ✓ The U.S. Congress meets in the Capitol. [Note the use of uppercase when referring to the U.S. Capitol.]

In virtually every other context, such as when referring to uppercase letters, financial assets, or a city that is a seat of government, *capital* is the correct word.

- ✓ Use capital letters for human gene symbols and lowercase letters for mouse gene symbols.
- ✓ The company must invest in capital improvement projects.
- ✓ Capital punishment is a controversial subject.
- ✓ Austin is the capital city of Texas.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:183.

# Case, Participant, Patient, or Subject?

Although *case*, *patient*, *participant*, and *subject* are commonly used interchangeably in medical literature to mean a disease or a person under investigation, each has a distinctive meaning and usage. A *case* is “a particular instance of a disease,” not a person, whereas a *patient* is “a particular person under medical care.”<sup>1</sup> A *participant* is someone who is included in a study and is a useful term when not all the people being studied are patients. A *subject* is generally an individual “under authority or control” and should not be used to designate patients or participants.<sup>2</sup>

- ✓ Our retrospective study investigated five colon cancer cases drawn from our institutional database.
- ✓ Fifty patients with colon cancer were enrolled in this phase II trial.

- ✓ There were 30 participants in our survey: 12 were patients, and 18 were caregivers.
- ✓ In the prospective cohort study, half of the participants had the mutation, and half did not.
- ✓ The powerful king had many loyal subjects.

## References

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:388.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1243.

# Choosing Between Adjectives and Adverbs

Both adjectives and adverbs describe or specify what another word is referring to, but their grammatical roles are distinct.

To choose between adjective and adverb, you need to identify the part of the sentence that the word in question is modifying—that is, the part being described, qualified, restricted, or intensified. Adverbs modify verbs, adjectives, and other adverbs but not nouns.

- ✓ The sun shines brightly. [*Brightly*, an adverb, modifies *shines*, a verb.]
- ✓ Breakfast was eaten heartily. [*Heartily* modifies *eaten*, a participle (verb form).]
- ✓ Randomly allocating patients across treatment groups should not involve hospital numbers or birth dates. [*Randomly* modifies *allocating*, a gerund (verb form).]
- ✓ The commitment was not one to make lightly. [*Lightly* modifies *to make*, an infinitive (verb form).]
- ✓ I adopted an unusually large cat. [*Unusually* modifies *large*, an adjective.]
- ✓ Current techniques can sequence DNA very quickly. [*Very* modifies *quickly*, another adverb.]

Adjectives, on the other hand, modify only nouns.

- ✓ The ferocious tiger roared. [*Ferocious*, an adjective, modifies *tiger*, a noun.]

- ✓ The lesion underwent pathologic examination. [*Pathologic*, an adjective, modifies *examination*, a noun.]

Sometimes the subject (a noun) and the adjective modifying the subject do not appear side by side; instead, they are connected by a linking verb, e.g., *is*, *was*, or *has been*, or by a verb that indicates sensation or perception, e.g., *feel*, *smell*, or *appear*. An adjective used in this way is said to complement the subject.

- ✓ The mole was symmetric. [*Symmetric* complements *mole*.]
- ✓ I feel bad. [*Bad* complements *I*. Note: “I feel badly” means “I am bad at feeling,” perhaps because of a lack of emotion or because of numbness.]

An adjective can also complement the object (again, a noun) of a clause (i.e., what the subject of the clause acts upon).

- ✓ We painted the walls blue. [*Blue* complements *walls*.]
- ✓ We considered the results inconclusive. [*Inconclusive* complements *results*.]

## Bibliography

Hodges JC, Horner WB, Webb SS, Miller RK. *Harbrace College Handbook*, 12th ed. Fort Worth, TX: Harcourt Brace College Publishers; 1994:45–50.

# Chord or Cord?

*Cord* and *chord* are easily confused in biomedical (and other) writing. They look similar and are pronounced the same, but their meanings differ substantially.

The more commonly used term in biomedical writing is *cord*. *Cord* refers to a long, thin anatomical structure such as the umbilical cord, the spinal cord, or a vocal cord. *Cord* also refers to a long, thin, flexible, woven or twisted structure such as a rope, string, or cable, sometimes with a plug at one end (as in an electrical cord); “a moral, spiritual, or emotional bond”; or 128 cubic feet of chopped wood.<sup>1,2</sup>

Less common in biomedical writing is *chord*, which refers to musical tones or an emotional response.<sup>2,3</sup> *Chord* also has specialized meanings in geometry, architecture, and aeronautics.

As a general guideline, if you mean a part of the body, use *cord*. If you mean **h**armonious sounds or feelings, use *chord*.

- ✗ The tumor invaded the spinal chord.
- ✓ The tumor invaded the spinal cord.
- ✗ Her speech struck a cord with me.
- ✓ Her speech struck a chord with me.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:277.
2. Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*. New York, NY: Atheneum; 1984:120–121.
3. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:219.

# Chronic or Long-Term?

*Chronic* and *long-term* are commonly confused adjectives; both indicate long duration, but each has a unique usage in biomedical writing.

*Chronic* typically refers to symptoms, conditions, or diseases that persist for a long period or that flare up repeatedly over time; the term implies that the effect or condition is permanent (although it may slowly change in severity or frequency).

Keep in mind that *chronic* does not indicate the severity of the condition, nor is the term used to describe patients, parts of the body, or treatments.

- ✓ Nerve blocks have improved quality of life for some patients who experience chronic pain.
- ✓ Even though symptoms of chronic granulomatous diseases can manifest at different times, the diseases themselves remain for the rest of a patient's life.

*Long-term* describes treatments, care, effects, or outcomes that occur over a relatively long time, but there is no implication that the effect or action is necessarily permanent.

- ✓ Researchers studied the effectiveness of long-term inhaled anesthetic sedation by comparing inhaled sevoflurane with intravenous midazolam.
- ✓ Although the accident caused long-term brain damage, the patient eventually healed completely.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:383.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:221, 734.



# Cite, Sight, or Site?

The terms *cite*, *site*, and *sight* are homophones (words pronounced alike but having different meanings) that can be major problems in a biomedical paper if the author is not careful. Complicating matters further is the fact that two of the words can be used as nouns or verbs.

The verb *cite* has several definitions, the most pertinent of which in biomedical writing is to quote or refer to an authoritative source on a particular subject, such as a reference to a published work. Another common definition of *cite* is to bring the reader's attention to an important finding or data point.

- ✓ We cited the work described previously by Smith and colleagues to support our hypothesis.
- ✓ I wrote that letter to the editor to cite the bias in the authors' research.

*Site* is both a noun and a verb, although the noun form is much more common than the verb form. In biomedical writing, *site* is usually used to designate the location of something.

- ✓ We examined the patients to identify their sites of metastasis.
- ✓ MD Anderson was the site of this phase II clinical trial.

As a verb, *site* means to put something in a specific location.

*Sight* is also both a noun and a verb. As a verb, *sight* means to see or look at something. As a noun, *sight* is the thing that is seen in addition to being one of the five senses.

- ✓ We sighted the p53-expressing cells in the tissue section under a microscope.
- ✓ A friendly nurse is a welcome sight for a first-time patient.
- ✓ Patients taking this drug often experience sight disturbances.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:225, 1158, 1166.

# Classic or Classical?

*Classic* and *classical* are sometimes used interchangeably, but the two terms do not mean the same thing in biomedical writing.

*Classic* can mean typical, authentic, or authoritative.<sup>1</sup>

- ✓ MicroRNAs are classic examples of non-coding RNA molecules.
- ✓ Radiating chest pain is a classic symptom of myocardial infarction.

*Classic* can also mean standard or traditional.<sup>2</sup>

- ✓ The patients in the control group received only the classic treatment indicated for their disease subtype, whereas the patients in the experiment group received the classic treatment concurrently with the new treatment.

*Classical*, on the other hand, is most often used in reference to

the humanities, the fine arts, or the historical arts (e.g., a classical scholar or classical architecture).<sup>1</sup>

- ✓ Wolfgang Amadeus Mozart is a world-renowned composer of classical music.

*Classical* has some specific scientific uses as well, such as *classical immunology*, *classical conditioning*, *classical genetics* (also called *Mendelian genetics*), and *classical complement pathway*. However, in biomedical writing, *classic* will most often be the correct choice.

## References

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:228.
2. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:368.

# Climatic or Climactic?

The adjectives *climatic* and *climactic* are often confused, but once you understand the roots of these words, their correct usage will be clear.

*Climatic* comes from the noun *climate*, which relates to weather patterns over time or environmental conditions characterizing a region or place.<sup>1</sup>

- ✓ Climatic data demonstrate that the atmosphere is warming.
- ✓ Climatic factors, such as temperature, affect the concentration of air pollutants.

*Climactic* comes from the noun *climax*, which relates to the highest or most exciting point in a course of events or narrative.<sup>1</sup> In medical use, *climax* can refer to “the acme, or period of greatest intensity, as in the course of a disease (crisis) or in sexual excitement.”<sup>2</sup> A common variation of this word is *anticlimactic*, which relates to an event or outcome that is less exciting than expected.<sup>3</sup>

- ✓ Years of experiments led to a climactic discovery, which we published in *Nature*.

- ✓ The ceremony itself was anticlimactic compared with all the excitement beforehand.

Finally, the medical term *climacteric*, which can be used as a noun or an adjective, relates to the “endocrine, somatic, and psychic changes” characteristic of menopause or andropause.<sup>2</sup>

- ✓ The Greene Climacteric Scale is a measure of menopause symptoms.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:231.
2. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:372.
3. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:54.

# Coarse or Course?

When spoken, *coarse* and *course* sound exactly alike, and they are often confused in writing. However, their meanings are quite different. They also are spelled differently and are different parts of speech. To add to the confusion, each has several different meanings.

*Coarse* is an adjective that modifies other words or phrases. *Coarse* can describe a rough texture (“coarse linen”) or relatively large pieces or particles (“coarse sand”). *Coarse* can describe something crude or unrefined (“coarse manners”) or rude or offensive (“coarse language” or a “coarse joke”). *Coarse* can describe something that is inferior or of poor quality (“coarse construction”). *Coarse* is also applied to certain objects (“coarse saw”) and to some types of freshwater fish (“coarse fish”).

- ✓ His skin was thickened and coarse from lifelong exposure to the sun.
- ✓ The coarse wool blanket was scratchy but warm.
- ✓ The comedian’s coarse humor was not to her taste.
- ✓ We landscaped the walking path with coarse gravel.

*Course* has even more meanings than *coarse*. As a noun, *course* can describe a path or direction (“change course”), flow (“the course of the river”), duration (“over the course of a morning”), or a series of events or steps (“course of action”). In medicine, *course* can describe the progression of a disease or treatment (“typical disease course”). *Course* also can describe a series of educational demonstrations or lectures (“biology course”) or the dishes

served as a meal (“three-course dinner”). *Course* can describe a field or pathway for certain sports (“golf course”) and has other applications in sailing, navigation, and building.

As a verb, *course* describes movement along a path (“the blood coursed through his veins”) or the movement of a watercraft (“the icebreaker coursed the Arctic”).

Finally, *course* is used in two widely used idioms. The phrase “of course” is used to denote “naturally,” “obviously,” or “certainly.” “In due course” means over an expected period of time.

- ✓ Surgery is the next step if this course of treatment is not effective.
- ✓ Treatment for multiple sclerosis depends on the disease course.
- ✓ In the normal course of events, we would not be faced with this decision.
- ✓ As we watched, the boat abruptly changed course.
- ✓ That English course requires a lot of reading.
- ✓ They would, of course, be accompanying their daughter to the clinic.

## Bibliography

*Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:237, 287.

# Collective Nouns: Singular or Plural Verb?

Collective nouns refer to groups of people or things—for example, *faculty*, *committee*, *majority*, *number*. Collective nouns can take either singular verbs (e.g., *is*, *does*, *says*) or plural verbs (e.g., *are*, *do*, *say*). To decide which type of verb to use, follow this rule:

When you wish to emphasize the group as a whole, use the singular verb; when you wish to emphasize the individual members or parts of the group, use a plural verb.

- ✓ The faculty meet every Tuesday afternoon in the department conference room. [emphasizing individual members of the faculty]
- ✓ The faculty of MD Anderson Cancer Center comprises more than 1600 physicians and scientists. [emphasizing the faculty as a whole]
- ✓ More patients were screened in 2011 than in 2001; however, even in 2011, the vast majority (96%) were not screened. [emphasizing individual patients within the majority]
- ✓ A number of physicians were available to consult with patients during the course of the study. [emphasizing individual physicians within the number]

- ✓ The number of previously reported cases is small. [emphasizing the group of cases]

Some collective nouns are commonly combined with *members* when the noun refers to individual people. In the first example, *faculty* could be changed to *faculty members*. Other common examples include *crew members*, *committee members*, *team members*, and *staff members*.

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*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:204.

Hodges JC, Horner WB, Webb SS, Miller RK. *Harbrace College Handbook*, 12th ed. Fort Worth, TX: Harcourt Brace College Publishers; 1994:87–89.



# Comparable or Similar?

Although *comparable* is frequently used to mean *similar*, the better word for conveying that two things are alike will almost always be *similar*.

- ✓ We inferred that the liver tumor had metastasized from the pancreatic tumor because their genetic profiles were similar. [Unclear: "...their genetic profiles were comparable."]

According to *Garner's Modern American Usage*, *comparable* means "capable of being compared; worthy of comparison."<sup>1</sup> In other words, *comparable* can describe *any* set of things that can be examined for either similarities or differences. Thus, dissimilar things are comparable, too.

- ✓ All the studies had used the Edmonton Symptom Assessment Scale, so their data on pain severity, although markedly divergent, were comparable.
- ✓ Because the two countries have adopted different methods for calculating cholesterol levels, national statistics are not comparable.

Therefore, you should always use a less ambiguous term than *comparable* when saying that two things are alike in some way, especially when that similarity is quantitative.

- ✗ The two cohorts had comparable survival times.
- ✓ The two cohorts had similar survival times.
- ✗ The accuracy of the experimental diagnostic procedure was comparable to that of the conventional procedure.
- ✓ The accuracy of the experimental diagnostic procedure was similar to that of the conventional procedure.

For an even stronger statement, provide the values you are comparing and/or say whether the difference between the things you are comparing is significant.

- ✓ The accuracy of the experimental diagnostic procedure did not differ significantly from that of the conventional procedure (85% vs. 78%, respectively;  $P = 0.07$ ).

## Reference

1. Garner BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:171.



# Compared With or Compared To?

Comparisons are frequently crucial components of reports of biomedical studies. Comparing patient characteristics, treatment outcomes, or results of previous studies is a fairly simple task. However, authors often ask about a small difference in wording when making a comparison: do you compare one thing *with* or *to* another?

## *Compared With*

If the comparison is between two things that belong to similar classes, the preferred terminology is *compared with*. Specifically, *compared with* is used to compare like things: people with people, a drug with a drug, MRI with CT or PET, etc.

- ✗ In a previous study, the researchers compared the treatment's effectiveness in diabetic patients to that in non-diabetic patients.
- ✓ In a previous study, the researchers compared the treatments's effectiveness in diabetic patients with that in non-diabetic patients.
- ✗ The authors compared leukemia cases to non-Hodgkin lymphoma cases.
- ✓ The authors compared leukemia cases with non-Hodgkin lymphoma cases.

## *Compared To*

In contrast, *compared to* is used when comparing things that are in different classes entirely, or unlike things. Such comparisons can make writing more colorful or help to illustrate a concept.

- ✗ We often compare this lengthy treatment plan with running a marathon.
- ✓ We often compare this lengthy treatment plan to running a marathon.

Another use of *compared to* is to provide a vivid description of something significant or important so that it stands out in the mind of the reader.

- ✓ Nothing compares to the feeling of relief when a scan is negative for cancer.
- ✓ None of the previously used treatments can compare to our new therapy.

## **Bibliography**

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:390.

# Complement or Compliment?

Don't expect to be complimented if you use *compliment* when you actually mean *complement* or vice versa. *Compliment* and *complement* have different meanings but are often used improperly.

According to *Merriam-Webster's Collegiate Dictionary*, the noun *compliment* is "an expression of esteem, respect, affection, or admiration" or "an admiring remark."<sup>1</sup> *Compliment* can also be used as a verb that means "to express esteem, respect, affection, or admiration to" or "to present with a token of esteem."<sup>1</sup>

- ✓ My boss paid me a compliment.
- ✓ She complimented him on his new shirt.

The adjective *complimentary* means "expressing praise or admiration," "expressing or containing a compliment," or "given free as a courtesy or favor."<sup>1</sup>

- ✓ The reviewer was complimentary about the manuscript.
- ✓ The restaurant offers complimentary valet parking.

So when you're referring to nice things said or done, the correct word is *compliment*.

If, however, you're referring to the "completeness" of something, the correct word is *complement*. *Merriam-Webster* defines

*complement* as "something that fills up, completes, or makes perfect" or "the quantity, number, or assortment required to make a thing complete."<sup>1</sup> Used as a verb, *complement* means "to complete or enhance by providing something additional."<sup>1</sup>

- ✓ The ship had its full complement of sailors.
- ✓ Adenine bases complement thymine bases.

*Complement* and its adjective form *complementary* appear in several medical and scientific terms, including *complementary DNA*, *complementary hypertrophy*, *complementary colors*, and *complement system*, which refers to a set of proteins and receptors that reinforce the immune system.<sup>2</sup>

In everyday use, *compliment* and *complimentary* are more common; in biomedical writing, however, you'll find *complement* and *complementary* used much more frequently.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:255.
2. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:395.

# Compose, Comprise, or Consist Of?

*Comprise, compose, and consist of* all describe relationships between a whole and its component parts, but the terms are frequently confused with one another. In particular, many writers treat *comprise* as if it were a synonym for *compose*, but in fact the words describe these relationships in opposite ways.

*Comprise* means “to be made up of” or “to include.” A whole comprises its parts. Thus, the phrase “comprised of” does not make sense and should not be used.<sup>1,2</sup>

*Compose* means “to form the substance of” or “to form by putting together.”<sup>3</sup> Parts compose a whole, and a whole is composed of its parts. *Compose* also means “to create by mental or artistic labor,”<sup>3</sup> as when a musician composes a song.

*Consist of*, the least-often misused of the group, is a synonym for *comprise*—it means “to be made up of.”<sup>3</sup> A whole consists of its parts.

- ✓ The central nervous system comprises the brain and spinal cord.

- ✓ The brain and spinal cord compose the central nervous system.
- ✓ The central nervous system is composed of the brain and spinal cord.
- ✓ The central nervous system consists of the brain and spinal cord.

## References

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:390.
2. *The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:273.
3. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:266.

# Confidant or Confident?

Are you confident in your confidant?

*Confident* and *confidant* have two very different meanings, but their similar spellings can lead to confusion when writing.

*Confident* is an adjective that means “certain”<sup>1</sup> (e.g., you are confident of a particular outcome). *Confident* is also commonly used to mean “having or showing assurance and self-reliance”<sup>1</sup>: a confident person is someone who is sure of himself or herself.

- ✓ Tim was confident that his new invention would work as planned.
- ✓ Being confident and having good networking skills are important to succeeding in business.

In biomedical writing, *confident* might be used to refer to a research team’s ability to complete the studies proposed in a grant application. *Confident* could also refer to a researcher’s belief in the reliability of a study’s results.

- ✓ We are confident that we will be able to enroll a sufficient number of patients with exertional dyspnea in our study.
- ✓ The authors were confident that no Fuhrman grade 4 renal cell carcinomas had sarcomatoid elements, which would have confounded the analyses.

A *confidant*, on the other hand, is “one to whom secrets are entrusted.”<sup>2</sup> You might describe your closest friend as your confidant.

- ✓ The little girl had many friends, but she was closest to her older sister, treating her sister as a confidant.

In biomedical writing, *confidant* is most likely to appear when discussing psychosocial characteristics or research.

- ✓ The risk of subsequent cardiac events may be significantly lower in myocardial infarction patients who have a close confidant within their social support network.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:261.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:260.

# Conscience or Conscious?

The words *conscience* and *conscious* are often confused.

*Conscience* is the nontechnical term for “the part of the mind that makes you aware of your actions as being either morally right or wrong.”<sup>1</sup>

- ✓ A guilty conscience forced the thief to confess.

*Conscious* is defined as “a state of awareness or alertness characterized by response to external stimuli,”<sup>2</sup> in other words, “aware of something (such as a fact or feeling): knowing that something exists or is happening.”<sup>3</sup>

- ✓ The patient was conscious when admitted to the hospital.

It's easy to use the incorrect word when describing someone who is not conscious, that is, someone who is unconscious. Note that *unconscience* is not a word.

- ✓ She was unconscious for a week after falling from her bicycle [meaning “having lost consciousness”<sup>4</sup> or, in medical terms, “incapable of responding to sensory stimuli and of having subjective experiences”<sup>2</sup>].

## References

1. Merriam-Webster's Dictionary website. <http://www.merriam-webster.com/dictionary/conscience>. Accessed March 7, 2014.
2. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:407.
3. Merriam-Webster's Dictionary website. <http://www.merriam-webster.com/dictionary/conscious>. Accessed March 7, 2014.
4. Merriam-Webster's Dictionary website. <http://www.merriam-webster.com/dictionary/unconscious>. Accessed March 7, 2014.

# Continual or Continuous?

Although the words *continual* and *continuous* are often used interchangeably, their definitions are not the same. According to *Garner's Modern American Usage*, *continuous* means occurring without interruption or unceasing, whereas *continual* means frequently recurring or intermittent.

In scientific writing, *continuous* is frequently used when *continual* is actually meant. For example, consider an experiment in which mice were monitored for signs of morbidity. To state that the monitoring occurred *continuously* indicates that the mice were monitored constantly, without interruption, by a person (unlikely over an extended period) or device (perhaps). Here is an example in which *continuous* would be appropriate:

- ✓ The heart rate of each mouse was continuously tracked with a heart rate monitor for 24 hours.

In contrast, *continual* monitoring means that the observation occurred on a regular basis—every few hours or days, for example.

- ✓ The mice were continually monitored for signs of morbidity for 8 weeks.

If the observation timeline was very structured, then you should describe the schedule rather than using the more vague *continual*.

- ✓ The mice were examined for signs of morbidity every 12 hours for 1 week.

Here's a quick way to distinguish the two words: *continuous* ends in **ous** and refers to **one uninterrupted sequence**.

## Bibliography

Garner BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:197.



# Correct Order of Adjectives Before a Noun

When three or more adjectives modify the same noun, how is the correct order of those adjectives determined? Many native speakers of English instinctively choose the correct order but are unaware of how they do so. If the grammar rules underlying adjective order are not followed, a sentence will likely still be understandable, but it will sound awkward.

Adjectives can be grouped into several classes on the basis of the type of characteristic they are describing. These classes of adjectives are placed before a noun in the following generally accepted order:

- (1) Determiner (*the, our, Jean's, this*)
- (2) Number (*twelve, several, fourth*)
- (3) General description or opinion (*educational, false, intelligent, superb*)
- (4) Size (*gigantic, 7-foot-tall, microscopic*)
- (5) Shape (*square, cubic*)
- (6) Age (*old, immature, adolescent*)
- (7) Color (*red, pale*)
- (8) Origin or location (*Northern, Texan, Japanese*)
- (9) Material (*polytetrafluoroethylene, silicon, aluminum*)

(10) Purpose (*chemotherapeutic, antifungal, hand-washing*)

(11) Nouns functioning as adjectives (*cancer cells, electron microscope, healthcare institution*)

- ✓ A [determiner] **3.5-cm** [size], **irregular** [shape], **whitish** [color] mass was found in the patient's abdomen.
- ✓ **Three** [number] **enthusiastic** [general description or opinion] **young** [age] **research** [noun as adjective] fellows joined the laboratory.
- ✓ **Jones et al.'s** [determiner] **promising** [general description or opinion] **new** [age] **trial** [noun as adjective] results suggest that **many** [number] **effective** [general description or opinion] **cancer-fighting** [purpose] immunotherapies will soon be available.

Note that some grammar experts disagree about how strictly these rules must be applied. Nevertheless, when in doubt, the order above will usually sound “natural.” In any case, it's a good idea to avoid using long strings of adjectives in your writing.

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# Could, Might, Should, or Will?

In research papers and grant proposals, savvy authors use modal verbs to convey the likelihood that something will occur. Modal verbs are auxiliary verbs that express possibility or necessity.

In scientific writing, the most commonly used of these verbs are *could*, *might*, *should*, and *will*.

*Could* and *might* both indicate that the writer has some doubt that an event will occur. *Could* is generally considered to convey less doubt and is therefore often preferred to *might*.

- ✓ Our finding that drug X inhibits a key angiogenesis pathway in prostate cancer could also have important implications for the treatment of other cancers.
- ✓ These results might also be important in the care of elderly patients with genitourinary cancers. Future studies will determine this definitively.

*Should* indicates that the writer has little doubt that an event will occur (i.e., the event is expected to occur).

- ✓ These findings should help drug developers create more effective therapies for multiple myeloma.

*Should* can also be used to make a recommendation.

- ✓ Physicians should discuss the adverse effects of the treatment with their patients.

*Will* indicates that the writer has almost no doubt that an event will occur (i.e., the event is considered inevitable).

- ✓ Our findings will change forever the way researchers look at the fruit fly's mating habits.

To sum up: Using *could*, *might*, *should*, and *will* correctly will strengthen your writing. In some cases, this correct usage could make a real difference. The way readers interpret your words might depend on it.

## Bibliography

*Merriam-Webster's College Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:284, 787, 1153, 1433.

# Creating the Plural and Possessive Forms of Nouns Ending in an *S*

Apostrophes are used to make nouns possessive, not plural. For most nouns, an *'s* at the end of the word is used to create the singular possessive form, and an *s'* is used to create the plural possessive form. An *s* at the end of the word is used to create the plural nonpossessive form of the noun. It's thus not surprising that writers sometimes confuse these forms.

That confusion is multiplied for singular nouns ending in an *s*, such as *lens* or *diabetes*. Nouns that end in an *s*, *x*, or *z* typically require an *'s* at the end of the word to create the singular possessive form, an *es'* to create the plural possessive form, and an *es* to create the plural nonpossessive form.

- ✓ the lens's magnification [singular possessive]
- ✓ the two lenses' magnifications [plural possessive]
- ✓ two lenses [plural nonpossessive]

The same rule applies to proper nouns (names) ending in an *s*, *x*, or *z*.

- ✓ Dr. Seuss's books [singular possessive]
- ✓ the Joneses' house [plural possessive; the house belonging to members of the Jones family]
- ✓ The Joneses met the Martinezes. [plural nonpossessive; couples or families with the surnames Jones and Martinez]

Like most rules or guidelines for the English language, there are exceptions. Nouns that end in a silent *s*, such as *chassis* or *Illinois*, use only an apostrophe in their singular possessive forms. The same is true for nouns ending in an *s* sound when used in the phrase “for...sake” and for names with two or more syllables that end in an *eez* sound.

- ✓ Illinois' largest hospital
- ✓ for goodness' sake
- ✓ Xerxes' wife

When you're not sure about the correct use of apostrophes in possessives, you can use *of* to avoid the possessive form.

- ✓ the wife of Xerxes

## Bibliography

*AMA Manual of Style*, 10th ed. New York: Oxford University Press; 2007:362–363.

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:281–283.

# Criteria and Data

Distinguishing plurals and singulars can be tricky but is necessary for precision and accuracy in scientific writing. In particular, *data* and *criteria* are used extensively in scientific writing, but they are often used incorrectly as singulars instead of plurals.

When referring to a set of multiple items of information, *data* is correct. When referring to a single item in a dataset, such as a single time point or value, the singular, *datum*, is correct. *Data point* is also acceptable for the same purpose and is more commonly used than *datum*.

Similarly, a single item in a group of *criteria* is a *criterion*.

- ✓ These data were consistent across all time points for the patient, except for the May 30 datum, which was aberrantly high.
- ✓ We found that the criterion of gum chewing was largely irrelevant to the condition and have eliminated it from our list of diagnostic criteria.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:369, 370.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:296, 316.

# Death or Mortality?

This column focuses on *mortality* and *death*. We refer, of course, to the correct usage of the two terms. Philosophical queries about these concepts should be directed elsewhere.

You may see the term *mortality* used in place of *death* in biomedical writing. For example, an author might, mistakenly, write of *three mortalities due to pancreatic cancer* rather than *three deaths due to pancreatic cancer*. Writing of *mortalities* when one means to refer to *deaths* is problematic because the two concepts are not interchangeable.

Whereas *death* refers to “the permanent cessation of all vital bodily functions”<sup>1</sup> in an individual, *mortality* is a statistical concept that relates to population groups. Specifically, *mortality* refers to the number or rate of deaths occurring in a given population and/or time period.

- ✓ Ghana’s infant mortality in 2005 was 51.43 deaths per 1000 live births.

- ✓ Among the patients in the Copenhagen trial who underwent pulmonary segmentectomy, the mortality rate at 3 months after surgery was 1.6% (4 patients).

Because *mortality* refers to the incidence of death in a particular group and not to an individual death, one cannot use *mortalities* to mean *deaths*.

Finally, when writing about mortality, it’s important to be as specific as possible. In the first example, the population is infants in Ghana, and the time period is 2005. Without a specific population and/or time frame, readers may assume you mean the current general population—but the mortality rate for that group, over an indefinite time period, is ultimately 100%.

## Reference

1. *Dorland’s Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:473.



# Definite or Definitive?

*Definite* and *definitive* look and sound very much alike, and this leads some people to use the terms interchangeably. However, they are not interchangeable terms. Whereas *definite* means “having distinct or certain limits . . . free of all ambiguity, uncertainty, or obscurity,” *definitive* is most often used to mean “serving to provide a final solution or to end a situation.”<sup>1</sup> Put another way, something that is *definite* “is not dubious, vague, loose, inexact, uncertain, undefined, or questionable,” and something that is *definitive* “is not temporary, provisional, debatable, or alterable.”<sup>2</sup>

- ✓ Far from being wide-ranging, the battle was fought over a definite area bounded by a low ridge to the north, a river to the west, marshland to the south, and forest to the east.
- ✓ Richard III was killed in a definitive battle.
- ✓ With his definitive victory at the Battle of Bosworth Field, Henry Tudor seized the throne from Richard III.

When writing about cancer treatments, authors must use extra care when choosing between *definite* and *definitive*, as the latter conveys a very specific meaning: *definitive* treatment is “the treatment plan for a disease or disorder that has been chosen as the best one for a patient after all other choices have been considered.”<sup>3</sup>

- ✓ The patient was eligible for definitive chemoradiation with curative intent.
- ✓ Definitive treatment consists of chemotherapy to shrink the tumor, surgery to remove the bulk of the tumor, and radiotherapy to eliminate any residual tumor.

- ✓ The physicians have a definite treatment plan: they will give chemotherapy to shrink the tumor, perform surgery to remove the bulk of the tumor, and then give radiotherapy to eliminate any residual tumor.

In medical writing, *definitive* is also used to mean “fully differentiated or developed”<sup>1</sup> or “denoting acquisition of final differentiation of character.”<sup>4</sup>

- ✓ Hematopoietic stem cells can differentiate into definitive lymphoid cells, such as T cells and B cells, as well as into definitive myeloid cells, such as monocytes, macrophages, and basophils.

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1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:327.
2. Fowler HW. *A Dictionary of Modern English Usage*, 2nd ed. New York, NY: Oxford University Press; 1965:122–123.
3. National Cancer Institute. NCI Dictionary of Cancer Terms. <https://www.cancer.gov/publications/dictionaries/cancer-terms?cdrid=597117>. Accessed June 21, 2017.
4. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:478.

# Dehumanizing Terms to Avoid

You may feel that it is difficult to keep track of all the rules for staying “politically correct” or respectful of a variety of people, especially patients. However, many of those rules can be boiled down to one idea: people are not their characteristics or situations.

Avoid referring to people by their conditions or treatments. Instead of calling someone a *disabled person* or a *diabetic*, place the person first: *person with a disability* or *patient with diabetes*. If brevity is needed, constructions like *diabetic patient* are acceptable in additional mentions.

In addition, avoid verbs or descriptions that confuse people with their conditions, treatments, or test results. Patients can be examined, treated, cared for, followed up, and given medication. Conversely, diseases are diagnosed, identified, and managed; and treatments are administered, continued, and discontinued. It is incorrect to write that a patient failed a treatment or is toxic; instead, write that the treatment itself has failed or is toxic. Patients cannot be normal or abnormal, but test results can be.

- ✗ The patients were examined and diagnosed.
- ✓ The patients were examined, and their conditions were diagnosed.

- ✗ We enrolled 30 schizophrenics and reported them after 4 weeks.
- ✓ We enrolled 30 patients with schizophrenia and observed them for 4 weeks.
- ✗ The patient was managed with imatinib.
- ✓ The patient’s leukemia was managed with imatinib.

Also, avoid calling a person a *subject*, *client*, *consumer*, or *victim* in biomedical writing unless no other word is appropriate.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:412–416.

*Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 7th ed. Reston, VA: The Rockefeller University Press; 2006:112.

# Delineate or Differentiate?

*Delineate* and *differentiate* both refer to the act of distinguishing, but the two words have substantially different meanings.

When one *differentiates*, one illustrates, demonstrates, causes, or develops a difference or differential characteristics or qualities. Typically, *differentiate* is used to distinguish one thing from another or from all others. For example, a *differential* diagnosis is a process whereby a condition is diagnosed by ruling out all other possible diagnoses—that is, a condition is *differentiated* from others with common or similar symptoms.

- ✓ Students must be able to differentiate between the two species in terms of their morphology and geographic spread.
- ✓ Mammography and biopsy may be used to differentiate inflammatory breast cancer from acute mastitis.

*Delineate*, on the other hand, is used to describe something with accuracy and detail. Sometimes this act involves a

precise or virtual illustration, which reflects the literal meaning of *delineate* (i.e., to draw or sketch).

- ✓ Mammography can be used to delineate the extent of breast lesions.
- ✓ Through keen observation, Sandra could delineate the layout of the new office suite after only a single tour.

It would not be appropriate to use *differentiate* in these two examples because a distinction is not being made between one element and another.

## Bibliography

Garner BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:235.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:330, 348.

# Denote and Connote: Words about Words

Words have two kinds of meanings: the literal, specific definition that appears in dictionaries and the meanings that are implied or suggested by the word. For example, *mother* is defined as a female parent but suggests (among other things) warmth, protection, nourishment, and care. *Denote* and *connote* are a useful pair of words that communicate the distinction between these two kinds of meaning.

*Denote* is a verb that refers to a word's literal meaning. *Denote* can also refer to symbols.

- ✓ Cancer denotes a group of diseases involving growth of abnormal cells with the potential for invasion and metastasis.
- ✓ The symbol kD denotes kilodaltons, a measure of molecular mass.

*Connote* is a verb that refers to a word's suggested or implied meaning. *Connote* suggests connections that are not explicit and also may refer to an implied consequence or condition. *Connote* is often used in its noun form, *connotation*.

- ✓ To many, gardening connotes fresh air, pleasant exercise, and a beautiful yard.
- ✓ The speech had frightening connotations.

*Denote* and *connote* are often confused. A useful way to keep them straight is to remember that *denote* = define and *connote* = imply or suggest.

## Bibliography

Fowler HW. *A Dictionary of Modern English Usage*, 2nd ed. New York: Oxford University Press; 1965:105.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:264, 333.

# Despite or In Spite Of?

The preposition *despite* and the prepositional phrase *in spite of* mean the same thing. However, *despite* is preferred in scientific or formal writing.

*The Associated Press Stylebook* and *The Chicago Manual of Style* both recommend using *despite* because it is shorter. In addition, many editors prefer *despite* because *in spite of* implies malice.

- ✓ Despite the small number of patients, this study shows that proton therapy is effective against soft tissue sarcomas.

*Regardless of* also can be used instead of *in spite of*.

## Bibliography

*The Associated Press Stylebook and Briefing on Media Law*, 44th ed. New York, NY: The Associated Press; 2006:123.

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:210.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:339.

# Die or Dye?

Although *die* and *dye* sound alike, the two words have different meanings.

*Die* is the present tense verb that means to “pass from physical life, to expire.”<sup>1</sup> Note that *of* is the correct preposition to use when specifying the cause of death.

- ✓ Before I die, I want to climb Mount Kilimanjaro.
- ✓ The patient will die if she does not receive a kidney transplant soon.
- ✓ After the mice died, we removed the tumors for analysis.
- ✓ I almost died of fright.

*Dye*, however, can be used either as a noun that means an “insoluble or soluble coloring matter” or as a verb that means “to impart a new and often permanent color to.”<sup>2</sup>

- ✓ She bought a box of pink dye [noun] at the store.

- ✓ We used trypan blue to dye [verb] the cells.

- ✓ He wants to dye [verb] his grey hair.

Writers should take particular care when using the participles (-ing form) of *to die* and *to dye*. *Dying* (with a change in vowels) is the participle of the verb *to die*, and *dyeing* (which simply adds -ing to *dye*) is the participle of the verb *to dye*.

- ✓ The hospice patient is dying of pancreatic cancer.
- ✓ She was dyeing the samples with alcian blue when she was interrupted by the fire alarm.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:347.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:389.



# Different or Differential?

What's the difference between *different* and *differential*? The two adjectives have related meanings but are not interchangeable.

*Different* means “partly or totally unlike.”<sup>1</sup> Use *different* if you mean *dissimilar* or *unlike*.

*Differential* means “of, relating to, or constituting a difference.”<sup>1</sup> Use *differential* if you mean *distinguishing*.

*Differential* is used in several common medical phrases. For example, a *differential blood count* determines the percentages of different types of cells,<sup>2</sup> and a *differential diagnosis* is the distinguishing of one disease from among several different possibilities.<sup>3</sup>

- ✓ The two drugs have different mechanisms of action.
- ✓ “While signature nucleotides or 16S rRNA gene sequences help to differentiate the genera of the family *Actinomycetaceae* from each other, reliable additional differential characteristics are hardly available.”<sup>4</sup> [*Differential* is correct here because the characteristics would be used to distinguish one genus from the other.]

- ✓ The differential diagnosis is made on the basis of three laboratory tests.

*Differential* also has several mechanical and mathematical meanings; the word is rarely if ever misused when those meanings are intended.<sup>1</sup>

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:348.
2. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:425.
3. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:507.
4. Schall KP, Atteyet FY. Family I. Actinomycetaceae. In: Brenner DJ, Krieg NR, Staley JT, eds. *Bergey's Manual of Systematic Bacteriology*. Vol 2. 2nd ed. New York, NY: Springer-Verlag; 2005:38.

# Diplomacy When Describing Others' Work

We often think of diplomacy only as it applies to foreign policy, but diplomacy is also essential in biomedical communication. Scientists often need to discuss other scientists' research—in editorials, peer reviews, and the Introduction and Discussion sections of their own articles. In fact, the rigor and robustness of one's own research are often more easily demonstrated via comparison with others' work.

When referencing previously published papers in your Introduction and Discussion, it's best to emphasize the validity of your proposal or findings instead of the shortcomings of other scientists' work. For example, rather than saying, "Smith et al. conducted a similar study using only self-reported data that were probably biased," you might say, "In addition to analyzing self-reported data, as Smith et al. did in a previous study, we evaluated participants' behavior via direct observation."

If, however, you must note the flaws or limitations of others' research, do so respectfully and constructively. When possible or appropriate, consider giving a "criticism sandwich": begin

by praising the research, then tactfully note the area that needs improvement or revision, and end on a positive note.

- ✓ You've submitted a timely article on an interesting and novel device; however, I recommend discussing examples of similar but less sophisticated devices to bolster your claims of its superiority. I anticipate that your well-organized Discussion section will be even more persuasive as a result.

Remember that other authors, like you, care greatly about their work and are sensitive to negative feedback. Discussing others' work diplomatically and constructively fosters mutual respect and, quite often, productive and educational dialogue.

## Bibliography

Day RA, Gastel B. *How to Write and Publish a Scientific Paper*, 6th ed. Westport, CT: Greenwood Press; 2006.

# Disburse or Disperse?

*Disburse* and *disperse* are similar in both spelling and pronunciation but have very different meanings.

The word *disperse* is used to describe dispelling, scattering, spreading, or breaking up something, such as particles in a liquid. Something can be dispersed randomly or evenly.

- ✓ The crop duster dispersed a pesticide over the field.
- ✓ The audience dispersed quickly after the show ended.

The word *disburse* is a financial term that means to pay out, such as from a bank account.

- ✓ The office manager disbursed funds to cover the visiting doctor's parking fees for the month.

- ✓ The grant was awarded in October, but the funds were not disbursed for another 2 months.

## Bibliography

Dictionary.com website. <http://dictionary.reference.com/browse/disperse>. Accessed July 28, 2014.

Grammarist. <http://grammarist.com/usage/disburse-disperse/>. Accessed July 23, 2014.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:355, 361.

# Disc or Disk?

The preferred spelling of *disc/disk* cannot be accurately predicted by the setting or type of structure, unfortunately. Thus, you may need to look up terms from time to time to determine what the standard is (sorry). Nevertheless, the examples here will cover most cases likely to come up in biomedical and scientific writing.

When it comes to describing anatomic structures, *disc* typically is restricted to ophthalmologic terminology (e.g., optic disc), whereas *disk* denotes non-ophthalmologic anatomic structures (e.g., lumbar and intervertebral disks). A quick mnemonic device can help you choose the correct spelling in these instances: You “c” with your eyes, which contain discs with a c.

- ✓ The patient was found to have back pain due to a herniated disk and visual disturbances due to optic disc edema.

This spelling issue also arises in mentions of computer and media storage. Here, *disc* refers to non-magnetic types of storage

media such as compact discs, digital video discs (DVDs), and phonograph records. *Disk*, however, refers to magnetic storage media such as floppy disks and the disks in hard drives. Unlike optical media discs, which are removable, disks tend to be encased in metal or hard plastic.

- ✓ I saved the data from the old floppy disk on a new compact disc.

A disc may also be part of a brake or plough system.

When in doubt, the dictionary is your best guide.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:392.

# Discreet or Discrete?

The adjectives *discreet* and *discrete* are homophones—words that sound alike but differ in meaning. As such, they are often confused in writing.

*Discreet* is used to refer to something that is modest, prudent, or unobtrusive. You may also be familiar with its noun form, *discretion*, which means having good judgment, showing tact, or maintaining confidentiality.

- ✓ The pharmacist offered discreet medication counseling to the patients.
- ✓ For both professional and personal reasons, the two colleagues chose to be discreet about their romantic affair.
- ✓ Employees should show discretion in their workplace conversations.

The word *discrete* describes distinct, separate entities. In math, it is used to indicate finite values or integers (whole numbers).

- ✓ The man was overwhelmed by the hundreds of discrete parts needed to assemble his new bookcase.
- ✓ Magnetic resonance imaging revealed two discrete lesions.
- ✓ To obtain discrete variables for analysis, the researcher used a Likert scale, which does not allow for fractional values.

One way to remember which word to use in a sentence is that the letter **T** *separates* the two **E**s (i.e., makes them *distinct*) in *discrete*, whereas the two letters are adjacent in *discreet*.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:868.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:357.

# Distinguishing Between Different, Divergent, and Diverse

*Divergent*, *different*, and *diverse* can all be used to indicate variation between items (including individuals) or groups, but the strength and type of relationship that these words imply vary.

*Divergent* items or groups have generally moved away from each other in opposite directions. Among the three words discussed here, *divergent* refers most specifically to a relationship of opposition. It can also imply transformation if items or groups develop opposing features over time.

- ✓ Our source sample of primary cancer cells developed into two divergent lines in culture: One line was stable and divided very slowly, and the other line divided rapidly and showed a high rate of apoptosis.

*Different* also describes variations between items or groups, but it is far more general than is *divergent*. *Different* does not specifically convey a sense of opposition or change over time. It is usually used to describe any sort of distinctness.

- ✓ Although every cancer case is slightly different, the goal of tumor sequencing efforts is to identify common trends in gene expression patterns.

Like *divergent*, *diverse* describes some sort of opposition, but *diverse* does not imply any sort of progression. *Diverse* can also be used to describe things that differ greatly. It is most commonly used when referring to more than two groups.

- ✓ The causes of cancer are diverse and can include factors ranging from single environmental exposures to innate genetic mutations.
- ✓ The diverse gene expression patterns seen in poorly differentiated tumors make them less amenable to targeted therapies.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:348, 365, 366.



# Divide by Half or Divide in Half?

The expression *divide by half* frequently appears in scientific writing, but in virtually all cases, it is used incorrectly. “If you are talking about dividing numbers or objects into two equal parts, the expression to use is *divide in half*,” says Paul Brians.<sup>1</sup>

The reason boils down to simple mathematics. To *divide by half* means to divide by  $1/2$ , or 0.5, which gives the same result as multiplying by 2. For example, dividing 4 by half gives you 8; dividing 4 in half yields 2.

In most cases, the scientific writer means that a larger group or object was divided into two equally sized smaller groups or objects, not that it was doubled in size. One may also write that the larger thing was divided into halves or was halved.

- ✗ We divided the total group of mice with the mutation ( $n = 20$ ) by half and then exposed one subgroup of 10 mice (the treatment group) to the agent and the other subgroup of 10 mice (the control group) to the vehicle only.
- ✓ We divided the total group of mice with the mutation ( $n = 20$ ) in half and then exposed one subgroup of 10 mice (the treatment group) to the agent and the other subgroup of 10 mice (the control group) to the vehicle only.
- ✓ We divided the total group of mice with the mutation ( $n = 20$ ) into halves and then exposed one subgroup of 10 mice (the treatment group) to the agent and the other subgroup of 10 mice (the control group) to the vehicle only.

- ✗ The volume of the solution was divided by half when the number of cells fell below the cutoff value.
- ✓ The volume of the solution was halved when the number of cells fell below the cutoff value.
- ✗ Since we were both still hungry, Dan and I divided the last piece of pizza by half so that we could share it.
- ✓ Since we were both still hungry, Dan and I divided the last piece of pizza in half so that we could share it.

Another solution would be to express the relationship in terms of a percentage (x was 50% of y) or to use a longer description.

- ✓ We divided the total group of mice with the mutation ( $n = 20$ ) into two subgroups of equal size (each  $n = 10$ )...” or “...into two subgroups of 10 mice each....”

## Reference

1. Brians P. *Common Errors in English Usage*. Portland, OR: William, James, & Co.; 2013:89.

# Dosage or Dose?

The nouns *dose* and *dosage* are often used interchangeably, but they are not synonyms.

The term *dose* has two meanings:

(1) The amount of medicine administered or radiation given at one time.

- ✓ The patient received an initial dose of 50 mg.
- ✓ A 25-mg dose was to be given every 6 hours.

(2) The total amount of medicine or radiation administered during a specified period.

- ✓ The patient received a total dose of 600 mg during the course of treatment.
- ✓ Doses of 35–45 Gy were delivered in 10 or more fractions.

The term *dosage* refers to an amount of medicine administered at regular intervals. It implies a regimen and is usually expressed as a quantity of medicine per unit of time.

- ✓ Amphotericin was used initially at a dosage of 30 mg/d.

The following examples use both *dose* and *dosage*:

- ✓ The patient received an initial dose of 50 mg. Thereafter, her dosage was 25 mg 3 times a day for 6 days. She received a total dose of 500 mg during the course of treatment.
- ✓ The usual initial dosage of furosemide for adult hypertension is 80 mg/d, typically divided into doses of 40 mg twice a day.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:392.

Dictionary of Cancer Terms. National Cancer Institute at the National Institutes of Health. <http://www.cancer.gov/dictionary>. Accessed March 1, 2012.

*Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 7th ed. Reston, VA: The Rockefeller University Press; 2006:105.

# Dramatic or Drastic?

The adjectives *dramatic* and *drastic* are commonly used in scientific writing—for example, “a dramatic reduction in tumor size” or “drastic changes in lifestyle.” While these two terms are often used interchangeably, their meanings and connotations differ.

The primary definition of *dramatic* is “of or relating to the drama.”<sup>1</sup> (For example, “Our community theater is putting on an exciting new dramatic production next season.”) Another common meaning is “striking in appearance or effect.”<sup>1</sup> Synonyms for this meaning of *dramatic* include *vivid*, *intense*, *impressive*, and *remarkable*.<sup>2</sup> When used in this sense, *dramatic* usually has a positive connotation.

- ✓ Many of the emerging immune-oncology approaches that have shown dramatic effects in other solid cancers have been ineffective in pancreatic ductal carcinoma.
- ✓ HER2+ status was once a marker of poor prognosis; however, trastuzumab has dramatically improved survival outcomes.

*Drastic* means “acting rapidly or violently” or “extreme in effect or action; severe.”<sup>3</sup> For instance, a sudden thunderstorm or freeze could be described as a drastic change in the weather. Declaring

war would be considered a drastic action. *Drastic* most commonly refers to something negative or even frightening.

- ✓ *BRCA1/2* mutation carriers often take drastic measures to reduce their risk of cancer, such as undergoing prophylactic mastectomy; thus, efforts are under way to determine which *BRCA1/2* variants are deleterious.
- ✓ Through oncogenic epithelial-to-mesenchymal transition, cancer cells shed many of their epithelial characteristics, detach from epithelial sheets, and undergo drastic morphologic and phenotypic alterations.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:378.
2. *The Doubleday Roget's Thesaurus in Dictionary Form*, rev ed. New York, NY: Doubleday; 1987:207.
3. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:379.

# Dual or Duel?

*Dual* and *duel* sound the same but have very different meanings.

*Dual* is an adjective that refers to “two parts or elements.”<sup>1</sup> It may help to remember that this word is spelled with an **a** for **adjective**.

- ✓ Dual targeting of proteins ABC and XYZ can increase breast cancer cell sensitivity to tamoxifen.
- ✓ Because she was born in Australia and because her parents are United States citizens, she has dual citizenship.

*Duel* is a noun or verb that refers to physical combat between two people or, more metaphorically, to a contest between opposing ideas or people.<sup>2</sup>

- ✓ Alexander Hamilton was killed by Aaron Burr during a duel.

- ✓ Chinese scientists’ first use of CRISPR technology in a person could lead to a biomedical duel with researchers in the United States.<sup>3</sup>

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:384.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:385.
3. Cyranoski D. CRISPR gene-editing tested in a person for the first time. *Nature* 2016;539(7630):479.

# Due To or Owing To?

Careful readers, including some peer reviewers, are particular about the phrase *due to*, distinguishing between it and *owing to* or *because of* to avoid potential misunderstandings. Thus, careful writers also distinguish these terms.

From a grammatical perspective, the rule is to use *due to* or *caused by* if the words begin an adjectival phrase (modifying a noun) and to use *owing to* or *because of* if the words begin an adverbial phrase (modifying a verb, an adjective, or another adverb).

Here's a simpler way to decide which phrase to use:

If you are considering *due to* and could substitute *caused by*, then *due to* is correct. Notice that in these cases the verb is often a form of *to be*: for example, *were* or *is*.

- ✓ We detected no adverse effects [that were] due to the mutation.
- ✓ His dizziness was probably due to decreased blood flow.
- ✓ The pain is due to the weakened structural integrity of the bone.

- ✓ Fractures [that are] due to metastatic disease are a possibility.

If you are considering *due to* and could substitute *because of*, then use *because of* or *owing to*.

- ✓ The findings were inconclusive because of the small number of patients.
- ✓ The mutation was lethal owing to impaired vascular development.
- ✓ Differences in gene expression may arise because of autocrine signaling.
- ✓ Patients may avoid social activities owing to concerns about their appearance.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:387.

Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*, 9th ed. New York, NY: Atheneum; 1984:152, 153.



# Effective Use of Acronyms and Initialisms

An initialism is an abbreviation formed from the first letters of the words (or parts of words) it stands for (such as CPR). An acronym is a type of initialism that forms a pronounceable word (such as AIDS). The purpose of using acronyms and initialisms is to make text easier to read. Very long chemical terms, molecule names, and laboratory procedures—especially those that are repeated throughout a manuscript—take a long time to read and use up valuable print space. Initialisms help readers take in these cumbersome words or phrases more efficiently.

However, too many initialisms actually make reading more difficult because readers will have trouble remembering what the initialisms stand for. In addition, undefined initialisms, particularly those that represent obscure terms, can be confusing to readers not familiar with them.

So, how do you decide which words or phrases should be referred to with initialisms? Finding the balance between too many and too few initialisms involves flexibility and common sense.

Here are some guidelines:

- ✓ Use an initialism only if the phrase it stands for is repeated numerous times in the text (5 or more times is a good guideline) or if a repeated phrase is especially long.
- ✓ Use initialisms that your readers are likely to know. Avoid inventing new initialisms, especially those that readers are likely to associate with something else. (For example, don't use MD to refer to anything other than "doctor of medicine" in a medical manuscript.)

- ✓ Define an initialism the first time you use it (unless it is not typically defined in articles in your target journal; for example, most journals do not require you to define DNA or RNA).
- ✗ Avoid creating an initialism for single words other than complex chemical names. (For example, don't abbreviate *cisplatin* as CIS or C, but do consider establishing an initialism for a multidrug regimen that you refer to repeatedly.)

If you are writing for a specific journal, read the journal's instructions to authors for information about use of initialisms and other abbreviations, and glance through some of the journal's published articles to see how they typically handle abbreviations.

In general, when determining whether to use an initialism or spell out a phrase, consider whether your decision will make it easier or harder for readers to understand your manuscript.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:379, 380, 442.



# E.g. or I.e.?

Both *e.g.* and *i.e.* are abbreviations of Latin terms: *e.g.* stands for *exempli gratia* (for example), and *i.e.* stands for *id est* (in other words; that is). These two terms are frequently used incorrectly.

If you sometimes confuse these terms, try using this memory device:

**e.g.** = **f**or **e**xample

**i.e.** = **i**n other words

When you are presenting one or more items in a group but not all possible items, use *e.g.* When you are introducing either a rewording or a complete list of all the possible items in a group, use *i.e.* Otherwise, readers who are not familiar with the subject matter might get confused.

- ✓ Cancer can be caused by oncogenes (e.g., *src*) or mutated tumor suppressor genes (e.g., *p53*).
- ✓ The grant recipient (i.e., the principal investigator) has full responsibility for ensuring proper use of the funds.

- ✗ Cancer can be caused by oncogenes—i.e., *src* and *ras*. [The sentence literally states that *src* and *ras* are the only oncogenes that exist, which might mislead or confuse readers. *E.g.* should be used in place of *i.e.* in this sentence.]
- ✗ Breast tumor samples are routinely tested for hormone receptor status (e.g., estrogen receptor status and progesterone receptor status). [Since examples are used to illustrate what is not shown in full, this sentence literally states that estrogen receptors and progesterone receptors are not the only hormone receptors routinely tested for in breast cancer samples. *I.e.* should be used in place of *e.g.* in this sentence.]

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:393.

*Merriam-Webster's Dictionary of English Usage*, 11th ed. Springfield, MA: Merriam-Webster; 2003:398, 617.

# Elicit or Illicit?

A sentence of this sort frequently slips into otherwise eloquent prose:

- ✗ The drug did not illicit the expected response.

Well, one would hope not. This sentence represents a common error in all sorts of writing: the misuse of *illicit* for the similar-sounding *elicit* (check your local paper or Twitter feed; you'll see it's true).

The verb *elicit* means “to draw forth or bring out (something latent)” or “to call forth or draw out (information or a response).”<sup>1</sup> *Illicit*, however, is an adjective that means “not permitted; unlawful.”<sup>2</sup>

Clearly, the verb *elicit* is meant in these examples:

- ✓ The drug did not elicit the expected response.
- ✓ Repeated exposure to the stimulus elicited a sensitivity response.

- ✓ The revised questionnaire was able to elicit self-report data that were consistent with the investigator-observed behaviors.

*Illicit* is not frequently used in scientific and biomedical communications, except when talking about illegal drugs or the illegal use of drugs.

- ✓ Methamphetamine is a particularly addictive and dangerous illicit drug.
- ✓ Illicit use of over-the-counter cold medicines by adolescents is a serious concern.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:404.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:618.

# Emigrate or Immigrate?

*Emigrate* and *immigrate* both describe the movement of people across national borders. *Emigrate* means “to leave one’s place of residence or country to live elsewhere,”<sup>1</sup> whereas *immigrate* means “to come into a country of which one is not a native for permanent residence.”<sup>2</sup> Thus, the correct use of either word depends on whether the people are moving from a country (*emigrate from*) or to a country (*immigrate to*).

- ✓ Fred and Margaret emigrated from the Balkans in the late 1940s.
- ✓ Her grandparents immigrated to the United States a few years after the armistice ending World War I.

Those who emigrate or immigrate are known as *emigrants* or *immigrants*, respectively.

- ✓ They were emigrants from a war-ravaged area.
- ✓ The study focuses on the smoking habits of recent immigrants to the United States.

*Emigrate* and *immigrate* (and *emigrant* and *immigrant*) are rarely used in scientific writing. However, the verb *migrate*—“to change position in an organism or substance”<sup>3</sup>—is sometimes used in basic science research.

- ✓ The cells migrated from the top compartment to the bottom compartment in the Boyden chamber assay.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:407.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:621.
3. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:787.

# Eminent or Imminent?

The adjectives *eminent* and *imminent* sound alike and are often confused. However, their meanings differ significantly.

*Eminent* means conspicuous, prominent, or standing above others in some aspect. The word is most often used to describe a well-respected or successful person.

- ✓ Several eminent faculty members spoke at the symposium.

*Imminent* means ready to take place. It often has a negative connotation, suggesting an unfortunate event is anticipated.

- ✓ The tornado warning gave the students a sense of imminent danger.

- ✓ Sepsis puts patients at risk of imminent death.

Adding to the confusion is the seldom-used word *immanent*, which means inherent or indwelling. It is most often seen in philosophy.

- ✓ According to many belief systems, God is immanent in the physical world.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:407, 621.

# Enumerable or Innumerable?

The adjectives *enumerable* and *innumerable* mean “countable”<sup>1</sup> and “countless,”<sup>2</sup> respectively. Thus, things that can be numbered are *enumerable*, and things that are too many to count are *innumerable*.

- ✓ At the conclusion of the quarterly meeting, the chairman requested a list of enumerable [countable] action items from each manager.
- ✓ The bacterial colonies were enumerable [countable] until they began merging with each other.
- ✓ Innumerable [countless] environmental and genetic factors have the potential to influence cancer development.
- ✓ For mice with innumerable [countless] metastases, we recorded 99 for the total number of metastases.

In biomedical writing, *enumerable* is often mistakenly used when *innumerable* is meant. One way to remember the difference is to keep in mind that the prefix *in-* means *not*,<sup>3</sup> as in inhumane and incomplete.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:418.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:645.
3. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:627.

# Envelop or Envelope?

The noun *envelope* and the verb *envelop* are almost identical in spelling, and their meanings are similar in that both words relate to something that is or that carries the action of being enclosed or surrounded. However, the words are pronounced differently: the first syllable is stressed in *envelope*, whereas the second syllable is stressed in *envelop*.

We're all familiar with the noun *envelope*, which usually refers to a flat, square or rectangular paper container in which a letter or other mailed material is enclosed. Additionally, *envelope* can mean "an encompassing structure or membrane" (such as a cell envelope).<sup>1</sup> *Envelope* can also mean "a conventionally accepted limit"<sup>2</sup> such as in the expression "push the envelope," which means "to push the boundaries of what is possible."<sup>3</sup>

- ✓ The Gram staining method identifies different types of bacterial cell envelopes. [encompassing structures]

- ✓ Her research for the Moon Shots Program really pushes the envelope. [conventionally accepted limit]

The action of completely enclosing or surrounding is conveyed by the verb *envelop*.

- ✓ Monocytes envelop and digest bacteria cells.

## References

1. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:628.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:418.
3. CollinsDictionary.com. 2015 <http://www.collinsdictionary.com/dictionary/english/push-the-envelope>. Accessed November 2, 2015.



# Every Day or Everyday?

Should you use one word (*everyday*) or two (*every day*)? The correct choice depends on how the word or phrase is being used.

*Everyday* is an adjective that means “ordinary” or “routinely encountered.”

- ✓ Everyday tasks such as dressing and bathing may be very difficult for sufferers of rheumatoid arthritis.

Here, *everyday* describes the noun *tasks*.

On the other hand, *every day* is an adverbial phrase that describes when something occurs.

- ✓ He wears the same tie every day.
- ✓ The patient went to physical therapy every day for 1 week.

In the first example, the adverbial phrase *every day* modifies the verb *wears*. In the second example, *every day* modifies *went*.

Remember: *everyday* describes what something is, and *every day* describes when something happens.

## Bibliography

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:280.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:433.

# Expiring, Passing Away, and Other Fates Worse Than Death

Because death can be unpleasant to think about, people sometimes use euphemisms such as *pass away*, *expire*, and *succumb* to refer to death indirectly. However, these phrasings are not precise or standard. In biomedical and scientific writing, always use *die* or *death* to describe death so every reader can quickly understand what you mean.<sup>1</sup>

- ✗ The disease was resistant to therapy, and the patient passed away.
- ✗ We obtained tissue samples from donors who were still alive and donors who had expired.
- ✗ Thirty-eight months after diagnosis, the patient succumbed.
- ✗ The late patient's medical record was used in a retrospective study.
- ✓ During the 1-year follow-up period, 12 of the 50 patients in the trial died.

Euphemisms can also be ambiguous or inaccurate. For example, even if a reader ignores the meanings of *expire* that are used to talk about milk and vehicle registrations, he or she may decide that the writer is using *expire* to mean *exhale* rather than *die*. In addition, one may not *breathe one's last* precisely at the moment of death, which *Dorland's Illustrated Medical Dictionary* defines as “the permanent cessation of all vital bodily functions.”<sup>2</sup> For clarity, accuracy, and simplicity, therefore, use *die* or *death* instead of euphemistic terms.

Other euphemisms for *die* that do not belong in scientific writing include *be no more*, *decease*, and *perish*.

## References

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:325.
2. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:473.

# Farther or Further?

The words *farther* and *further* are often used interchangeably, but they actually have slightly different meanings. According to *The Chicago Manual of Style*, “The traditional distinction is to use *farther* for a physical distance and *further* for a figurative distance.”<sup>1</sup> *The Careful Writer* agrees that “the general preference is to restrict *farther* to ideas of physical distance and to use *further* for everything else.”<sup>2</sup> Here are some examples of the correct uses of these words.

## Farther

*Farther*, the comparative form of the word *far*, is used when a measurable length or distance is meant.

*Farther* can be used as an adjective or an adverb:

As an adjective, *farther* means “more distant” or “remoter.”<sup>3</sup>

- ✓ We set sail for the farther shore.

As an adverb, *farther* means “at or to a greater distance.”<sup>3</sup>

- ✓ As a result, the C terminus of  $\alpha 6$  is pushed farther away from the N terminus of  $\alpha 7$ .
- ✓ The tumor has also spread to lymph nodes that are farther away but on the same side of the body.

## Further

*Further* is used when a metaphorical, or figurative, distance is meant.

*Further* can be used as an adjective, an adverb, or a verb:

As an adjective, *further* means “going or extending beyond” or “additional.”<sup>3</sup>

- ✓ They provided funding for further development of antibodies.
- ✓ Further research into this mechanism is needed.

As an adverb, *further* means “to a greater degree or extent.”<sup>3</sup>

- ✓ She needs to research further before making a decision.
- ✓ You would have to look further into the past to find the roots of the current problems.

As an adverb at the beginning of a sentence, *further* means “in addition” or “moreover.”<sup>3</sup>

- ✓ Further, the funds will be used to buy new equipment.

As a verb, to *further* means “to help forward” or “to promote.”<sup>3</sup>

- ✓ The funds will be used to further the development of more efficient wind turbines.

In summary, when you’re looking for an adjective or an adverb, if you mean a physical distance, use *farther*; and if you mean a metaphorical distance (a degree or an extent), use *further*. When you’re looking for a verb, only *further* can be correct.

## References

1. *The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:281.
2. Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*, 9th ed. New York, NY: Atheneum; 1984:181.
3. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:454.

# Faze or Phase?

The word *phase* is commonly encountered in scientific writing: clinical trials occur in phases; there are phases of the cell cycle; and systems, processes, technologies, and people may go through phases of development. *Phase* is most often used as a noun and is defined as “a particular appearance or state in a regularly recurring cycle of changes” or “a distinguishable part in a course, development, or cycle.”<sup>1</sup>

- ✓ Figures 5a and 5b, respectively, show the proportions of cells in G<sub>2</sub>/M phase in cultures that did and did not contain the agent.
- ✓ Here we report the results of a phase II trial evaluating the regimen’s efficacy in children with resistant/recurrent Ewing sarcoma.
- ✓ During the initial phase of disease onset, patients may experience only slight fatigue.

*Phase* can also sometimes be used as a verb meaning (most commonly) “to introduce in stages”<sup>1</sup>; in such cases, the expression *phase in* is most frequently seen:

- ✓ We will phase in use of the new electronic medical record system over a period of months to minimize disruptions in our clinics.

*Faze*, always a verb, means “to disturb the composure of,”<sup>2</sup> as in the expression “Nothing seems to faze him.” *Faze* is infrequently encountered in scientific writing.

A very common mistake in nonscientific writing is the misuse of *phase* when *faze* is meant. Unfortunately, because the mistake happens so often, many writers, readers, and, yes, even editors no longer notice the error.

Want to make sure you get it right? Remember that the word *phase* is usually used as a noun and is far more common in scientific writing than its homonym *faze*; if you could easily substitute a word like *stage* or *part*, then *phase* is the word you want.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:928.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:457.

# Febrile, Feverish, or Had a Temperature?

*Febrile*, *feverish*, and *had a temperature* are used in similar contexts, but it is important to be aware of their differing meanings when determining which expression is appropriate for a given situation.

When one is discussing body temperature, the phrase *had a temperature* is commonly (but inaccurately) used to indicate a body temperature outside of the normal range. Every patient has a temperature; it could be 104°F (40°C) and considered dangerous to the patient, or it could be 98.6°F (37°C) and considered normal. Therefore, when using the phrase *had a temperature*, always include the specific number.

- ✓ The patient had a temperature of 98.9°F (37.2°C) after undergoing two treatments.
- ✗ The patient had a temperature on the third day of treatment.
- ✓ The patient's temperature rose from 98.6°F on the first day of treatment to 102.7°F (39.3°C) on the third day of treatment.

*Febrile* is an adjective used to describe a patient whose body temperature has risen above the normal range. Therefore, when using the word *febrile*, you do not need to specify the temperature

unless that information is needed for clarification. *Febrile* is used more commonly than is *feverish* as an adjective describing medical conditions such as seizures caused by a patient's fever.

- ✓ The patient was febrile when she checked into the emergency room.
- ✓ The girl's febrile seizures lasted more than 30 minutes.

*Feverish* is an adjective that may be used to describe symptoms a patient has when his or her temperature is above normal.

- ✓ The patient reported that he felt feverish and exhausted.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:394.

Garner, BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:800.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:458.



# Feeling Tense About Verb Tenses?

Verb tense indicates the timing of an action in relation to the present. In scientific writing, verb tense is important because it communicates to the reader the sequence of events or the status of completion, acceptance, or agreement on any particular point. Biomedical research articles use verb tense in very specific ways.

The present tense is used for statements of accepted knowledge, established fact, or ongoing truth. The present tense is used in the Introduction section of a research article to indicate what was known about the topic when the current study was undertaken (i.e., the background). It may be used in a similar way in the Discussion section.

- ✓ Mutations in the *BRCA1* and *BRCA2* genes *are* linked to hereditary breast and ovarian cancers.

The present tense may also be used to state the general conclusions of a study.

- ✓ Our findings *confirm* the value of the exercise stress test as a tool for prognosis and risk stratification.

In addition, the present tense is used in a current hypothesis.

- ✓ We hypothesized that the risk of colorectal cancer *is* higher among individuals with both the *TGC* and *WEC* mutations.

The past tense refers to an action that is complete. In a research article, the past tense is used to describe what you did and what you found. The information in the Methods and Results sections is therefore almost always reported using the past tense.

- ✓ We *measured* the patients' blood pressure before and after the exercise class. [Methods]
- ✓ The PJW knockout mice *developed* tumors within 6 weeks of carcinogen exposure. [Results]

The past tense is also used to describe specific findings of previous studies, whether the authors' own or those of other investigators.

- ✓ In the study by Zhou et al., 70% of cases *were* linked to frameshift mutations in the DDL gene.

Additionally, the past tense is used to introduce a research article's hypothesis, although the hypothesis itself remains in the present tense.

- ✓ We *hypothesized* that the risk of colorectal cancer *is* higher among individuals with both the *TGC* and *WEC* mutations.

The present perfect tense reflects actions that were started in the past and have continued into the present or that have not yet happened. This tense also may be used to describe something that happened in the recent past.

- ✓ No transcription factor for  $\beta$ -cell formation *has been identified* thus far.

The past perfect tense is used to describe experiences of human subjects or treatments of cells, tissues, or animals that took place before the study being reported. Such information is usually presented in the Methods section.

- ✓ Previous interferon-alfa therapy *had failed* in all of the study participants.

Using verb tenses correctly in your research articles helps the reader understand your purpose and strategy and place your findings in the context of what is already known in the field.

## **Bibliography**

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:320, 321.

# Few or A Few?

*Few* and *a few* appear and sound similar, and both are used in association with quantity; so it's easy to understand why they are often confused in writing. However, the terms differ importantly in connotation and emphasis and should not be used interchangeably, especially in biomedical writing, where precision is critical.

According to *Merriam-Webster's Collegiate Dictionary*, *few*, used as an adjective, describes or consists of not many or a small number of individuals or things. When used alone (without a preceding *a*), *few* suggests an insufficient amount. *Few* therefore carries a negative emphasis.

- ✓ Few tumor cells survived the aggressive combination chemotherapy regimen. [Almost no cells survived.]
- ✓ The literature contains few reports of this rare tumor subtype. [Reports of this tumor are scarce, and data are lacking.]

Like *few*, *a few* refers to a small number of individuals or things, but *a few* describes a quantity that is greater than that described by *few*. Whereas *few* conveys a meaning of *almost none* and

implies insufficiency, *a few* carries a meaning of *some* (as opposed to *none*) or suggests a number that, albeit small, is nonetheless meaningful or sufficient and possibly significant. *A few* should be used when a positive emphasis is desired.

- ✓ Studies are ongoing, but a few reports [i.e., some reports, although not many, but enough to warrant mention and to have possible significance] have identified promising novel biomarkers and targetable proteins for ovarian cancer.

Thus, *a few* emphasizes what is there, whereas *few* emphasizes what is lacking.

## Bibliography

*Fowler's Modern English Usage*, revised 3rd ed. New York: Oxford University Press; 2004:197.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:464.

# Fewer or Less?

When saying that one amount is smaller than another, when should you use *less* and when should you use *fewer*? It depends on what you are comparing.

Some things exist as a group of discrete, countable units. For instance, a handful of marbles can be divided into single marbles and a group of patients into individual patients. To indicate that one such group contains a lower number of distinct units than another, use *fewer*.

- ✓ The patients who received both treatments had fewer recurrences than the patients who received only one.
- ✓ The first trial had fewer inclusion criteria than the subsequent trial did.

Other things are represented as continuous quantities, such as volume, mass, length, area, duration, percentage, intensity, or monetary cost. These types of amounts should be compared using *less*.

- ✓ The diameter of a hollow gold nanosphere is less than that of a silica-core gold nanoshell.
- ✓ Insomniacs sleep less at night than people with normal sleeping habits.

However, when emphasizing number, not quantity, expressions such as “fewer miles per gallon” are acceptable.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:394.

Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*, 9th ed. New York, NY: Atheneum; 1984:184.

Garner BA. *Garner’s Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:351.

# Finally or At Last?

*Finally* and *at last* both can be used to mean “at the end of a period of time”<sup>1</sup>—generally a substantial period of time or a period of time characterized by substantial effort.

- ✓ The new electronic health record was finally launched on March 4.
- ✓ With the help of a librarian, I finally found the article I was looking for.
- ✓ With these findings, the team at last confirmed what had long been suspected.

*Finally* also can be used to introduce the last item in a series or the last step in a process, but *at last* should not be used for this purpose.

- ✓ In developing these recommendations, we considered mortality, morbidity, and, finally, cost-effectiveness.
- ✗ In developing these recommendations, we considered mortality, morbidity, and, at last, cost-effectiveness.

- ✓ First, we searched PubMed to identify relevant articles. Next, we searched ASCO abstracts online to identify relevant abstracts. Finally, we reviewed the references cited in the identified papers and abstracts to find additional relevant articles.
- ✗ First, we searched PubMed to identify relevant articles. Next, we searched ASCO abstracts online to identify relevant abstracts. At last, we reviewed the references cited in the identified papers and abstracts to find additional relevant articles.

## Reference

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:469, 702.

# Flammable or Inflammable?

The words *flammable* and *inflammable* mean the same thing: easily set on fire.

- ✓ The laboratory safety manual says to keep flammable chemicals away from the vacuum pumps.
- ✓ John's coworkers told him that flammable solvents should be kept in a place away from open flame sources.
- ✓ Fireworks are highly flammable.

However, because *inflammable* has the prefix *in-*, which can have a negative connotation (as in “inflexible,” “inefficient,” or “indecent”), some people mistake *inflammable* for an antonym (opposite) of *flammable*. This is not the case; *inflammable* does not mean “not flammable.” Therefore, *flammable* is preferred to *inflammable* to avoid such confusion. If a word meaning “not flammable” is needed, *nonflammable* should be used.

- ✓ Lithium-ion batteries contain flammable solvents that raise safety concerns; researchers have recently discovered that polymers can be used as nonflammable electrolytes to make batteries safer.

*Inflammable* has a second meaning that *flammable* does not, however. *Inflammable* can also mean easily roused, provoked, or excited, though this usage is not often seen in scientific writing.

- ✓ John's coworkers were well aware of his inflammable temper and avoided talking with him unless it was absolutely necessary.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:475, 640.



# Flesh Out or Flush Out?

Although the phrases differ by only one letter, *flesh out* and *flush out* have distinct meanings. To *flesh out* is to give substance to or provide more detail about something.

- ✓ We fleshed out our idea at the team meeting.

*Flush out* can be used in the context of washing something out with a liquid or chasing something out of hiding, literally or figuratively.

- ✓ She used the laboratory eyewash station to flush out the chemical in her eyes.
- ✓ He used polite but direct questions to flush out the truth.

## **Bibliography**

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:478, 483.

# Forego or Forgo?

Choosing which of the homophones *forego* and *forgo* is the right one to use can be tricky. They sound the same, and their spellings differ only by a buried *e*, so neither sound nor appearance readily distinguishes them. Unfortunately, the meanings are dramatically different:

forego: “to go before, precede”<sup>1</sup>

forgo: “to do without”<sup>2</sup>

That means careful proofreading is the only sure way to avoid inaccuracy (and possibly unintended humor) when using these words.

In the following examples, either word might be correct, so the writer must be careful to choose the one with the intended meaning:

- ✓ The bride must forego the ring bearer. [The bride must walk down the aisle before the ring bearer does.]

- ✓ The bride must forgo the ring bearer. [The bride must do without the ring bearer.]

In the next case, *forego* is clearly incorrect:

- ✗ To forego chocolate is too great a price to pay for perfect health.
- ✓ To forgo chocolate is too great a price to pay for perfect health.

## Reference

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:490.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:491.

# Formatting Gene and Protein Symbols

Gene and protein names can often be confusing, especially in emerging fields, where naming conventions have yet to be standardized. Fortunately, each vertebrate experimental model has a defined standard for formatting gene and protein symbols, usually involving some combination of capitalization and italicization. The use of symbols rather than full gene names can also save writing time and effort.

Symbol formatting standards generally differ depending on the organism being discussed, so adherence to these standards is also a convenient method of showing which organism you are referring to. For instance, the symbol for the human sonic hedgehog gene is *SHH*, but the symbol for the mouse sonic hedgehog gene is *Shh*.

As an example, the formatting for wingless-type MMTV integration site family member 1 (WNT1) is given below.

| Model   | Gene symbol | Protein symbol |
|---|-------------|----------------|
| Humans  | <i>WNT1</i> | WNT1           |
| Rodents (mice and rats)                                       | <i>Wnt1</i> | Wnt1           |
| Chickens  | <i>WNT1</i> | WNT1           |
| Frogs ( <i>Xenopus laevis</i> and <i>Xenopus tropicalis</i> ) | <i>wnt1</i> | wnt1           |
| Zebrafish   | <i>wnt1</i> | Wnt1           |

This table offers general guidelines rather than absolute standards. Occasionally, a gene or protein name can deviate from the standardized formatting for historical or technical reasons. This

is most common for recently characterized or poorly understood genes and proteins. Similarly, not all genes or proteins have standardized symbols.

Although formatting differences can be used to distinguish between the sources of genes and proteins, it is still advisable to mention the source organism at first instance to prevent any confusion. For instance, “We inserted human *NOT* into the EGFR locus using standard techniques.”

Naming gene donor and recipient organisms is particularly important when you have used several experimental models that all use the same gene or protein name formatting. One example of this standard would be, “We inserted the *X. laevis wnt1* gene into the *D. rerio wnt* locus.”

If you are studying a protein or gene that has not yet been assigned a symbol, the full name of the gene or protein should be used at all instances. This will ensure that your paper will be both easily searchable and understood in the future regardless of the symbol that is ultimately selected as the standard.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:531, 532.

Genetic nomenclature guide. Vertebrates. *Trends Genet.* 1995 Mar:30.

NCBI Gene Database: <http://www.ncbi.nlm.nih.gov/gene>. Accessed July 31, 2013.

# Gage or Gauge?

The terms *gauge* and *gage* were once variants of each other. However, these terms now have distinct meanings.

*Gauge* is by far the more common term. In noun form, a *gauge* is something used for measurement, be it a device or a standard of some sort. In verb form, *gauge* means to judge or measure something.<sup>1</sup>

- ✓ Blood was obtained via a catheter with an 18-gauge needle.
- ✓ We gauged tumor response to irradiation in follow-up examinations.

In contrast, the primary definitions of *gage* are old-fashioned and thus rarely, if ever, used today. Specifically, as a noun, a *gage* is something that indicates a defiant act or a pledge to fulfill a commitment. Similarly, as a verb, *gage* means to take a risk or

make a pledge. Use of *gage* as a variant of *gauge* appears farther down in the list of definitions of the word, meaning that this usage is not common.<sup>2</sup>

A note of caution: Gage is a fairly common surname. Writers should be aware of this when using the Find and Replace feature in word processing programs, as replacing all instances of *gage* with *gauge* could lead to a misspelled name or names in the reference list and/or other parts of a manuscript.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:518.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:511.

# Gender or Sex?

The words *gender* and *sex* describe similar categories, but the precise implications of those categories are not the same.

The *AMA Manual of Style* defines *sex* as “the classification of living things as male or female according to their reproductive organs and functions assigned by chromosomal complement.” *Gender*, on the other hand, is “a person’s self-representation as man or woman, or how that person is responded to by social institutions on the basis of the person’s gender presentation” and is “rooted in biology and shaped by environment and experience.”

In short, *sex* is a biological distinction, whereas *gender* is a cultural distinction.

In biomedical writing, *sex* is often used to categorize patients (or sometimes animals) for statistical comparisons between males and females. In most biomedical research, whether a patient’s self-representation aligns with what is culturally expected of a man or a woman is not relevant to the research, whereas sex-related characteristics such as hormone levels may be very relevant.

- ✓ The analyses performed in the retrospective

cohort study were adjusted for age, sex, race, and comorbidities.

- ✓ Male sex was associated with a higher risk of coronary heart disease.
- ✓ The prevalence of congenital color vision deficiencies varies by sex.

So is *gender* ever appropriate in biomedical writing? Sometimes. Consider this example from the *AMA Manual of Style*:

- ✓ Responses to pain therapies differ between men and women. Whether this difference is related to sex-based factors (physiological), gender factors (psychosocial), or both has not been determined.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:395.

# Good or Well?

Whether a writer uses *good* (“of a favorable character or tendency”)<sup>1</sup> or *well* (“in a good or proper manner”)<sup>2</sup> depends on the word the writer wishes to modify. *Good* is an adjective, so it is used to modify nouns and pronouns. *Well*, on the other hand, is an adverb, so it is used to modify verbs, adjectives, or other adverbs.<sup>3</sup>

- ✗ After several courses of chemotherapy, the patient was doing good. [Since the word being modified is *doing*, which is a verb, *well* should be used.]
- ✓ After several courses of chemotherapy, the patient was doing well.
- ✗ The patient tolerated therapy good. [Since the word being modified is *tolerated*, which is a verb, *well* should be used.]
- ✓ The patient tolerated therapy well.

- ✗ Body mass index (BMI) is a well measure of a patient’s body fat. [Since the word being modified is *measure*, which is a noun in this case, *good* should be used.]
- ✓ Body mass index (BMI) is a good measure of a patient’s body fat.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:539.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1420.
3. *The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:243.



# -Gram or -Graphy?

The terminology used for clinical imaging is often inconsistent, sometimes even within individual manuscripts. This can cause confusion for readers.

One simple way to be clear in your descriptions of clinical imaging is to differentiate between two common suffixes for imaging techniques and their products, respectively: *-graphy* and *-gram*.

Terms such as *mammography*, *echocardiography*, and *ultrasonography* refer to the techniques in general or to the procedures performed by the physician or radiologist.

- ✓ We performed ultrasonography to assess the patient's tumor.
- ✓ Mammography revealed no lesions in our cohort.
- ✓ The study patients underwent physical examinations, baseline laboratory testing, and echocardiography before treatment.

The products of these tests use *-gram*: *mammogram*, *echocardiogram*, and *sonogram*.

- ✓ Metastases were evident on the patient's sonogram.
- ✓ No lesions were evident on any of the cohort's mammograms.
- ✓ We excluded one patient from the study because his echocardiogram indicated advanced heart disease.

Likewise, terms such as *computed tomography*, *magnetic resonance imaging*, and *positron emission tomography* refer to techniques or procedures, and *computed tomography image*, *magnetic resonance image*, and *positron emission tomography image* refer to products.

## **Bibliography**

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:401.

# Historic or Historical?

The words *historic* and *historical* are adjectives that mean similar things, but they are used in slightly different ways. *Historic* means important or influential in history; people frequently use *historic* when they mean the thing they are describing changed history. *Historical*, on the other hand, is usually used to indicate that something happened in the past or is based on history. For example, the Declaration of Independence is a historic document, and the movie *The Patriot* is a historical film about the Revolutionary War.

Because both words are pronounced with a consonant at the beginning (unlike *hour*, for instance, which begins with a vowel sound), both *historic* and *historical* should be paired with the indefinite article *a* instead of *an*.

- ✓ We celebrated the historic occasion with a historical reenactment of the signing of the Declaration of Independence.

- ✓ The establishment of the first immortalized cell line, HeLa, was a historic event in 20th-century medicine. Rebecca Skloot recently wrote a historical biography of Henrietta Lacks, the woman from whom those cells were taken.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:396.

Skloot R. *The Immortal Life of Henrietta Lacks*. New York, NY: Crown Publishers; 2010.

# Home In or Hone In?

*Word for Word* often compares a pair of words or phrases that are similar in spelling or pronunciation and are frequently mistaken for each other. Usually the correct answer is straightforward: there's a right way and a wrong way. Today's pair of words, *home* and *hone*, is not quite so simple.

The word *home*, of course, has many different meanings. Here we focus on its use as a verb meaning to move, progress, or proceed directly toward a target, destination, or objective. *Home* or *homing* is sometimes, but not always, paired with *in* in this context; *home in* is a synonym for *zero in*. *Home* can also be used as a noun to describe the act of homing or as an adjective to describe something that homes.

- ✓ As the clues fell into place, the detectives homed in on the fugitives.
- ✓ Homing of hematopoietic stem cells to the bone marrow is partly regulated by chemokines.
- ✓ For centuries, homing pigeons were used to deliver messages to remote locations.

*Hone* means to shape, sharpen, or perfect. As a rule, it is not followed by *in*.

- ✓ The bodybuilders worked to hone their muscles in the weeks before the competition.
- ✓ Honing his carving knife is my father's sole preparation for the holiday meal.

- ✓ The students hone their physical examination skills with volunteer "patients."

In the past few decades, the phrase *hone in* has emerged. It began as a misuse of *home in* but has increased in usage and is now recognized and even considered an acceptable alternative by some sources. *Hone in* is typically used in one of two contexts: as a synonym for *home in* or to mean listen carefully or pay close attention. However, many readers and language experts still consider *hone in* an error, and it is likely that less proficient English speakers and readers will be confused by it. We recommend that you use *home* and *hone* as shown in the examples here.

## Bibliography

Garner BA. *Garner's Modern English Usage*, 4th ed. New York, NY: Oxford University Press; 2016.

*Merriam-Webster's Collegiate Dictionary*, 10th ed. Springfield, MA: Merriam-Webster; 2003.

Norris M. Don't try to hone in on a copy editor. *The New Yorker*. September 14, 2012. <http://www.newyorker.com/books/page-turner/dont-try-to-hone-in-on-a-copy-editor>. Accessed June 29, 2017.

# In to or Into?

The word *into* and the phrase *in to* differ only by a space, but their meanings are quite distinct.

*Into* is a preposition that comes after a verb and is followed by a noun. It typically answers the question “where.”

- ✓ Tumor cells were injected into the tail veins of nude mice.
- ✓ The patients’ data were entered into the department database.
- ✓ She dived into the pool.

*In to* also follows a verb, but *in* is an adverb and *to* introduces an infinitive phrase (to + the simple form of a verb + an object or modifier; for example, “to catch a thief”) that explains the purpose of the action.

- ✓ The sutures were left in to prevent the wound from opening.

- ✓ The patient walked in to discuss her treatment.
- ✓ He dived in to save her.

*Into* is also sometimes confused with *in*. Whereas *into* indicates movement, especially toward the center of a place or object, *in* denotes a more static position.

- ✓ The man walked into the house as the children played in the yard.

## Bibliography

Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*. New York, NY: Atheneum; 1965:228.

*Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:627, 656.

# Incidence, Incidents, or Instance?

Although *incidence*, *incidents*, and *instance* sound similar, they have different meanings.

An *incidence* is the rate at which something occurs. In medicine, *incidence* is used to mean the number of new cases of a disease or condition occurring in a population during a specific period.

- ✓ The annual incidence of stomach cancer in the United States has been declining since the early 1990s.

*Incidence* can also be used to mean “the arrival of radiation at a surface,”<sup>1</sup> but this usage is much less common than the usage described above.

*Incidents* are events, often ones that are unusual or concerning.

- ✓ The committee is charged with investigating wrong-site surgery and other critical patient-care incidents.
- ✓ The chemical spill was the first major incident in the laboratory since its founding.

*Incident* can also be used as an adjective meaning “falling or striking upon, as incident radiation.”<sup>1</sup>

An *instance* is an occurrence or case of something. *Instance* is also used in the phrase “for instance,” which means “for example.”

- ✓ The software detected a number of instances [occurrences] of plagiarism in the review article.
- ✓ Patients may experience prolonged anorexia; in such instances [cases], consultation with a nutritionist is often helpful.
- ✓ The MD Anderson campus includes several beautifully landscaped gardens, for instance [for example], the Tom Jean Moore Rose Garden near the Freeman-Dunn Chapel and the Dorothy H. Hudson Memorial Garden south of the Main Building.

## Reference

1. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:926.

# Incite or Insight?

*Incite* and *insight* are often confused and misused, but they differ in both meaning and pronunciation.

*Incite* is a verb that refers to causing or stirring something up. *Incite* traditionally carries a negative connotation.

- ✓ Wheat, barley, rye, and some oats incite intestinal inflammation in people with celiac disease.
- ✓ The complicated poster project incited stressful competition among the nursing students.

*Insight* is a noun that refers to the power or result of understanding a situation. In biomedical writing, *insight* might be used to describe how new information has led to a better understanding of a case, illness, or treatment.

- ✓ The patient's daily food diary and description of her symptoms led to an important insight about her condition.
- ✓ The research team's new insights in immunotherapy led to an effective treatment for patients with Merkel cell carcinoma.

When pronouncing *incite*, the primary stress is placed on the second syllable (**incite**). When pronouncing *insight*, the primary stress is placed on the first syllable (**insight**).

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:629, 647.



# Includes or Is?

Scientific writing often contains lists of data such as patient characteristics, inclusion/exclusion criteria, reagents, and toxic effects, and how such lists are introduced can tell the reader whether the list is complete or partial. Consider these two examples:

- ✓ The exclusion criteria included age greater than 70 years, Zubrod performance score less than 2, and evidence of metastasis.
- ✓ The toxic effects of cisplatin treatment were nephrotoxicity, nausea, vomiting, neurotoxicity, and hemolytic anemia.

The use of *included* in the first example implies that the list is not comprehensive, i.e., that other exclusion criteria were used but are not listed here. In the second example, the list is understood to be complete, i.e., no other toxic effects occurred.

*Merriam-Webster's Collegiate Dictionary* defines *include* as “to take in or comprise as a part of a whole or group.” In recent years,

however, *include* has come to be widely misused to mean *consists of*. This misuse can lead to sentences such as “The five stages of mitosis include prophase, prometaphase, metaphase, anaphase, and telophase.” Because all five stages are listed, a more definite verb (*are* or *consist of*) is needed.

The incorrect use of *include* can be even more problematic if the total number of items is unknown. In that case, the author may be reporting a complete list, but the reader may interpret it as incomplete.

To avoid this type of miscommunication, use *includes* only if a list is incomplete and use *is* or *consists of* if a list is complete.

## Reference

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:629.

# Including, Like, or Such As?

What are the differences between *including*, *such as*, and *like*?

*Including* means “to shut up or enclose,” “to take in or comprise as a part of a whole or group,” or “to contain between or within.”<sup>1</sup> It is most commonly used to list examples:

- ✓ The overexpression of several genes, including *Ras*, *bcl-2*, *HER2*, and *p53*, has been found in carcinoma of unknown primary.

In this sentence, most readers will assume that not only *Ras*, *bcl-2*, *HER2*, and *p53* but also other genes (not listed here) are overexpressed in carcinoma of unknown primary. In other words, the use of *including* to introduce a list implies that the list is not complete.

Therefore, *including* should not be used when a list is exhaustive:

- ✗ We are currently conducting studies of genes including *Ras*, *bcl-2*, *HER2*, and *p53*.
- ✓ We are currently conducting studies of the genes *Ras*, *bcl-2*, *HER2*, and *p53*.

*Such as* is a phrase that should be used in the same manner as *including*:

- ✓ All clinical data, such as disease characteristics and treatments, were collected from patients’ medical records.

*Like* is often used interchangeably with *such as*, but because it means “having the characteristics of or similar to,”<sup>2</sup> readers may assume that the examples listed are not included in the group themselves. This can lead to ambiguity, such as in the following sentence:

- ✗ Our laboratory is determining the expression of genes like *Ras* and *HER2* in carcinoma of unknown primary.

It is not clear whether the laboratory is determining the expression of *Ras* and *HER2* themselves (along with other genes) or just genes that are similar to *Ras* and *HER2*.

Below is an acceptable use of *like* as a comparator:

- ✓ Like antimetabolites, alkylating agents are sometimes used to treat leukemia.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:629.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:720.

# Invaluable or Valuable?

When deciding whether to use *valuable* or *invaluable* in scientific writing, one must consider whether the object the adjective modifies is merely very useful or downright indispensable.

*Valuable*, defined by Merriam-Webster, means “having monetary value” (e.g., a valuable necklace); “having desirable or esteemed characteristics or qualities” (e.g., a valuable work of art); or “[being] of great use or service” (e.g., a valuable therapeutic option for breast cancer patients).<sup>1</sup>

*Invaluable* goes a step further: Something that is invaluable is “valuable beyond estimation: PRICELESS” (e.g., an invaluable necklace left to me by my late grandmother, an invaluable example of Leonardo’s early work, an invaluable therapy for patients with few other options).<sup>2</sup> Whereas valuable items or services may be replaced, invaluable items cannot.

- ✓ Michael made valuable contributions to the study. [His contributions were important and useful, but not necessarily essential, to the completion of the study.]

- ✓ The contributions Michael made to the study were invaluable. [His contributions were essential; that is, they were so important that the study would not have been performed without them.]

Unlike *invaluable*, *valuable* (often *valuables*) can also be used as a noun meaning “personal possession[s] of relatively great value.”<sup>1</sup>

- ✓ The sign read, “Please secure your valuables. The hotel management is not responsible for lost or stolen items.”
- ✓ Michael shouted, “Hide your valuables! Here comes the hotel manager!”

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1382.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:658.

# Irradiation or Radiation?

When writing about common cancer treatments, it's important to use precise terminology. Although they are often used interchangeably, *radiation* and *irradiation* do not mean the same thing. Generally, use of the right word depends on whether radioactive particles are being released from (*radiation*) or absorbed by (*irradiation*) an object.

*Radiation* is the “energy transmitted by waves through space or through some medium. By extension, a stream of particles, such as electrons, neutrons, protons, or alpha particles,”<sup>1</sup> are emitted from a common point. On the other hand, *irradiation* is “exposure to radiation (as x-rays or alpha particles).”<sup>2</sup>

- ✗ The patient underwent radiation for his prostate cancer.
- ✓ The patient underwent irradiation for his prostate cancer.
- ✗ The patient's irradiation dose exceeded the recommended limit.
- ✓ The patient's radiation dose exceeded the recommended limit.

*Radiate* and *irradiate* also have different meanings. *Radiate* means “to diverge or spread from a common point”<sup>1</sup> or “to proceed in a direct line from or toward a center.”<sup>3</sup> *Irradiate* means “to apply ionizing radiation for therapeutic or diagnostic purposes”<sup>4</sup> and similarly “to treat by exposure to radiation.”<sup>2</sup>

- ✗ We used a Varian Clinac 6EX Linear Accelerator to radiate the tumors. [This suggests the tumors are moving away from the linear accelerator.]
- ✓ We used a Varian Clinac 6EX Linear Accelerator to irradiate the tumors. [The tumors receive radiation from the linear accelerator.]
- ✗ The brachytherapy pellets irradiate tumor-killing alpha particles. [This suggests the particles receive radiation from the pellets.]
- ✓ The brachytherapy pellets radiate tumor-killing alpha particles. [The pellets emit the particles.]

## References

1. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:1570.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:662.
3. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1025.
4. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:960.

# Is “Pair” Singular or Plural?

*Pair* is often used with a prepositional phrase to describe two (often similar or identical) nouns that are used together or that occur together (e.g., pair of chopsticks, pair of hands, pair of chromosomes). It can also be used to describe a single object that has two parts that are identical or that work together (e.g., pair of jeans, pair of scissors, pair of eyeglasses).

Even though the object of the preposition *of* (chopsticks, scissors, hands, etc.) is plural, the noun *pair* is singular and takes a singular verb.

- ✓ His favorite pair of gray wool trousers was ruined when he got caught in the storm.
- ✓ The soiled pair of gloves was discarded by the surgeon.
- ✓ A new pair of red high-heeled shoes is the latest addition to Cindy’s shoe collection.

These noun phrases can be made plural by changing *pair* to *pairs* and using a plural verb.

- ✓ Two pairs of safety goggles are among the items that the chemistry students are required to purchase.
- ✓ One hundred matched pairs of patients and healthy control subjects were included in the study.
- ✓ Four pairs of microscissors were sterilized by the surgical technician.

## Bibliography

*The Chicago Manual of Style*, 17th ed. Chicago, IL: The University of Chicago Press; 2017:345.

*Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:891.

# It's or Its?

Even though they sound the same, *it's* and *its* are very different words, and they are often used incorrectly.

*It's* is a contraction, short for *it is* or *it has*. If you can substitute *it is* or *it has* for the term in a sentence, then *it's* is the correct choice.

- ✓ It's [It is] raining.
- ✓ It's [It has] been a long time since I saw my brother.
- ✓ A biopsy of the mass is performed to determine whether it's [it is] malignant.

On the other hand, *its* is the possessive form of the pronoun *it* that means “of or relating to it or itself” or “belonging to it.” Although possession is indicated with an apostrophe in most other cases (e.g., Mary's car, the farmer's field, or the dog's tail), *its* is an exception to the rule.

- ✓ The dog wagged its tail.
- ✓ The company's patent for its drug has expired.
- ✓ The rabbit was scanned to determine whether its malignant tumor had progressed.

A simple test is that if you can substitute *his* or *her* for *its* in a sentence, even if it doesn't make logical sense, then *its* is the correct choice. And remember, *its'* is not a word.

## Bibliography

Burchfield RW. *Fowler's Modern English Usage*. Oxford: Oxford University Press; 2000:310–312.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:665.



# Joint Possessives

The possessive form of nouns and pronouns indicates ownership, possession, or occupancy (e.g., MD Anderson’s intellectual property)<sup>1</sup>; a relationship (e.g., his mentor)<sup>1</sup>; origin (e.g., my R01 proposal)<sup>2</sup>; or purpose (e.g., a surgeon’s loupe).<sup>2</sup>

By current convention, when two nouns jointly “possess” the same thing, only the name of the second noun is put in the possessive case.

- ✓ Dave and Ahmed’s office is always extremely cold.
- ✓ MD Anderson Cancer Center and Peter MacCallum Cancer Centre’s sister-institution agreement is expected to strengthen research collaboration between the two institutions.
- ✓ Everyone could hear Erin and Ming’s pet cat meowing in the background during the last five minutes of the conference call.

However, this convention can lead to confusion in some cases, such as the following:

- ✗ Confusing: We thank Dr. Karen Smith and Dr. Bill Harvey’s engineering team for sharing their technical expertise.

Are the authors thanking a person (Dr. Smith) and a separate team (Dr. Harvey’s team)? Or are the authors thanking a team headed jointly by Dr. Smith and Dr. Harvey? If it is not perfectly clear that

a phrase is describing joint owners, the phrase should be rewritten to avoid confusion:

- ✓ Clear: We thank the engineering team headed by Dr. Karen Smith and Dr. Bill Harvey for sharing their technical expertise.

If a pronoun and a noun are used, the noun should be in the possessive case even if the noun appears before the pronoun.<sup>3</sup>

- ✗ Ahmed told me that Dave and his office is always cold.
- ✓ Ahmed told me that Dave’s and his office is always cold.

## References

1. *The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:152.
2. Einsohn A. *The Copyeditor’s Handbook*, 3rd ed. Berkeley, CA: University of California Press; 2011:364.
3. The Chicago Manual of Style Online. <http://www.chicagomanualofstyle.org/qanda/data/faq/topics/PossessivesandAttributives/faq0007.html>. Accessed October 9, 2014.

# Kill or Sacrifice?

Euphemisms (substitutions of inoffensive terms for offensive terms) are useful in social situations but should generally be avoided in biomedical writing because they are imprecise and can be distracting.

A common euphemism in biomedical writing is *sacrifice* in place of *kill*:

- ✗ We sacrificed 10 mice from the temozolomide-treated group.

Unfortunately, this sentence conjures up a rather amusing (or frightening) image for many readers. *Sacrifice* has more than one meaning, but its primary definition is “an act of offering to a deity something precious; especially: the killing of a victim on an altar.”<sup>1</sup>

Of course, the animals used in scientific experiments are not killed using ceremonial daggers, but the secondary meanings of *sacrifice* (“something offered in sacrifice; destruction or surrender of something for the sake of something else; something given up or lost”<sup>1</sup>) may not be the first to enter readers’ heads.

So what should you use instead? The 10th edition of the *AMA Manual of Style*<sup>2</sup> recommends the use of *kill* (“to deprive of life: cause the death of”<sup>1</sup>) or *kill humanely*:

- ✓ We killed 10 mice from the temozolomide-treated group.

Another option may be *euthanize*: “[to kill or permit] the death of hopelessly sick or injured individuals (as persons or domestic animals) in a relatively painless way for reasons of mercy.”<sup>1</sup>

Of course, you should also specify how the animals were killed:

- ✓ Mice will be anesthetized using carbon dioxide gas and killed by cervical dislocation.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:432, 686, 1094.
2. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:409.

# Know When to -Fold 'Em

The suffix *-fold* is perhaps the most misused of all affixes in scientific writing. *-Fold* has two meanings: (1) multiplied by (a specified number) or times and (2) having (a specified number of) parts.<sup>1</sup> The second meaning is not used very often (“Our purpose in conducting this study was threefold: to determine whether alternative signaling pathways exist, to test possible inhibitors of such pathways, and to quantify . . .”). The first meaning, on the other hand, is used (and misused) abundantly. Most frequently, confusion arises because *-fold*, like the idea of multiplication, implies an increase. And if not used carefully, the suffix can be confusing or even create logical impossibilities.

Let’s start with a straightforward example. Logically, if *-fold* means *times*, then a onefold decrease would mean that the resulting amount was zero ( $A - [1 \times A] = 0$ ). “Once something decreases 100 percent, it’s *gone!*” points out Bill Walsh, a copy editor at the Washington Post.<sup>2</sup> With that in mind, consider:

- ✗ The amount of protein expressed by the treated cells was decreased 2.4-fold relative to baseline.

It is difficult to determine what this sentence means. If “2.4-fold” means “multiplied by 2.4,” then the amount of protein after treatment would be calculated like this: baseline amount – (2.4 × baseline amount) =  $-1.4 \times$  baseline amount, which leads to confusion: How can you have a negative amount of expression?

What the writer probably means is that the baseline amount was 2.4 times the final amount (baseline =  $2.4 \times$  final); thus, the amount of protein expressed by the treated cells was  $1/2.4$  (or about 42%) what it was originally. A more straightforward way to express the decline would be to simply use the fraction (or its decimal equivalent) or to write something like:

- ✓ The amount of protein expressed by the treated cells was about 42% of the baseline level.

Therefore, we advise you not to use *-fold* when you mean that something is getting smaller. The sentences that result from such attempts will confuse the reader. We also advise you to stay away from *-fold* when an increase is meant because what is written may be imprecise or easily misinterpreted.

- ✗ We found a 12-fold increase in the incidence of metastases in rats exposed to the toxin.

The author probably means that the incidence in exposed rats was 12 times that in unexposed rats. But “increase” implies that something was added to another thing, so the author might mean that the incidence in exposed rats = incidence in unexposed rats + (12 × incidence in unexposed rats) = **13** × incidence in unexposed rats.

Again, writing to express the amount as a relative value (“the incidence in exposed rats was 12 times that in unexposed rats”) or as a percentage (“the incidence in exposed rates was 1200% that in unexposed rats”) would be much more straightforward.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:485.
2. Walsh B. *Lapsing Into a Comma: A Curmudgeon’s Guide to the Many Things That Can Go Wrong in Print—and How to Avoid Them*, 1st ed. New York: McGraw Hill; 2000:38.

# The Last Word on *Last*

Is the *last follow-up* the most recent follow-up before the time of writing or the final follow-up of a series? *Last* means *final*; however, it is often imprecisely used to mean *most recent* or *latest*.

When referring to the nearest past event or instance in a series that has the potential to continue into the future, say *most recent* or *latest*. When referring to the final event or instance in a series that will not continue any further, say *last* or *final*.

- ✓ We again found no evidence of disease at the patient's last follow-up, so he was discharged.
- ✓ More employees take time off during the last week of each month than during other weeks.

- ✓ His most recent CT study showed shrinkage of the tumor, so we will continue to administer the same chemotherapy regimen.

- ✓ The latest issue of the journal came out yesterday.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:702.

# Latinisms

Do you write about *Mus musculi* (laboratory mice) in your research papers? Do you make visits to your *alma mater* (fostering mother, or the college you attended), from which you may have graduated *summa cum laude* (with highest distinction)? Do you rush to get home from work by 7 p.m. (*post meridiem*, or after midday) to feed your pets, e.g. (*exempli gratia*, or for the sake of example), your *Canis lupus* (dog), *Felis catus* (cat), or *Cavia porcellus* (guinea pig)?

Latin is all around us. Here are some commonly used Latin terms that are helpful to know when reading or writing articles about medical research.

Something that is *a priori* is formed or conceived beforehand.

- ✓ The experiment proved that his *a priori* expectations regarding the usefulness of the drug were correct.

The abbreviation *i.e.* stands for *id est* and means *that is*.

- ✓ The chemotherapy regimen was particularly effective among the youngest patients in our study (i.e., those  $\leq 25$  years old).

The term *in vivo* refers to something in the living body of a plant or animal.

- ✓ To test the bone graft substitute *in vivo*, we injected it into 10 rats and x-rayed their legs 4 weeks later to see if their bones had fused.

The term *in vitro* refers to something outside the living body and in an artificial environment.

- ✓ Before testing the antibiotic in live rats, we tested it *in vitro* in a cell culture.

*Per se* means *by, of, or in itself* or *as such*.

- ✓ Although the procedure was not responsible *per se* for the failure of the skin graft, it was certainly a contributing factor.

An item given or received *quid pro quo* is given or received for something else.

- ✓ We established a mutually beneficial *quid pro quo* arrangement with our sister university. We sent them 50 of our nude mice, and they sent us 50 of theirs.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003.



# Lay or Lie?

Although the verbs *lay* and *lie* are closely related, they are used in distinctly different ways.

*Lay* is a transitive verb, meaning that the subject of the sentence performs an action on something else (i.e., a direct object).

- ✓ He lays [present tense] the instruments on the table.
- ✓ She was laying [past progressive tense] the books on a chair as he walked in.
- ✓ They laid [past tense] their bags on the floor.
- ✓ They had laid [past perfect tense] the books on the floor.

In this context, *lay* is similar in meaning and usage to *place* or *set*. The past tense of *lay* is *laid*.

Unlike *lay*, *lie* is an intransitive verb, so the subject is being acted on (and there is no direct object).

- ✓ The instruments lie [present tense] on the table.
- ✓ The books were lying [past progressive tense] on a chair.

- ✓ She was lying [past progressive tense] on the floor.

Here, *lie* is similar in meaning and usage to *rests* or “is/are in a horizontal position.” Unfortunately, the simple past tense form of *lie* is *lay*, which is often a source of confusion between the two verbs.

- ✓ The bags lay [past tense] on the floor.
- ✓ Yesterday, he lay [past tense] in the hospital bed.
- ✓ She had lain [past perfect tense] in bed all week.

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# Leach or Leech?

*Leech* and *leach* are easily mistaken for each other because they look and sound similar. However, these two words have very different meanings.

A *leech* is a freshwater-dwelling parasite that usually has a flattened body with a sucker.<sup>1</sup>

- ✓ In 2004, the Food and Drug Administration approved the medical use of leeches.
- ✓ After swimming in the nearby lake, the girl was shocked to find that a leech had attached itself to her foot.

A *leech* also can refer colloquially to a person who seeks parasitic relationships that enable him or her to benefit from other people's work or resources.

- ✓ Maria was tired of John's being a leech; this was the third time that he had taken credit for a project's success without contributing much of anything.

*Leach*, on the other hand, describes the process of separating soluble components out by percolation.<sup>2</sup>

- ✓ The researcher observed that lead had leached out of the soil and into the nearby river.
- ✓ She now uses an aluminum water bottle because plastic bottles might allow BPA to leach into the water.

*Leach* also can be used metaphorically to describe something "remove[d] as if by percolation."<sup>2</sup>

- ✓ He felt as though the conference had leached all the energy from him.

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1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:709.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:706.

# Lead or Led?

In this column, we frequently write about homophones—words that sound the same but mean different things. The words we consider in this entry, however, are two sets of homophones (with a noun and a verb in each set) and three homographs—words that are spelled the same but mean different things (two nouns and a verb). All those words boil down to these two spellings: *lead* and *led*.

Here are the words along with the pronunciations, parts of speech, and definitions most often encountered in scientific writing:

1. lead (pronounced “leed”), noun: “position at the front”<sup>1</sup>
2. lead (pronounced “led”), noun: “a bluish-white soft malleable ductile plastic but inelastic heavy metallic element”<sup>1</sup>
3. lead (pronounced “leed”), verb: “to guide on a way, especially by going in advance; to direct on a course or in a direction”<sup>1</sup>
4. led (pronounced “led”), verb: past tense of the verb “lead”<sup>2</sup>

One of the most frequent mistakes that occurs is use of the spelling *lead* when the past tense verb *led* is what the writer intends. The confusion arises because the two words can be pronounced the same.

So a writer may write, “The lack of a marker for residual disease lead to early termination of treatment” because she has the right pronunciation (“led”) but has used a noun spelling rather than the spelling for the past tense verb.

To decide what spelling is correct, then, the writer has to think about not just the meaning of the word but also the part of speech (noun versus verb) and, when a verb is needed, tense (present versus past). Some examples should help:

- ✓ Dr. Mitchell is the lead [def. 1] on the project.
- ✓ The lead [def. 2] used in paints still found on the walls of older homes can cause cognitive deficits in children who ingest paint chips.
- ✓ Smoking leads [def. 3] to lung cancer.
- ✓ The lack of any responses in the first 10 patients led [def. 4] to an early closure of the trial.

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1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:706.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:709.

# Loose or Lose?

*Loose* and *lose* have similar spellings and thus appear similar when written out; however, these words differ in pronunciation and in meaning.

*Loose* (which rhymes with moose) most often is used as an adjective to describe something that is at least in part “free from... confinement, restraint, obligation,” or interpretation.<sup>1</sup> *Loose* should be used to describe something that is not securely attached or that has “worked partly free of attachment”<sup>1</sup> and moves somewhat without restraint. *Loose* can also refer to something that is slack (not tightly stretched) or “not tight-fitting” or to refer to something that is “not dense, close, or compact in structure or arrangement.”<sup>1</sup> Other uses of *loose* include to indicate something that is lacking in restraint (including moral restraint, precision, or care) or that allows freedom of interpretation.<sup>1</sup>

In a medical context, *loose* can refer to something that is “not solid” or “watery or overactive, as indicated by frequent voiding, especially of watery stools.”<sup>1</sup> *Loose* can also be used to indicate something (such as a cough) that is produced freely and that raises mucus.

- ✓ The door did not work properly because the doorknob was loose.
- ✓ The girl wore loose-fitting clothing when she exercised.
- ✓ After being caught, the thief had a loose tongue and told the police all the details of the robbery.
- ✓ The judge had a loose interpretation of the laws involved in the case.

- ✓ A known side effect of the medication is gastrointestinal distress and loose stools.
- ✓ The patient had a loose cough that produced excessive phlegm.

*Lose* (which rhymes with news, choose, or fuse) is a verb that in general expresses deprivation of something, an inability or failure to find something or someone, a failure to win something, or a failure to keep or hold something, especially something of value. Some common meanings of *lose* are “to miss from a person’s possession or from a customary location”; to be deprived of or to part with accidentally or unexpectedly or by death or final separation (referring to a person); “to undergo defeat,” fail to sustain, or “fail to keep control of”; to miss one’s bearings or way; or to become withdrawn from reality.<sup>2</sup> *Lose* is also used in various idiomatic expressions, such as “lose your way” (to go astray), “lose weight” (get rid of), “lose ground” (give up the advantage), “lose it” (become overwhelmed with emotion, become out of touch with reality, go crazy), and “lose your heart” (fall in love). In a medical context, *lose* is sometimes used to mean “be deprived of.”<sup>2</sup>

- ✓ My neighbor always loses his car keys.
- ✓ She never expected to lose her parents in a traffic accident.
- ✓ The man tried not to lose his temper during the discussion.
- ✓ We’ve waited long enough; there is no more time to lose.

- ✓ Sometimes you can lose yourself in daydreams.
- ✓ Explore the area, but be careful not to lose your way.
- ✓ The injured girl is talking with the paramedics, and we do not think she will lose consciousness.
- ✓ As cats age, they sometimes lose their sense of smell.

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1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:735.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:736.

# Maintaining Parallelism in Lists of Cancers

Careful writers use parallel structure to list actions or items concisely and efficiently. According to the *AMA Manual of Style*, in presenting a series or making comparisons, “the elements of the series or of the comparison should be parallel structures, e.g., nouns with nouns, prepositional phrases with prepositional phrases.”<sup>1</sup>

This holds true for presenting lists of cancers, in which disease names should be parallel.

- ✗ Colorectal, leukemia, lung, and breast cancer are prevalent in this tiny population of islanders.

Here, one can determine whether the items are parallel by pairing each item in the list (“colorectal,” “leukemia,” “lung,” and “breast”) with the word it modifies (“cancer”). If any of the word pairs are redundant or nonsensical, the list must be modified. Here, “colorectal cancer,” “lung cancer,” and “breast cancer” all make sense, but “leukemia cancer” does not, so the sentence must be altered.

- ✓ Colorectal cancer, leukemia, lung cancer, and breast cancer are prevalent in this tiny population of islanders.

- ✓ Colorectal, lung, and breast cancers and leukemia are prevalent in this tiny population of islanders.

It is also important to avoid mixing cancer sites with cancer types in lists.

- ✗ Cancers of the abdomen, brain, and osteosarcomas are also common among residents of this remote outpost.

“Cancers of the osteosarcomas” is nonsensical, so the sentence must be adjusted.

- ✓ Abdominal cancers, brain cancers, and osteosarcomas are also common among residents of this remote outpost.
- ✓ Osteosarcomas and cancers of the brain and abdomen are also common among residents of this remote outpost.

## Reference

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:326.

# Making Clear Comparisons

Scientific writing often contains comparisons. To ensure that these comparisons are clear, writers should follow four general rules.

First, it is important to state explicitly what the variable is and what the groups are. For example, the sentence “We found lower levels of the X gene in patients with skin tumors” does not contain enough information. Does the author mean “We found lower levels of the X gene than of the Y gene in patients with skin tumors” or “We found lower levels of the X gene in patients with skin tumors than in patients without skin tumors”?

Second, it is important to be clear about what the difference is. Consider the following example:

- ✗ Expression of the X gene in ABC cells was increased compared with DEF cells.

This sentence is problematic because the word “increased” is vague. Does the author mean that the X gene increased in ABC cells but not in DEF cells or that expression of the X gene was higher in ABC cells than in DEF cells?

Here is another example:

- ✗ The prognosis of the subset of patients with CNS metastases and mutation of the Z gene was significantly improved.

This example both contains a vague term of comparison, “improved,” and lacks an explicit statement of what is being compared. Here is a clarified version of the sentence:

- ✓ The prognosis of the subset of patients with CNS metastases and mutation of the Z gene was significantly more favorable than that of patients with CNS metastases but no Z gene mutation.

The third rule of comparisons is that the items in each part of the comparison should be in the same order (i.e., the sentence should have parallel construction), and the terms used should be the same. Look at the following sentence:

- ✗ Group 1 had a response rate of 29% compared with 45% responding in group 2.

In this example, the order in which the group and the response rate are stated is reversed, and the terms of comparison are different (“response rate of 29%” versus “45% responding”).

Here are two ways to express this comparison:

- ✓ Twenty-nine percent of patients in group 1 responded, compared with 45% in group 2.
- ✓ Response rates in group 1 and group 2 were 29% and 45%, respectively.

Last, when writing comparisons, ensure that the groups or items being compared are as close together as possible. This can eliminate the need for vague referents, such as “that” in the following example:

- ✗ Because the immune system of younger patients with colon cancer is more reactive than that of older patients...



This phrase can be rewritten as follows:

- ✓ Because the immune system is more reactive in younger patients with colon cancer than in older patients with colon cancer....

Don't worry about being too repetitive when stating comparisons. Because the conclusions of your work often rest on the results of

such comparisons, it is well worth a few extra words to ensure that these comparisons are stated clearly.

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# Making Compound Nouns Plural

Most English nouns can be made plural by simply adding *s* or *es* to the end of the singular form. However, proper placement of the *s* or *es* can be challenging for the large group of nouns called compound nouns.

A compound noun is a combination of two or more words that form a single noun. The words forming the compound noun can themselves be almost any part of speech. Many compound nouns are so frequently used that you may not even notice that they are made up of two words, for example, *nosebleed*, *spreadsheet*, or *motorcycle*. Compound nouns can be written as one word (*greenhouse*), as two words (*waiting room*), or as a hyphenated word (*runner-up*).

The plurals of compound nouns are formed by adding the marker of the plural (usually *s* or *es*) to the end of the main—or most important—word in the compound. Often, the main word falls at the end of the compound noun, so the plural of the compound noun is formed just like that of other nouns.

- ✓ Migraines can be treated with over-the-counter painkillers or with triptan medications.
- ✓ School was cancelled because of yesterday's blizzard, so the children went outside to build snowmen.

In some hyphenated or two-word compound nouns, the main word does not fall at the end of the compound noun. Nonetheless, the plural ending is added to this main word.

- ✓ Janet's sisters-in-law threw a surprise party for her birthday. [*Sister* is the main word in the hyphenated compound noun *sister-in-law*, so *sister* takes the *s* to make the compound plural, even though it is the first word in the compound.]
- ✓ When the man collapsed in the parking lot, two passers-by performed CPR until paramedics arrived. [The main word in the compound noun *passer-by* is *passer*, so it takes the pluralizing *s*.]

Many such terms have to do with law and politics or indicate a title or rank: *attorney general*, *sergeant major*, *heir apparent*, *president-elect*, *notary public*, *editor-in-chief*.

- ✓ Three former surgeons general signed the statement calling for an increase in funding for smoking cessation research.
- ✓ The soldiers will be subject to courts martial for being AWOL last month.

Some compound nouns do not contain a noun at all, making it challenging to identify the main word. For instance, *output*, *hideout*, and *follow-up* consist of a verb and an adverb. In these cases, the word is made plural just as if it were a regular, noncompound noun.

A dictionary can resolve any uncertainty about how to form the plural of a compound noun.

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# Media or Medium?

The terms *medium* and *media* are often seen in biomedical articles, most commonly in the Methods section. The two terms are unrelated when *medium* is used as an adjective (e.g., “the patient had a medium build”). However, in most cases, the terms are related when *medium* is used as a noun.

*Medium* has various definitions, but the one most relevant to biomedical researchers is a substance frequently used in laboratory procedures, such as a culture medium. When authors describe the use of a medium in reports of their research, however, confusion between *medium* and *media* can result.

The confusion about *medium* and *media* can be remedied by remembering this simple rule: one medium but more than one media. Specifically, *media* is the plural form of the word *medium*, just as *data* is the plural form of *datum*.

- ✗ The cells were cultured in liquid and solid bacterial growth medium.

- ✓ The cells were cultured in liquid and solid bacterial growth media.
- ✓ The cells were cultured in both liquid bacterial growth medium and solid bacterial growth medium.
- ✗ The media containing the cells was centrifuged.
- ✓ The medium containing the cells was centrifuged.
- ✓ The media containing the cells were centrifuged.

As with so many English rules, this one has its exceptions. The most common exception is that *media* is commonly a singular term when used to describe the print and broadcast journalism industry.

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*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:770, 771.

# Militate or Mitigate?

*Militate* and *mitigate* look much alike, but because they have different meanings, they cannot be used interchangeably.

*Militate* means “to have weight or effect”<sup>1</sup> and is followed by a preposition (usually *against*). Because *militate* is an intransitive verb, it cannot be followed by a direct object (i.e., *militate* cannot be followed immediately by a noun). *Militate* is often used when evidence points strongly against something.

- ✓ John’s inability to control his temper militates against his promotion.
- ✓ The severe toxic effects of the drug militate against its use for prophylaxis.

*Mitigate*, on the other hand, means “to cause to become less harsh or hostile” or “to make less severe or painful.”<sup>2</sup> Synonyms for *mitigate* include *alleviate*, *extenuate*, *excuse*, *relieve*, and *reduce*.<sup>2</sup> *Mitigate* is often used when talking about extenuating or excusing

circumstances. The transitive verb *mitigate* must be followed by a direct object when used in the active voice.

- ✓ The high complete response rate mitigates the inconvenience of the regimen.

In a passive-voice sentence, the direct object precedes *mitigated by*.

- ✓ John’s angry outburst is mitigated by his recent family tragedy.

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1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:788.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:796.

# Misconceptions About Passive Voice

Traditionally, writing experts have encouraged authors to use active voice instead of passive voice—that is, to construct sentences in which the subject performs the action (active voice) rather than receiving the action (passive voice). For example, “the biomarker mediates the association” is preferred over “the association is mediated by the biomarker.” Sentences written in the active voice are thought to be more straightforward and concise and to more effectively emphasize the subject or focus of the sentence. However, the passive voice can be the better choice in certain situations.

In scientific writing, the passive voice is often acceptable—and even preferred—because it allows authors to place less emphasis on themselves (and their actions and roles) and more emphasis on their research and the results of their experiments. This is particularly true when describing materials and methods. For example, “We then incubated the reaction mixtures for 10 minutes at 25°C” (active voice) emphasizes the performer (we), which

isn’t particularly important here, rather than what happened: “The reaction mixtures were then incubated for 10 minutes at 25°C” (passive voice). Similarly, “The cells were centrifuged” is probably a better choice than “We centrifuged the cells.” In addition, the passive voice may be useful when the agent carrying out an action is not known.

Of course, if your goal is to assert authority, then use the active voice. “Our group is the first to show that...” is far more authoritative than “...was first shown by our group.”

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# The Misuse of “Literally”

The misuse of the word *literally* (and complaints about the practice) is very common—in fact, the issue is so well known that the word is often misused on purpose as a joke. How should *literally* be used?

*Literal* means “adhering to fact or to the ordinary construction or primary meaning of a term or expression” or “free from exaggeration or embellishment.”<sup>1</sup> The opposite of *literal* is *figurative*, meaning “expressing one thing in terms normally denoting another with which it may be regarded as analogous.”<sup>2</sup> In this context, *figurative* is synonymous with *metaphorical*.

Consider the following example:

- ✓ When her husband told her to take a hike, Barbara took him literally and headed for the nearest trail.

“Take a hike” is a common idiom used to rudely tell someone to go away. In this sentence, Barbara interpreted what her husband said literally—as a suggestion that she go for a walk.

Using *literally* with a figurative expression can have unintentionally humorous effects:

- ✓ I was glued to my seat the whole time.
- ✗ I was literally glued to my seat the whole time.
- ✓ She was so angry, her head exploded!
- ✗ She was so angry, her head literally exploded!

In these examples, the addition of *literally* indicates that the speaker was physically glued to the chair and that the woman’s head actually exploded. Assuming these events did not occur, the word *literally* was being used inappropriately.

A common but controversial use of *literally* is to “emphasize the truth and accuracy of a statement or description.”<sup>1</sup>

- ✓ I slept for literally 9 hours straight last night.
- ✓ The little girl was so happy that she literally jumped up and down on the spot.

In these sentences, *literally* is being used for emphasis; however, it is not needed because no meaning is lost if *literally* is omitted.

Using *literally* for emphasis can introduce ambiguity: “You are literally the funniest person I have ever met” and “That was literally the biggest burger I’ve ever eaten!” could be true statements, or they could be exaggerations.

*Literally* is not commonly used in scientific writing, but it does appear. In this sentence, *literally* is being used for emphasis; it can be omitted without affecting the meaning of the sentence.

- ✓ At high resolution, literally thousands of individual fields can be inspected in a single stained tissue section.

In the following examples, *literally* is being used to point out that a common metaphorical expression should be considered actually true; this is a correct use of *literally*.

- ✓ In activity therapy, patients literally move toward mental health.<sup>3</sup>
- ✓ Overall survival duration has become the gold standard for determining the benefit of cancer treatment—it is literally the “test of time.”

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2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:467.
3. Martin J. In activity therapy, patients literally move toward mental health. *Phys Sportsmed* 1977;5:84–89.

# Moral or Morale?

The words *moral* and *morale* differ by only one letter, but these words have very different meanings.

*Moral*, as an adjective, means ethical or virtuous. *Moral*, as a noun, means the ethical message or practical lesson that the audience should understand after reading or hearing a story (e.g., a fable).

- ✓ Mahatma Gandhi once said, “Cowards can never be moral.”
- ✓ The moral of the story is that honesty is the best policy.

*Morale* is a noun that means the enthusiasm, confidence, or sense of purpose of a person or group of people.

- ✓ The principal investigator brought a pie to the lab meeting to raise the morale of the research team.
- ✓ Morale was high when the NIH funded the grant proposal.

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*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:807.

# Mucous or Mucus?

*Mucus* and *mucous* are just as different as *cancer* and *cancerous*; just as *cancerous* means relating to cancer, *mucous* means relating to mucus. In general, a word with the suffix *-ous* is an adjective that means possessing, full of, or relating to the referent of the root word.<sup>1</sup> Thus, switching *mucus* and *mucous* will always change the meaning of the sentence the word is in (and may result in nonsensical syntax).

The noun *mucus* means “the free slime of the mucous membranes, composed of secretion of the glands, along with various inorganic salts, desquamated cells, and leukocytes.”<sup>1</sup>

The adjective *mucous* means “covered with mucus,” “secreting, producing, or containing mucus,” or pertaining to mucus in any other way.<sup>1</sup>

- ✗ The common cold can increase the production of mucous in the upper respiratory tract.

- ✗ Melanoma sometimes develops on a mucus membrane.
- ✓ A goblet cell is a mucous gland that comprises only one cell.
- ✓ Land snails use a layer of mucus to traverse surfaces.
- ✓ The protective lining was mucous. [The protective lining was covered with or secreting mucus.]
- ✓ The protective lining was mucus. [The protective lining was itself composed of mucus.]

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1. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:1187.

# Nauseated or Nauseous?

One of the most common side effects of cancer treatment is also the source of an all too frequently misused term. How often do we hear a person complaining that he or she is *nauseous*? While this usage is very common and not at all confusing in everyday speech, careful scientific writers will avoid it in their manuscripts.

*Nauseous* should be used only when describing something that causes nausea, for example, a chemotherapeutic drug, a disease, or perhaps even a gruesome scene in a horror movie. In such cases, the term would be used thus:

- ✓ Researchers found the drug to be nauseous in the study population.
- ✓ Inner ear infections are often nauseous in pediatric patients.

Because this wording may sound funny to readers who are used to the incorrect usage, you could also write something like “Researchers found the drug caused nausea in the study population.”

When describing the condition of having nausea, the correct term is *nauseated*, that is, acted upon by something that nauseates. This usage is in line with descriptions of other conditions: pupils can be dilated, tissues can be inflamed, and patients can be nauseated.

- ✓ The majority of the study population reported that they were nauseated after taking the drug for at least 2 days.
- ✓ When the children in our clinic say that they feel nauseated, we test them for inner ear infections.

Unfortunately, the incorrect term is used much more often than the correct one. Just be warned that if you tell someone you’re *nauseous*, you might be greeted with the response “I know. You make me sick to my stomach.”

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# None Are or None Is?

Which of the following is correct?

None of the suspected mutations is present in the sample.

None of the suspected mutations are present in the sample.

Despite widespread belief to the contrary, *none* can be either singular, taking a singular verb such as *is*, or plural, taking a plural verb such as *are*. The correct verb depends on the writer's intent.<sup>1-4</sup>

To decide whether to use a singular verb or a plural verb with *none*, consider whether the actions or qualities attributed to *none* by the sentence in which it appears fit something singular or something plural. Also, try replacing *none* with “not one” and “not any” (with *any* considered to be plural).<sup>2</sup> If “not one” sounds better, then treat *none* as singular in that case; if “not any” sounds better, then it may be appropriate to treat that instance of *none* as plural. If the context does not clearly indicate singularity or plurality, as in the example at the beginning of this article, then either is correct. When in doubt, treat *none* as singular; the singular *none* is more common than the plural *none*.

- ✓ None of the variables was significantly associated with longer survival. [Singular; each variable was considered alone.]
- ✓ None were able to complete the three-legged race without falling over. [Plural; the minimum “unit” is two people.]

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# Normal? Just What Do You Mean by That?

The words *normal* and *abnormal* appear from time to time in biomedical and scientific writing, for instance, in sentences like this:

- ✗ Normal mice were used as controls.

Although the sentence is grammatically correct and even makes sense, it doesn't tell the reader anything particularly useful about the controls. The mice used as controls are probably different from their counterparts in some meaningful way (in this case, the mice may not have tumors or a particular genetic feature), but *normal* won't convey the meaning as precisely as some other options. There is also the question of subjectivity—what is normal to me may seem quite aberrant to you—but that's another matter.

If you want to ensure that your writing is precise and informative, we recommend that you specify the characteristic of interest. So for the example above, you might write:

- ✓ Non-tumor-bearing mice were used as controls.
- ✓ Mice without the *Cdk2* mutation were used as controls.

In addition, the *AMA Manual of Style*<sup>1</sup> cautions against using the words *normal* and *abnormal* to describe a person's health status:

- ✗ We recruited 60 patients with breast cancer and 60 age-matched normal participants.

- ✓ We recruited 60 patients with breast cancer and 60 age-matched healthy participants.

*Normal* and *abnormal* are also sometimes mistakenly used in constructions like these:

- ✗ The immunoassay was normal.
- ✗ An abnormal screen for the gene was done.

In these cases, the sentences literally state that the tests themselves were normal or abnormal when the author really means something like this:

- ✓ The results of the immunoassay were normal.
- ✓ The screening test found that the gene was mutated.

Use of *normal* and *abnormal* may be appropriate when describing conditions that apply to a group (“This pattern of radiotracer uptake is abnormal for cases of resistant disease”) and is clearly acceptable when describing the results of standard laboratory tests that have population-normed ranges of values (“Her blood pressure was normal”). In most other cases, though, a more informative word is preferred.

## Reference

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:381, 382.

# Not Only...But Also

*Not only...but also* is a pair of correlative conjunctions. Like all conjunctions, correlative conjunctions join elements in a sentence, but correlative conjunctions are particularly useful in sentences that are structurally complex or in which a simple conjunction (“and,” “but,” “or”) might lead to confusion.<sup>1</sup> Usage expert Theodore Bernstein points out that correlative conjunctions must connect “elements of the same grammatical value and in parallel form,” whether they be nouns, adjectives, phrases, or complete clauses.<sup>2</sup>

- ✓ The fish not only swims but also jumps.
- ✓ These data not only show a previously unknown aspect of the Sonic Hedgehog pathway but also suggest a novel therapeutic target.

The most common mistake writers make in using correlative conjunctions is misplacing them so that the things being joined are not of the same grammatical value or form.

- ✗ Systemic chemotherapy has had limited efficacy in treating glioblastomas not only because the drugs have difficulty permeating the blood-brain barrier but also the electric charges of the drugs.

The two parts of the sentence introduced by the correlative conjunctions (“because the drugs have difficulty permeating the blood-brain barrier” and “the electric charges of the drugs”) are

not parallel (the first is a complete clause and the second a noun phrase).

- ✓ Systemic chemotherapy has had limited efficacy in treating glioblastomas because of not only the impermeability of the blood-brain barrier but also the electric charges of the drugs.

The phrases introduced by correlative conjunctions (“the impermeability of the blood-brain barrier” and “the electric charges of the drugs”) are parallel.

When using *not only...but also*, writers also sometimes erroneously introduce redundancy.

- ✗ We purchased antibodies not only to pERK but also to ERK2 as well.

“Also” and “as well” are redundant; in this case, the writer must choose one of the two or simply write “We purchased antibodies to pERK and ERK2.”

## References

1. *The Chicago Manual of Style*, 15th ed. Chicago, IL: University of Chicago Press; 2003:255.
2. Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*. New York, NY: The Free Press; 1998:293–296.

# Oral or Verbal?

Knowing whether to use the word *oral* or *verbal* in phrases such as “oral communication” or “verbal instructions” isn’t easy. Even dictionaries don’t always clearly distinguish between the two words. For example, *oral* is defined as “uttered by the mouth or in words,”<sup>1</sup> whereas *verbal* can mean “consisting of words” but can also mean “spoken rather than written,”<sup>2</sup> which seems very much like the meaning of *oral*.

One way to distinguish the two words is that *oral* always means spoken, whereas *verbal* can mean spoken or written.

When choosing between *oral* and *verbal* to refer to spoken communication in your writing, the use of either word would be correct. However, since *verbal* has two possible meanings—either spoken words or communication with words, but not necessarily spoken words—its meaning can be ambiguous in some situations.

Therefore, when you want to convey the meaning of communication by speaking, the word *oral* would be the clearer

choice.<sup>3</sup> In other words, if an agreement is spoken, not written, the use of “oral agreement” is more precise than the use of “verbal agreement.”<sup>4</sup>

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:872.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1389.
3. *American Heritage Dictionary of the English Language* (Houghton Mifflin). <https://education.yahoo.com/reference/dictionary/entry/verbal>. Accessed August 13, 2014.
4. Strunk W Jr, White EB. *The Elements of Style*, 3rd ed. Needham Heights, MA: Allyn & Bacon; 1979:63.

# Overall, Disease-Free, or Progression-Free Survival?

The various metrics used to report survival data—such as disease-free survival or disease-specific survival—can be confusing to readers and writers alike, and not being clear about which metric you are using just adds to this confusion. The metric used for reporting survival data is usually determined by a study’s endpoints. Below are some of the most frequently used measures of survival.

Let’s begin with *overall survival*, which the National Cancer Institute defines as “the length of time from either the date of diagnosis or the start of treatment for a disease, such as cancer, that patients diagnosed with the disease are still alive.”<sup>1</sup> Overall survival does not distinguish between disease-related death and death from other causes. This metric might be used in a large clinical study because it includes deaths from treatment side effects.

*Disease-specific survival*, also called *cause-specific survival*, is defined as “the length of time from either the date of diagnosis or the start of treatment for a disease, such as cancer, to the date of death from the disease.”<sup>1</sup> Patients who died from causes other than the disease being studied are not included. This metric is frequently used when other causes of death (e.g., comorbid conditions) might be expected to skew survival data, but it is sometimes criticized as an endpoint because it disregards deaths caused by the treatment.

*Disease-free survival* is “the length of time after primary treatment for a cancer ends that the patient survives without any signs or symptoms of that cancer.”<sup>1</sup> This measures not only whether patients are alive but also whether their disease returns or recurs. Disease-free survival is often an endpoint in clinical studies of new therapies.

Similarly, *progression-free survival* is “the length of time during and after the treatment of a disease, such as cancer, that a patient lives with the disease but it does not get worse.”<sup>1</sup> Progression-free survival is often an endpoint in studies in which patients have metastatic or advanced disease.

*Relative survival* is defined as “the ratio of the proportion of observed survivors (all causes of death) in a cohort of cancer patients to the proportion of expected survivors in a comparable cohort of cancer-free individuals.”<sup>2</sup> In other words, it’s the ratio between the hazard ratios for people with and without cancer. The National Cancer Institute uses this measure in reporting Surveillance, Epidemiology and End Results data.

When reporting survival data, be as precise as possible. Specify the survival metric being used and whether you are reporting the duration or the rate.<sup>3</sup>

- ✓ Patients in the treatment group had a 75% 5-year overall survival rate.

- ✗ Patients in the treatment group had a 75% survival rate. [Neither the survival metric nor the time period is given.]
- ✓ Median disease-free survival times were 13 and 10 months for patients in the treatment and control groups, respectively.
- ✗ Patients in the treatment group had longer survival (median, 13 months) than patients in the control group (10 months). [The survival metric is not given.]

## References

1. Dictionary of Cancer Terms. National Cancer Institute at the National Institutes of Health. <http://www.cancer.gov/dictionary>. Accessed October 24, 2012.
2. Surveillance Research. National Cancer Institute at the National Institutes of Health. <http://surveillance.cancer.gov/survival/measures.html>. Accessed October 24, 2012.
3. Survival, Survival Time, or Survival Rate? Word for Word. <http://inside2.mdanderson.org/w4w/2011/11/survival-survival-time-or-surv.html>. Accessed October 24, 2012.

# Overdue or Overdo?

The adjective *overdue* and the verb *overdo* both carry the idea of “excess” or “too much,” but besides that, only their pronunciation is the same. Their meanings are distinct and their usage very different.

Although neither of these words appears frequently in scientific writing, it is useful to know which is which because a spell checker won’t tell you whether you have chosen the right one.

Of the two, *overdue* is the more frequently used. The most familiar use is probably the one referring to a failure to return library books at the specified time; when the borrower holds them for too long, they are said to be overdue. However, *overdue* can be used more generally to indicate that something has not happened when it was supposed to or when it would have been desirable.<sup>1</sup>

- ✓ The patient was overdue for her annual exam when she called to report unusual bleeding.
- ✓ I am overdue for a haircut; my bangs are almost to my chin.

- ✓ Can you proofread these pages quickly? The manuscript is already overdue to the publisher.

*Overdo* indicates that something is being done or cooked too long, too much, or too intensely. The word often suggests the idea of exhaustion or saturation. *Overdo* may also mean “to use in excess.”<sup>1</sup>

- ✓ Don’t overdo it on your run today; the weather is very hot.
- ✓ If you overdo the steak, it will be tough and unappetizing.
- ✓ He tends to overdo the cologne when he’s trying to impress someone.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:884.



# Overly Precise Percentages

What's wrong with the following statement?

- ✗ Twenty-three (85.19%) of 27 patients responded to the experimental treatment.

In this example, the answer is that carrying the percentage to two decimal places suggests a level of precision, meaning, or importance that isn't supported by the data. What would 0.19% of 27 patients be? Only 1/20th of a patient—not a meaningful clinical “unit.”

In general, when reporting percentages, you should round off the percentages to whole numbers (e.g., 85%) when your denominator (total number of subjects or events) is 20–99. When your denominator is 100 or greater, you can report percentages to one decimal place (e.g., 85.2%); and when your denominator is 1,000 or greater, you can report percentages to two decimal places (e.g., 85.19%).

What about when your denominator is less than 20? Percentages are rarely helpful in such cases and should generally not be reported at all. In fact, percentages derived from very small

denominators can be misleading. For example, reading that 50% of patients with advanced pancreatic cancer survived longer than 3 years with a new treatment might be exciting, but learning that the 50% in fact represented only 1 of 2 patients would be a letdown.

When you have a mix of large and small denominators, the Council of Science Editors recommends that you report all percentages with the number of decimal places supported by the smallest denominator:

- ✓ Twelve (40%) of 30 male patients and 97 (46%) of 212 female patients survived longer than 10 years after diagnosis. [Because the smaller denominator is 30—well under 100—no decimal places should be reported with the percentages.]

## Bibliography

*Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 7th ed. Reston, VA: Council of Science Editors; 2006:183.

# Palate, Pallet, or Palette?

It can be tricky to tell apart *palate*, *pallet*, and *palette*. They look similar and sound almost the same, and taking a random guess will land you on the wrong word two-thirds of the time.

*Palate* refers literally to the roof of the mouth and metaphorically to taste or preferences. Of the three words, it is the one most commonly used in medical writing.

- ✓ Patients with head and neck cancer sometimes undergo reconstruction of the soft palate.
- ✓ When a restaurant franchise expands internationally, it may tailor its menu to the palates of its new customers.

*Pallet* most often means either a straw-filled mattress or a portable wooden platform used for carrying things.

- ✓ Each prisoner was given a rough pallet to sleep on.

- ✓ The empty pallets on the seaside dock awaited the incoming cargo.

*Palette* means a range of available elements, such as colors for painting; it also means the thin board that a painter holds and mixes paints on.

- ✓ The artist contemplated her half-finished painting and then mixed two colors on her palette into a new hue.
- ✓ Experimental electronic music can make use of a broad palette of sounds.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:834–835.

# Passed or Past?

*Passed* and *past* sound alike and have related definitions, but they are different parts of speech and therefore are used differently.

*Past* is the more frequently used of the two words. As a noun, *past* refers to a time period before the present day:

- ✓ Cancer researchers look to the past when analyzing the benefits of a new treatment in relation to previous techniques.

As an adjective, *past* indicates an event that happened previously:

- ✓ Cancer researchers analyze past techniques to determine the benefits of new treatments.

As a preposition, *past* indicates that something has traveled near and then beyond the object of the preposition:

- ✓ The surgeon ran past the desk on the way to the emergency room.

Finally, *past* can also be used as an adverb to indicate that an action involves coming near and then going beyond the observer:

- ✓ Some cancer researchers were talking to each other as the surgeon ran past.

On the other hand, *passed* is almost always used as a past-tense verb that indicates something has moved (relative to

something else or from one place to another). Put another way, *passed* indicates that the action of passing happened previously.

- ✓ The rate of disease-specific death in the control mice passed that in the treated mice by week 10.
- ✓ The infection passed from patient to patient by means of direct contact with blood or blood products.

Both words may appear in the same sentence:

- ✓ The nurse walked past the patient before he passed the forceps to the surgeon.

To quickly distinguish the two words, remember that *passed* is almost always a verb and that *past* is never a verb.

## Bibliography

Garner BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:612.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:905, 906.

# Peak, Peek, or Pique?

Peak, pique, or peek?

*Peak*, *peek*, and *peek* sound alike but have different meanings.

The most common of these three words, *peak*, can mean “the top of a hill or mountain ending in a point” or, more broadly, “the highest level or greatest degree.”<sup>1</sup> In the latter sense, *peak* can be used as a noun, adjective, or verb.

- ✓ We enjoyed the vista of miles of mountain peaks.
- ✓ The peak of the curve represents the time of maximum energy output.
- ✓ Peak absorption occurred at a wavelength of 400 nm.
- ✓ Pulmonary function was measured using peak expiratory flow rate.
- ✓ During peak hours, staffing levels will be increased.
- ✓ The side effects peaked between the third and fourth doses.

Many writers use *peak* when they really mean *peek*, “to excite or arouse.”<sup>2</sup> This verb is often followed by the word *interest* or *curiosity*. *Pique* also has another, less common meaning; as a noun or verb, *peek* can relate to a feeling of anger, resentment, or wounded pride.<sup>2</sup>

- ✓ One goal of the Specific Aims section of a grant application is to pique the reviewers’ interest in the proposed project.

- ✓ The article piqued my curiosity about inflammatory factors in cancer.
- ✓ After a moment of pique when she received the reviewers’ comments, she calmed down and decided to revise the manuscript.

Finally, the word *peek* denotes “a furtive look” or “a brief look.”<sup>3</sup> It can be used as a noun or verb. This word is somewhat informal and is rarely used in business or scientific writing.

- ✓ We’ll get a sneak peek of the new facility on Tuesday.
- ✓ The entomologist peeked through the leaves, hoping to glimpse the rare western glacier stonefly.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:911.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:943.
3. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:913.

# People or Persons?

*People* and *persons* have the same meaning—more than one human being<sup>1,2</sup>—and either is correct in scientific writing.

The word *people* is the most typical form used in both speaking and lay writing. According to Merriam-Webster’s online dictionary for English learners, “The plural of *person* is usually *people* except in formal or legal contexts, where the plural is often *persons*.”<sup>3</sup> The Council of Science Editors recommends using *people* for a general group and *persons* for a specific number of individuals.<sup>4</sup> However, in common practice and in scientific journals such as *Cancer Research* and *Journal of Clinical Oncology*, both *people* and *persons* are regularly used to refer to a specific number of individuals.

Thus, it would be correct to use either *people* or *persons* in any of the following examples:

- ✓ We seek to reduce the rate of infection among people with chronic illness.
- ✓ People older than 60 years are considered at greater risk of disease.
- ✓ The disease affected 130 people last year.
- ✓ Policy 4.266 covers the rights of older persons with disabilities.
- ✓ We are studying the health issues of displaced persons.

When the word *people* is used in an anthropological or sociological context (e.g., “the Navajo people”), the word can itself be made plural. In this context, the word *peoples* refers to groups “united by a common culture, tradition, or sense of kinship that typically have common language, institutions, and beliefs, and that often constitute a politically organized group.”<sup>1</sup>

- ✓ Infection rates have fallen among the indigenous peoples of the continent.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:860.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:867.
3. Merriam-Webster Learner’s Dictionary website. <http://www.learnersdictionary.com/search/person>. Accessed February 10, 2014.
4. *Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 7th ed. Reston, VA: The Rockefeller University Press; 2006:95.



# Percent, Percentage, and Percentage Point

*Percent* (often indicated with the symbol %) means “per hundred” and is used to indicate specific proportions.

- ✓ Of the 30 cell lines examined, 10 (33%) expressed high levels of HER2.

To indicate the general concept of proportion expressed in hundredths without indicating a specific proportion, use *percentage*, not *percent*:

- ✗ We determined the percent of patients with reactivation of hepatitis B viral replication after treatment with rituximab.
- ✓ We determined the percentage of patients with reactivation of hepatitis B viral replication after treatment with rituximab.

*Percentage point* is used to describe differences between percentages.

- ✓ The proportion of men who reported engaging in moderate- or high-intensity exercise at least 3 hours per week increased from 10% at baseline to 33% at the end of the study, an increase of 23 percentage points.

Special care is necessary when *percent* and *percentage point* are used to describe changes. A percent change is derived by subtracting a baseline value from a final value and dividing the result by the baseline value. A percentage point change is derived by subtracting one percentage from another percentage.

- ✓ If a particular woman’s baseline lifetime risk of cancer is 10%, an exposure that increases that risk by 10 percent would result in a lifetime cancer risk of 11%. However, an exposure that increases that risk by 10 percentage points would result in a lifetime cancer risk of 20%.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:830, 831.

Cohn V, Cope L. *News and Numbers*, 2nd ed. Ames, IA: Iowa State University Press; 2001.

*Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:918.



# Periodic or Periodical?

Even expert writers are sometimes confused by *-ic* and *-ical* endings on words used as adjectives. Contemporary usage has evolved through custom, and thus there is no hard and fast rule about when each ending is correct. In many cases, the endings (and the word meanings) are interchangeable, such as *anatomic/anatomical* and *immunologic/immunological*, although most dictionaries of U.S. English prefer one or the other. However, some *-ic/-ical* word pairs each have distinct meanings, and previous columns have covered some of those pairs (for example, *classic/classical* and *historic/historical*).

*Periodic/periodical* falls into the second group. These words share the same root, and both have meanings associated with regular intervals, but the terms are used in different ways.

*Periodic*, an adjective that refers to something that occurs at regular, predictable intervals, might refer to a time interval or to a series of events, processes, or symbols. The adverb form is *periodically*.

- ✓ We receive periodic updates on our travel expenditures.
- ✓ The engineers were confounded by the periodic vibrations.

- ✓ The birds return periodically to their nesting grounds.

*Periodical* was once used interchangeably with *periodic* as an adjective. In current usage, *periodical* is reserved almost exclusively to convey regularly occurring publication, especially as a noun referring to communications that are published at fixed, regular intervals, such as magazines, journals, and newspapers.

- ✓ We met by chance in the periodicals room at the public library.
- ✓ Many periodicals are shifting to online-only publication.

## Bibliography

*AMA Manual of Style*, 10th ed. New York: Oxford University Press; 2007:396.

*Merriam-Webster's Collegiate Dictionary*, 10th ed. Springfield, MA: Merriam-Webster; 2000:862.

# Practicable or Practical?

*Practicable* and *practical* sound similar and also have similar—but not identical—meanings. It’s therefore unsurprising that writers often confuse the two terms.

*Practicable* is an adjective that most commonly means “capable of being put into practice or of being done or accomplished”<sup>1</sup>; a synonym for this use of the word is “feasible.”

- ✓ Given the lack of resources and time, these experiments were not practicable.

*Practical*, also an adjective, means “of, relating to, or manifested in practice or action; not theoretical or ideal.”<sup>1</sup> Another meaning of *practical* is “capable of being put to use” or “useful.”<sup>1</sup>

- ✓ The research assistants implemented several practical solutions to the problem of waste in the laboratory.

To choose correctly between *practical* and *practicable*, try substituting the synonyms *useful* and *feasible* in the sentence: If *useful* makes more sense, then *practical* is the best choice. If *feasible* makes more sense, then *practicable* is the best choice. You can also determine which word to use by looking at the noun that is being modified by the adjective. If you are writing about people or skills, *practical* is usually the best adjective. If you are writing about plans or actions, *practicable* is usually the best choice.

## Reference

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:974.

# Precede or Proceed?

*Precede* and *proceed* look similar, sound similar, and have some similar-sounding definitions, but the two words are not interchangeable.

*Precede* means “to be, go, or come ahead or in front of” or “to be earlier than.”<sup>1</sup>

- ✓ Chronic liver disease often precedes the development of hepatocellular carcinoma.
- ✓ Each treatment is preceded by a complete blood count.
- ✓ The preceding department chair had been here since the 1970s.

*Proceed* means “to begin and carry on an action, process, or movement” or “to move along a course.”<sup>2</sup>

- ✓ If surgery does not remove all of the tumor, we will proceed with radiotherapy.
- ✓ The study proceeded in two stages.

- ✓ On the basis of our preclinical data, we are proceeding with a clinical trial.

A common noun form of *proceed* in the academic setting is *proceedings*, meaning “an official record of things said or done.”<sup>2</sup>

- ✓ Abstracts for the talks were published in the conference proceedings.

Now, just for fun, test yourself: Like many of our [preceding/proceeding] readers, we hope that you will [proceed/precede] to choose the correct word from here on out.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:976.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:990.

# Precedence, Precedent, or Precedents?

Despite their phonetic similarities, *precedence* and *precedent* have different meanings. And *precedents* is simply the plural of *precedent*.

*Precedence* is a noun that refers to something that occurs earlier or is dealt with sooner because of its importance.<sup>1</sup>

- ✓ In the emergency department, the patient with a heart problem takes precedence over the patient with a sprained wrist.
- ✓ It is not ethical to give patients precedence on the basis of their wealth.

On the other hand, when used as a noun, *precedent* refers to an event in the past that justifies a present or future decision or action. This usage is most common in legal writing.<sup>1</sup>

- ✓ The lawyers cited last year's *White versus Smith* case as a precedent when they argued that Dr. Doe should not be tried for malpractice.
- ✓ According to legal precedents, the pharmaceutical company violated patent law.

*Precedent* is also an adjective that means “prior in time, order, arrangement, or significance.”<sup>1</sup> However, this use is rare.

- ✓ The doctor used a precedent case to support her diagnosis.

## Reference

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:976.

# Precision in Number Ranges

Certain statistical analyses require discrete groupings of continuous data. For example, patients may be divided into age groups or by laboratory test results to determine whether these factors contribute to the risk of developing a certain condition.

- ✓ Age 0–50 years or 51–80 years
- ✓ Total cholesterol <200 mg/dL or  $\geq$ 200 mg/dL

When such groups are used, the cutoff points that divide groups must be clear. In the examples above, data points falling at the cutoff point clearly fit into one group or the other. In the first example, a patient aged 50 years fits into the first group; and in the second example, a patient with total cholesterol of 200 mg/dL fits into the second group. However, the need to include the cutoff point in one (and only one) group is sometimes overlooked when data are summarized in a table or text for a manuscript.

- ✗ Age 0–50 years or 50–80 years
- ✗ Total cholesterol <200 mg/dL or >200 mg/dL

In the first example, patients aged 50 years could be placed in either group. In the second example, those with total cholesterol of 200 mg/dL do not clearly fit into either group. Even if no patients in the study were exactly 50 years old or had total cholesterol of 200 mg/dL, including the specific cutoff point in a group is important for a reader to be able to interpret the data and apply the methods to future research.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:787.

# Prepositions: What to End a Sentence With

Is it true that sentences should never end with a preposition?

The answer is no. Ending a sentence with a preposition, such as *to*, *on*, *for*, *with*, or *about*, is not inherently incorrect.

To decide where to place a preposition, choose the option that is the least confusing. Often, the clearest option is the one that results in the least complicated sentence, and that may be the one with the preposition at the end.

- ✓ The findings gave us a new hypothesis to talk about.
- ✓ The findings gave us a new hypothesis about which to talk.
- ✓ During tumor excision, healthy organs can be barriers one must work around.
- ✓ During tumor excision, healthy organs can be barriers around which one must work.
- ✓ We don't know what they are looking for.

- ✓ We don't know for what they are looking.
- ✓ Ask not whom the bell tolls for.
- ✓ Ask not for whom the bell tolls.
- ✓ Come aboard!
- ✓ Come aboard the ship!

Bear in mind that your adherence to the “rule” that sentences should not end with a preposition may matter to some readers; if you are not willing to give the reader an excuse (even a silly one) to criticize your writing, do not put prepositions at the end of your sentences.

## Bibliography

Fowler HW. *A Dictionary of Modern English Usage*, 2nd ed. New York, NY: Oxford University Press; 1965:473–475.



# Prescribe or Proscribe?

What a difference one letter makes! Although their similar spellings make the words *prescribe* and *proscribe* easy to confuse, their meanings are almost opposite.

*Prescribe* can mean “to lay down a rule” or “to write or give medical prescriptions.”<sup>1</sup> *Proscribe* means “to condemn or forbid as harmful or unlawful.”<sup>2</sup>

An easy rule of thumb is that you *prescribe* something beneficial but *proscribe* something harmful, as seen in the following examples:

- ✓ The doctor prescribes amoxicillin to treat ear infections.

- ✓ The combination of a sedative and an antihistamine was proscribed.
- ✓ The new law proscribes smoking in restaurants.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:981.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:997.

# Principal or Principle?

The words *principal* and *principle* are often confused. Two of the most common mistakes are illustrated in the phrases *the principals of good conduct* (which should use *principles*) and *her principle occupation* (which should use *principal*). Here are some of the most common correct uses for these words.

## Principal

*Principal* can be used as a noun or an adjective.

As a noun, *principal* usually refers to a person who has controlling authority (the principals in the project) or a person who is in a leading position (as in an educational institution: the principal of an elementary school. The familiar mnemonic in this case is *the principal is your pal*.). *Principal* also has specialized meanings in law and finance.

As an adjective, *principal* refers to something of primary importance, consequence, or influence (the principal pathway for the repair of DNA damage; the principal signaling protein).

A common biomedical use of *principal* is as an adjective in the term *principal investigator* (PI), the scientist who directs a research project or program.

## Principle

*Principle* is used only as a noun and has several meanings:

(1) A basic and fundamental truth, law, or doctrine (the principles of democracy)

(2) A rule or law concerning the functioning of a natural phenomenon or the function of a complex system (the principle of apoptosis)

(3) A basic rule or standard of good behavior or a belief about what is right and morally good (a person of principle)

(4) An essential ingredient (such as a chemical) in a drug that imparts a characteristic quality (the active principle of a drug)

(5) As part of the phrase *in principle*, which means “with regard to fundamentals although not concerning details.” For example, if you agree to something *in principle*, you are in favor of it based on what you know so far—the principle, or the idea, seems good to you. *In principle* can also refer to something that is possible in theory but not yet proven. (In principle, there is no reason why we can’t duplicate his findings in our laboratory.)

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American Heritage Dictionary of the English Language. Houghton Mifflin. <http://education.yahoo.com/reference/dictionary/entry/principle>. Accessed October 5, 2011.

*Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:987.

# Purposely or Purposefully?

The words *purposely* and *purposefully* are very similar. Their spellings and their dictionary definitions are so alike that they are easily confused.

But they do have distinct meanings and are not interchangeable.

*Purposely* means “intentionally” or “deliberately.” When you want to say something was done “on purpose,” *purposely* is the correct choice.

- ✓ We purposely exposed the cell cultures to extremes of temperature.
- ✓ Joe didn’t purposely leave the door unlocked.

Confusion arises because some dictionaries give “intentionally” as one of the definitions of *purposefully*. However, *purposefully* is usually used to mean “resolutely,” “with determination,” or “with a specific goal.” When you are determined to accomplish something, you act *purposefully*.

- ✓ The research assistants searched every cupboard purposefully but could not find the missing mouse.
- ✓ Jean approached the buffet table purposefully, plate in hand.

## Bibliography

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*Merriam-Webster Collegiate Dictionary*, 10th ed. Springfield, MA: Merriam-Webster; 2000:947.

# Quotation Marks? So-Called? Using New and Unconventional Terms

Before a new biomedical term becomes fully established, it may go through a period of semiofficial use. Quotation marks can be used to indicate that a term is novel and has not yet gained acceptance or that a term is in some way unconventional even though it's widely used.

- ✓ Interactions between the “virobiota” and the immune system were beyond the scope of our study.
- ✓ We used a “sandwich” immunoassay to compare antigen levels.

In the first example, the quotation marks indicate that *virobiota* is a relatively novel term. In the second example, the quotation marks indicate that *sandwich* is used figuratively.

The adjective *so-called* can be used instead of quotation marks with terms that are unconventional or that may be unfamiliar to many of your readers.

- ✓ These so-called nude mice, which lack T cells, do not reject xenografts.

- ✓ A compacted precipitate can be removed from a beaker with a so-called rubber policeman.

Quotation marks should not be placed around a term preceded by *so-called*. Writers should also avoid using *so-called* or quotation marks with a term after its initial mention in a document. For a biomedical audience, well-known biomedical terms (such as *nude mice* or *sandwich immunoassay*) don't need quotation marks or *so-called* even at first mention.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:361.

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:341.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1183.

# Quotation Marks with Other Punctuation Marks

When you use quotation marks, where should other punctuation marks be placed in relation to the closing (final) quotation mark? Most American and Canadian publishers adhere to the following guidelines.

Periods and commas appear before the closing quotation mark.

- ✓ On the title page, please declare potential conflicts of interest, or state, “The authors have no potential conflicts to declare.”
- ✓ In their article “Frontiers in targeted therapy,” Chaturvedi and colleagues describe several exciting new approaches.

Colons and semicolons appear after the closing quotation mark.

- ✓ He has published in each of the “big three”: *Cell*, *Nature*, and *Science*.
- ✓ The brochure had referred to Houston as “a cosmopolitan metropolis”; however, when he walked out of the airport into the August humidity, it occurred to him that “swamp” would be a more adequate description.

Question marks and exclamation points appear after the closing quotation mark unless they are part of the material being quoted, in which case they should appear before the closing quotation mark.

- ✓ Who coined the phrase “the guardian of the genome”?
- ✓ The first talk in this series is “Mammography: When Should Screening Be Started?”

Note: The style described here is followed by many United States and Canadian publications<sup>1</sup> and is recommended in the American Medical Association style guide.<sup>2</sup> Many publications in the United Kingdom and Australia and some in the United States use a different style.<sup>1</sup> In that style, periods and commas appear before the closing quotation mark only if they appeared in the original material being quoted; otherwise, periods and commas appear after the closing quotation mark. This other style is recommended in the Council of Science Editors style guide,<sup>1</sup> which some basic science journals follow.

## References

1. *Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 7th ed. Reston, VA: Council of Science Editors; 2006:131.
2. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:359.



# Radiography or Radiology?

The terms *radiography* and *radiology* are frequently interchanged, but usually inappropriately. Much of the confusion about when to use which word probably comes about because there is some overlap between them.

*Radiography* has the more restrictive definition, referring specifically to the technique of using ionizing radiation (e.g., x-rays and gamma rays) to create images of internal structures of the body. This term is a near-synonym for *roentgenography*, which is only infrequently used now.

- ✓ Radiography is the conventional method for assessing broken bones.

*Radiology*, in contrast, is a rather broad term, with several meanings. Frequently it is used to refer to the more general class of imaging types—those that use ionizing radiation and those that do not (e.g., sonography and magnetic resonance imaging are included in the class of radiologic techniques). *Radiology* can also refer to the practice of studying such images to diagnose disease and plan treatments. Furthermore, the term *radiology* can be used to describe radiation-guided treatment itself (as in interventional radiology).

But when it comes to describing the physicians who work with these various imaging techniques, only radiology is referred to (i.e., the physician is called a *radiologist*).

- ✗ The patient's physician requested that a radiography specialist analyze the magnetic resonance images.
- ✓ The patient's physician requested that a radiologist analyze the magnetic resonance images.
- ✗ Radiographic techniques such as sonography are already in widespread clinical use and therefore are well suited to the real-time assessment proposed here.
- ✓ Radiologic techniques such as sonography are already in widespread clinical use and therefore are well suited to the real-time assessment proposed here.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:401.

*Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:1572, 1573.



# Raise or Rise?

The verbs *rise* and *raise* have different uses and are not interchangeable.

In biomedical writing, *rise* is most often used to mean *increase*, and it is always intransitive—i.e., it does not have a direct object.<sup>1</sup>

- ✓ We hypothesized that cerebrospinal fluid protein levels would rise in infected mice.
- ✓ The patient's body temperature rose to 39.8°C yesterday but subsided today.
- ✓ We watched the water rise over the banks of Brays Bayou.

The verb *raise* can also be used to mean *increase*, but it is transitive—i.e., it has a direct object (a noun that is being acted on).<sup>2,3</sup>

- ✓ The board of directors voted unanimously to raise their president's salary. [*Salary* is the direct object.]
- ✓ The antiretroviral regimen raised CD4 T-cell counts by >50% in 92 of 124 patients. [*Counts* is the direct object.]
- ✓ The 5K walk was organized to raise awareness of the importance of breast cancer screening. [*Awareness* is the direct object.]

- ✓ When Sally found out that tanning bed use raises the risk of skin cancer, she immediately stopped going to the salon. [*Risk* is the direct object.]

Other meanings of *raise* include “stimulate the production of,” “bring up for consideration,” “rear,” and “breed.”<sup>2</sup>

- ✓ We used monoclonal antibodies raised [i.e., stimulated] in rabbits instead of those raised in mice.
- ✓ Smith et al. were the first to raise [i.e., bring up] the possibility that protein Q is involved in prostate cancer progression.

As the above examples illustrate, *rise* and *raise* are most likely to be confused when the idea of increase needs to be conveyed. Such confusion can be dispelled by keeping in mind that *raise* acts on something but *rise* does not.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1075.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1028.
3. *Oxford Dictionaries*. [http://www.oxforddictionaries.com/us/definition/american\\_english/raise](http://www.oxforddictionaries.com/us/definition/american_english/raise). Accessed October 29, 2014.

# Rational or Rationale?

They look similar, and they share a common foundation—so it is easy to confuse *rational* and *rationale*. But *rational* is an adjective, whereas *rationale* is a noun.

*Rational* describes something that is based on reason. The term is commonly used to describe sensible behavior or thinking. You may also be familiar with *rational*'s antonym (opposite), *irrational*.

- ✓ He didn't seem to have a rational argument for avoiding the event.
- ✓ Our decision to continue the program was rational because its benefits outweighed its costs.

A *rationale* is the reasoning behind a policy, practice, or decision.

- ✓ The study's authors did not provide their rationale for selecting that particular treatment.
- ✓ The manager outlined her rationale for cutting the department's office supply budget at the weekly meeting.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1032.

# Reconstruct or Repair?

The verbs *reconstruct* and *repair* are often used interchangeably in descriptions of plastic surgery procedures, but choosing the wrong term can inadvertently convey the opposite of your intended meaning.

*Reconstruct* has a very narrow meaning: “to establish or assemble again” or “to subject (an organ or part) to surgery to re-form its structure or correct a defect.”<sup>1</sup> Synonyms for *reconstruct* include *rebuild* and *re-create*.

*Repair*, in the context of surgery, means “to restore by replacing a part or putting together what is torn or broken,” “to restore to a sound or healthy state,” or “to make good, compensate for.”<sup>2</sup> Synonyms for *repair* include *fix*, *renew*, and *mend*.

You can reconstruct or repair a body part. Both of the following are correct:

- ✓ We reconstructed the patient’s chest wall.
- ✓ We repaired the patient’s chest wall.

However, when talking about the wound or defect created by ablative surgery, only *repair* should be used to describe the correction of the wound or defect itself:

- ✗ We used a TRAM flap to reconstruct the defect created by mastectomy. [Here, substituting a synonym for *reconstruct* demonstrates that the sentence means the opposite of what is intended: “We used a TRAM flap to re-establish the defect...” or “We used a TRAM flap to re-create the defect....”]
- ✓ We used a TRAM flap to repair the defect created by mastectomy. [“We used a TRAM flap to fix the defect....”]
- ✓ We used a TRAM flap to reconstruct the breast after mastectomy. [“We used a TRAM flap to re-create the breast....”]

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1040.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1055.

# A Recurring Problem: Recur and Relapse

You hear it in the clinic: “Mr. Smith relapsed” or “this patient is a recurrence.” It’s a succinct and convenient way for clinicians and clinic staff to communicate important information about a patient. However, this kind of verbal shorthand, or jargon, does not belong in formal scientific writing. Whether it’s cancer or an ear infection, it’s the disease, not the patient, that relapses or recurs.

“The patient relapsed” is an example of dehumanizing language. This usage artificially conflates the human being with the disease. Furthermore, it does not directly say exactly what condition relapsed or recurred. Save the verbs *relapse* and *recur* for diseases, symptoms, and signs.

- ✗ About 25% of the patients with this cancer relapse after first-line therapy.
- ✓ This cancer relapses in about 25% of patients after first-line therapy.
- ✗ Most patients recurred within 4 weeks of treatment.
- ✓ The symptoms recurred in most patients within 4 weeks of treatment.

There is an exception to this rule: when writing about addiction and substance dependence, statements such as “the patient

relapsed” are acceptable. In such a case, relapse involves the patient’s actions, making it permissible to attribute agency to the patient.

- ✓ Most smokers relapse at least once before quitting permanently.

*Relapse* and *recur* also can be used in their noun forms.

- ✓ Relapse after first-line therapy is relatively uncommon, occurring in about 25% of patients.
- ✓ About 25% of patients experience relapse after first-line therapy.
- ✓ Disease recurrence in this group usually presents as nausea and vomiting.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:408.

*Publication Manual of the American Psychological Association*, 6th ed. Washington, DC: American Psychological Association; 2009.

# Redundancy

A redundancy is a term or phrase that unnecessarily repeats words or meanings. In certain instances, careful repetition of key words and sentence structures can establish, emphasize, or clarify connections in our writing. However, unnecessary words and phrases reduce readability, slow the reader, and lengthen an article while adding nothing to its clarity or meaning.<sup>1</sup> In scientific writing especially, wherein the content is complex and clarity and efficiency are paramount, writers should strive to eliminate redundancies.

To help authors identify and eliminate excess verbiage from their writing, we have listed some commonly used redundancies below. This list focuses on phrases in which one of the words repeats the meaning (stated or implied) of another word in the phrase (by definition). The redundant words are in bold and can be deleted.

## Redundant Phrases

- ✗ **Advance** planning—*planning* implies action before the event, so *advance* is superfluous.
- ✗ **Close** proximity/scrutiny—*proximity* means “close in location,” and *scrutiny* means “close study,” so *close* is unnecessary.
- ✗ During **the course of**—*during* means “in or throughout the duration of,” so *the course of* can be deleted.
- ✗ **Difficult** dilemma—a dilemma by its nature is complicated, so *difficult* as a modifier is not needed.

- ✗ **End** result—because a result occurs at the end of something, *end* can be omitted.
- ✗ **Fellow** colleagues
- ✗ Few **in number**
- ✗ **Past** history/record—by definition, a history is a record of past occurrences, and a record is documentation of what has already happened. In both cases, *past* is redundant.
- ✗ Red **in color**
- ✗ **Skin** rash
- ✗ **Therapeutic** treatment—in the sense of medical care, treatment is by nature therapeutic.<sup>2</sup>

## Redundancy in Acronyms and Initialisms

Acronyms and initialisms are abbreviations formed from the initial components in a phrase or a word. Redundancy in such constructions is common, possibly because the abbreviation is often perceived as a modifier rather than as the complete term. The result is that a word in the construction is often literally represented twice. Examples include:

- ✗ ATM machine—automatic teller machine **machine**
- ✗ MRI imaging—magnetic resonance imaging **imaging**

- ✗ NDA application—New Drug Application **application**
- ✗ PCR reaction—polymerase chain reaction **reaction**
- ✗ RAM memory—random access memory **memory**
- ✗ RECIST criteria—response evaluation criteria in solid tumors **criteria**<sup>2</sup>

## References

1. About.com. <http://grammar.about.com/od/words/a/redundancies.htm>. Accessed September 15, 2012.
2. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press, 2007:405–407.



# Referring to Age and Sex in Biomedical Writing

Although age and sex are general demographic characteristics with which we are all familiar, precise words are needed to avoid confusion when describing these characteristics in biomedical writing. Consider the following examples:

- ✓ The study population included 75 men and 60 women. The median age was 53 years (range, 34–78 years).
- ✓ The control group consisted of 25 girls and 20 boys, ranging in age from 4 to 11 years.

In these examples, specific terms have been used to describe the sex and age of the study participants. According to the *AMA Manual of Style*, the words *men* and *women* refer to adults aged 18 years or older, whereas *boy* and *girl* refer to children aged 1–17 years. However, when a study population does not fit into these precise age categories, less precise terms such as *male* and *female* may be needed when referring to sex.

- ✓ Sixteen female patients and 25 male patients, ranging in age from 11 to 37 years, participated in the study.

It is best to avoid using the terms *male* and *female* as nouns.

- ✗ Thirty-six females and 24 males, ranging in age from 36 to 75 years, participated in the study.
- ✓ Thirty-six women and 24 men, ranging in age from 36 to 75 years, participated in the study.

Other age-related terms that may be used include *neonate* (aged <1 month), *infant* (aged 1 month to 1 year), and *teenager* or *adolescent* (aged 13–17 years).

- ✓ The study group included 12 adolescent boys and 14 adolescent girls.
- ✓ Thirteen male infants were included in the study.
- ✓ The study included 20 male neonates and 15 female neonates.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:410, 416.

# Refrain or Restrain?

Although *refrain* and *restrain* have a similar general meaning, these verbs differ in their usage. The act of *refraining* is usually performed on oneself, while the act of *restraining* is usually performed on another person or thing.

*Refrain* means to keep yourself from doing or indulging in something that you want to do. Often, *refrain* is followed by the preposition *from*.

- ✓ For a weight loss program to succeed, one must refrain from reverting back to unhealthy habits.

*Restrain* means to limit or restrict another person or thing from doing, exhibiting, or expressing something.

- ✓ When performing first aid on someone who is having a grand mal seizure, you should never try to restrain his or her movement.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1046, 1063.

# Regarding *Regardless* and *Irregardless*

The word *regardless* implies that something has occurred in spite of something else.

- ✓ Regardless of short-term side effects, all patients recovered from the surgery.

The word *irrespective* is a synonym of *regardless*.

- ✓ Irrespective of the treatment received, most patients developed metastatic disease.

Perhaps because these words sound similar and mean the same thing, the term *irregardless* sometimes appears where *regardless* or *irrespective* is intended.<sup>1</sup> However, *irregardless* is not a word.

- ✗ Irregardless of disease stage, most patients experienced adverse effects from the treatment.

If *irregardless* shows up in your writing, change it to *regardless* or *irrespective* instead.

- ✓ Regardless of the treatment received, most patients developed metastatic disease.
- ✓ Irrespective of disease stage, most patients experienced adverse effects from the treatment.

## Reference

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:662.

# Regime or Regimen?

You may often see the words *regime* and *regimen* used interchangeably in popular media to describe diet and fitness fads. You may even find that the dictionary states that the terms are synonymous. But in scientific writing, the terms have very different meanings.

According to *AMA Manual of Style*, *regime* means “a form of government, a social system, or a period of rule,” and *regimen* means “a systematic schedule (involving, for example, diet, exercise, or medication) designed to improve or maintain the health of a patient.”<sup>1</sup> *Regime* is infrequently used in reports of scientific research (with the possible exceptions of histories and opinion pieces).

- ✗ Patients with colorectal cancer began a chemotherapy regime consisting of 5-fluorouracil, oxaliplatin, and leucovorin.
- ✓ The FOLFOX regimen has been found to have benefit in many patients with colorectal cancer.

- ✓ The participants were instructed to follow a regimen of regular aerobic exercise (minimum of 30 minutes/day) and adequate hydration (minimum of 64 fluid ounces of water/day).

BONUS: A regiment is “a military unit consisting usually of a number of battalions,” according to *Merriam-Webster’s Collegiate Dictionary*.<sup>2</sup> *Regiment* is almost never used in scientific writing, unless one is writing about, say, the incidence of podobromhidrosis among the Sutherland Highlanders during the Crimean War.

## References

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:401.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1048.

# Reign or Rein?

*Rein* and *reign* are often confused not only because they sound the same but also because they have related, but distinct, meanings. Often these words are used figuratively.

A *rein* is a strap attached to the mouth of an animal, usually a horse, to give it directions such as to turn or to slow down. Used figuratively, *rein* means to restrain or control:

- ✓ We should rein in our enthusiasm until we have validated these results.
- ✓ The new Chair took the reins of the department in January.

*Giving full rein* is an idiom that means “an opportunity for unhampered activity or use,”<sup>1</sup> as in giving a horse freedom from the control of the reins.

- ✓ The principal investigator gave full rein to his team to research their ideas.

*Reign*, however, means the rule or sovereignty of a king or queen or “the dominion, sway, or influence of one resembling a monarch.”<sup>1</sup> *Reign* also denotes the time period of a monarch’s rule.

- ✓ *The Emperor of All Maladies: A Biography of Cancer* chronicles cancer’s reign throughout the past 2500 years.
- ✓ Results from the Large Hadron Collider could call into question some of the reigning theories of physics.
- ✓ The reign of Queen Elizabeth I ended in 1603.

## Reference

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1049.

# Select or Selected?

The meaning of the word *select*, when used as a verb, is straightforward. To *select* means to choose something from several alternatives.<sup>1,2</sup> The past tense of this verb is *selected*.

- ✓ We will select [We selected] 200 patients for the study.

When *select* and *selected* are used as adjectives, however, these two words have different meanings and are often misused.

The adjective *select* means “specially chosen, of superior quality,”<sup>1</sup> “of special value or excellence,”<sup>3</sup> exclusive, or exceptional.

- ✓ A select group of researchers will present their findings at the conference.

The adjective *selected* refers to something that has been picked from a larger number of things. The reason that the item was selected, however, isn’t necessarily because of the item’s superiority but can usually be determined by the sentence context.<sup>4</sup>

- ✓ The medication will be given to selected patients.  
[The patients given the medication are not superior to the others; they happen to be the ones who will benefit most from the medication.]

- ✓ Researchers will estimate the lung cancer risk of workers engaged in selected occupations. [The occupations of workers selected for this study are not superior to other occupations; the researchers selected occupations that were relevant for their study.]

## References

1. Vocabulary.com, 2016. <https://www.vocabulary.com/dictionary/select>. Accessed June 24, 2016.
2. Macmillan Dictionary. 2016. [http://www.macmillandictionary.com/dictionary/american/select\\_1](http://www.macmillandictionary.com/dictionary/american/select_1). Accessed June 24, 2016.
3. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1125.
4. Daily Writing Tips. 2016. <http://www.dailywritingtips.com/select-vs-selected/>. Accessed June 24, 2016.



# Set up or Setup?

The correct use of *set up* versus *setup* requires keeping in mind that *set up* functions as a verb and *setup* functions as a noun. Thus, we *set up* (verb) something, and the *setup* (noun) is the result of our action.

- ✓ Clinical trials of this promising drug are being set up [verb] on five continents.
- ✓ The setup [noun] of the clinical trial at our hospital took 4 months.
- ✓ We will set up [verb] our melanoma screening booth in the main lobby.
- ✓ Ellen will coordinate the setup [noun] of the booth with Facilities staff.

This principle also applies to other verbs that are traditionally followed by *up* and the nouns that refer to those processes.

Examples include *follow up* (verb) and *follow-up* (noun); *back up* (verb) and *backup* (noun); and *break up* (verb) and *breakup* (noun). A dictionary can guide you in whether to use a hyphen in the noun form.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1140.

# Shall You Use *Will*? Or Will You Use *Shall*?

*Shall* and *will* are verbs that can be used to refer to events in the future or to give a command (e.g., “You will do as I say!”). Although it has largely fallen out of common use in American English, *shall* still has three remaining idiomatic uses.

*Shall* is still used in legal documents, where it indicates explicit obligation (although again, it is falling out of favor).

- ✓ The institutional review board shall have the authority to suspend or terminate approval of research that is not being conducted in accordance with its requirements.
- ✓ A judge shall accord to every person who has a legal interest in a proceeding, or that person’s lawyer, the right to be heard according to law.

*Shall* may also be used in inspirational speech or prose to indicate determination that a goal will be achieved.

- ✓ We shall be the premier cancer center in the world, based on the excellence of our people, our research-driven patient care, and our science.
- ✓ We shall fight on the beaches, we shall fight on the landing grounds, we shall fight in the fields and in the streets, we shall fight in the hills; we shall never surrender.

Third, *shall* may also be used to issue an invitation or request permission.

- ✓ Shall we dance? [issuing an invitation]
- ✓ Shall I take your coat, ma’am? [requesting permission]

In medical writing, the use of *shall* is rare. One is unlikely to use legalistic or inspirational language or to issue invitations or requests for permission in medical writing. When referring to future events in medical writing, then, it is best to use *will*.

- ✓ We cannot predict which HER2-positive breast cancer patients will benefit from trastuzumab.
- ✓ More than 10,000 physicians will attend the upcoming ASTRO annual meeting.

## Bibliography

Garner BA. *Garner’s Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:742.

*Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1143, 1433.

# Significant or Substantial?

In general use, *significant* can have any of several different meanings, but in biomedical writing, *significant* should almost always be restricted to the statistical sense.

In biomedical writing, the word *significant* alone is mostly used to mean *statistically significant*. Results that fit this definition should be accompanied by the supportive *P* value and confidence interval.<sup>1</sup>

- ✓ Using logistic regression analysis with adjustment for known risk factors for pancreatic cancer, we found that high background and hydrogen peroxide–induced micronuclei levels were significantly associated with an increased risk of pancreatic cancer (odds ratios [95% confidence intervals] of 5.06 [3.60–7.11] and 2.89 [2.04–4.09], respectively;  $P < 0.001$  for both).

In non-scientific statements, *significant* can convey having a special meaning, importance, notability, influence, a lasting effect,

or a size, amount, or number large enough to merit attention (but without statistical support).<sup>2</sup>

- ✓ The latest healthcare bill is by all accounts the most significant piece of legislation in the past 5 years.
- ✓ This landmark discovery will drive a significant change in genetic research going forward.

If the author means that a result or effect is clinically significant, that phrase or a similar one (e.g., *clinically meaningful*) should be substituted. In other cases, a word like *substantial*, *notable*, or *marked* may suffice. In these cases, supportive values are usually not needed.

## References

1. *Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 7th ed. Reston, VA: The Rockefeller University Press; 2006:189.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1159.

# Silicon or Silicone?

*Silicon* and *silicone* are easily confused because they sound similar and are related. To make matters more confusing, the spelling of the two words differs by only one letter.

*Silicon* is a naturally occurring, nonmetallic element that is frequently used in alloys and semiconductors.<sup>1</sup>

- ✓ Next to oxygen, silicon is the most abundant element in the Earth's crust.
- ✓ Silicon, because of its properties as a semiconductor, is often used in the computer industry.
- ✓ Silicon can chemically bond with living tissue and has the potential to be fully biodegradable.

*Silicone* refers to a variety of synthetic polymeric organic silicon compounds “comprising alternating silicon and oxygen atoms linked to organic radicals.”<sup>2</sup>

- ✓ Silicone is often used for catheters, feeding tubes, and facial prostheses (such as ears).

- ✓ Medical history was made when the first silicone elastomer tube was used to repair a duct during biliary surgery.

To remember the difference between these two words, look at the end of the word. *Silicon* (the shorter word) refers to the element alone and is used in specific compound names such as silicon dioxide (silica), silicon carbide, and silicon fluoride. *Silicone* with an e at the end (the longer word) is engineered and includes silicon, oxygen, and organic materials.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1160.
2. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:1717.

# Specifying Genus and Species Names

For many writers, specifying genus and species names in the correct format is a source of uncertainty. Remembering a few simple rules will make the task easier.

When writing the Latin name for an organism, capitalize the genus name, but write the species name in lower case. Both the genus and species names should be italicized.

✓ *Escherichia coli*

After the first mention of an organism's genus and species, the genus name may be abbreviated to a single capital letter.

✓ *Staphylococcus aureus* is a leading source of skin infections. Fortunately, most infections caused by *S aureus* heal without treatment.

Note that some journals, such as American Medical Association journals (e.g., *JAMA*), do not use a period after the abbreviated genus name, whereas others do require the period (*S. aureus*).

When the same genus name is used with more than one species name, the genus name should be spelled out when each species name is first mentioned.

✓ *Staphylococcus aureus* and *Staphylococcus epidermidis* may be components of normal flora or pathogens in clinically significant infections; in cases of infection, *S aureus* is the more serious pathogen.

When organisms with genus names that begin with the same letter are mentioned in the same article, the genus name is usually still abbreviated to one letter after the first mention of the organism.

✓ We have seen a decline in hospital infections caused by *Staphylococcus aureus* and *Streptococcus faecalis*, although *S aureus* and *S faecalis* remain common in many settings.

Note that sometimes the first two or three letters of each genus name or the full genus names are used at subsequent mentions if the editor or author believes the genus names could be confused.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:374, 377, 925.

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:438.

# Starting Sentences with Conjunctions

A coordinating conjunction is a word that is used to join similar grammatical elements, such as two nouns or two independent clauses. There are seven conjunctions in English: *and*, *but*, *or*, *yet*, *for*, *nor*, and *so*.

For decades, English teachers have been telling students that they should never begin a sentence with a conjunction. But this is one of many common writing myths. Beginning a sentence with a conjunction is not grammatically incorrect. In fact, placing the emphasis on the transition word—the conjunction—in a sentence can serve useful functions in casual and creative writing. For example, starting a sentence with a conjunction can create drama, show surprise, or indicate uncertainty.

- ✓ Miss Scarlett suspected Professor Plum had committed the crime. And she was right. [dramatic effect]
- ✓ But you didn't want any candy! [surprise]
- ✓ I'll have the chocolate cake. Or maybe I should have the pie instead. [second-guessing a decision]

Starting sentences with coordinating conjunctions is considered less acceptable in formal and business writing, which may call for more formal conjunctive adverbs. Conjunctive adverbs demonstrate relationships between clauses such as cause and

effect, sequence, contrast, and comparison. Common conjunctive adverbs are *however*, *moreover*, *in addition*, *although*, and *nevertheless*.

- ✓ Pancreatitis substantially increases patients' chances of developing pancreatic ductal adenocarcinoma. However, most patients with pancreatic adenocarcinoma do not have pancreatitis.

If you begin a sentence with a coordinating conjunction, always make sure that the relationship between the material that precedes it and the material that follows it is clear. In other words, be sure to pick the correct coordinating conjunction. In the first example below, it is unclear how the second sentence relates to the first—why did the teacher smile? In the second example, the relationship between the ideas is apparent.

- ✗ Unclear: The student used a conjunction correctly. And his writing teacher smiled.
- ✓ Clear: The student used a conjunction correctly. So his writing teacher smiled.

## Bibliography

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:257, 258.



# Stationary or Stationery?

Because only one letter differs in *stationary* and *stationery* and because these words have the same pronunciation, the two words are commonly confused.

*Stationary* means immobile, unchanging, or at rest.

- ✓ The physical therapist recommended exercise using a stationary bicycle.
- ✓ R-(+)-equol and S-(-)-equol were prepared from (±)-equol by chiral stationary-phase high-performance liquid chromatography.
- ✓ Intensity-modulated radiation therapy plans included nine stationary beams.

*Stationery* refers to writing materials such as paper, pen, and ink. The term is also used to refer to writing paper with matching envelopes.

- ✓ The administrative assistant ordered new stationery when the office moved to another building.

- ✓ MD Anderson stationery should be used for official purposes only.
- ✓ The Children's Art Project creates seasonal stationery that can be bought at MD Anderson gift shops and online.

One way to remember which spelling is correct is that *stationery*, *paper*, and *letter* are spelled with *er*.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1219.

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:229.

# Subjunctive Mood

Mood refers to the speaker or writer's attitude about what is being said. The verbs in most biomedical writing are expressed in the *indicative* mood, which is used to state facts or assert opinions.

- ✓ This protein stimulates angiogenesis.
- ✓ The overall survival rate did not differ between group A and group B.
- ✓ This proposal is innovative, in our opinion, because the experimental method we will use has never been applied to this type of research.

However, when a verb expresses a hypothetical or conditional situation, or when it expresses a recommendation, suggestion, or wish, the *subjunctive* mood is used. The subjunctive form of most verbs is the same as the infinitive form, but without *to*.

**Indicative mood:** She exercises.

**Subjunctive mood:** The physician suggests that she exercise more.

The verb *to be* has special subjunctive forms. In the present tense, the subjunctive of *to be* is *be*, regardless of whether the subject is singular or plural.

**Indicative mood:** I am now discharged from the hospital.

**Subjunctive mood:** The physician recommends that I be discharged from the hospital.

The past tense subjunctive form of *to be* is always *were*.

**Indicative mood:** I was not there to help.

**Subjunctive mood:** If I were there, I would have helped.

**Indicative mood:** He was not interested.

**Subjunctive mood:** If he were interested, he would have asked for more information.

The subjunctive mood is often used in grant proposals because applicants are typically asked to describe potential problems and alternative strategies to address those problems. Use of the subjunctive mood rather than the indicative mood in this description subtly suggests that a potential problem is unlikely to occur.

**Indicative mood:** If too few mice respond to the treatment, we will use a different mouse model.

**Subjunctive mood:** If too few mice were to respond to the treatment, we would use a different mouse model.

**Indicative mood:** If the technique yields too few cells to harvest for our experiment, we will use an alternative technique.

**Subjunctive mood:** If the technique were to yield too few cells to harvest for our experiment, we would use an alternative technique.

## Bibliography

Hodges JC, Horner WB, Webb SS, Miller RK. *Harbrace College Handbook*, 13th ed. Fort Worth, TX: Harcourt Brace College Publishers; 1998:41.

*The Chicago Manual of Style*, 16th ed. Chicago, IL: The University of Chicago Press; 2010:235–236.

# Survival, Survival Rate, or Survival Time?

In biomedical writing, the concept of survival can be used in any of several contexts and accordingly can have diverse meanings. This entry will clarify the distinctions among *survival*, *survival time*, and *survival rate*. Furthermore, this entry will focus on *overall survival* rather than *disease-specific survival*, *disease-free survival*, or any other category of survival. For brevity's sake, *overall* will be assumed rather than repeatedly stated.

In general and biomedical contexts, the term *survival* is defined as the act or fact of living or continuing longer than another person or thing or, more simply, the continuation of life or existence. Used alone, *survival* does not address or capture the concept of time.

- ✓ The malnourished patient depended upon adequate nutritional intake for his survival.
- ✗ Patients in treatment group 1 had better survival than did patients in group 2. [This is not specific enough. The author needs to specify what aspect of survival he/she is referring to (e.g., survival duration, survival rate, quality of life).]

*Survival time* (or *survival duration*) is the period elapsing (measured as the duration or amount of time) between the institution or completion of any procedure and death. *Survival*

*time* and *survival duration* may be used interchangeably; either specifically captures the concept of time and can be used when expressing how much time has passed between a designated procedure or event and death.

- ✓ After treatment, the survival duration of patient 6 was 8 months.
- ✓ The median survival time of treated patients in group 1 was 6 months.
- ✗ Survival time was different in patients in group 1. [This is not specific enough. The author needs to specify whether survival time was longer or shorter (rather than just different), clarify what group the patients in group 1 are being compared with, and, preferably, indicate the survival times being compared and whether the difference was statistically significant (with a *P* value).]

*Survival rate* refers to the percentage of people in a study or treatment group who are alive for a specified period of time after they were diagnosed with or treated for a disease, such as cancer. For example, if the 5-year survival rate for patients with a particular cancer is 35%, this means that 35 of 100 people initially

diagnosed with that cancer would be alive at 5 years. *Survival rate* does not indicate whether a disease is cured or whether treatment is completed.

- ✓ Patients treated with surgery plus chemotherapy had a higher 5-year survival rate (50%) than did patients who received chemotherapy alone (35%).
- ✗ Patients treated with chemotherapy only had a 35% survival rate. [The period of time used to calculate this rate needs to be specified.]

## Bibliography

*Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:1809.

Dictionary of Cancer Terms. National Cancer Institute at the National Institutes of Health. <http://www.cancer.gov/dictionary>. Accessed November 14, 2011.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1259.

# Systematic or Systemic?

*Systemic* and *systematic* have similar spellings, and both are sometimes used in medical and scientific writing. However, the two words have different meanings.

*Systemic*, usually an adjective, means “of, relating to, or common to a system”<sup>1</sup> and usually describes something happening to or inside of a system. Chiefly a scientific term, *systemic* should be used when you mean belonging to, supplying, or affecting the system or the body generally or entirely or when you are referring to supplying the parts of the body that receive blood through the aorta (but not the pulmonary artery). *Systemic* can also be a noun referring to a pesticide that does not harm an animal or a plant but that when absorbed into the bloodstream or the sap renders the entire organism toxic to pests.<sup>1</sup> The word *systemic* is frequently used in medicine to describe a disease, condition, response, or therapy that affects many organs and tissues in the body.

- ✓ The patient was diagnosed with sarcoidosis, a systemic disease affecting the lungs, brain, joints, and eyes.
- ✓ In a critical care setting, the presence of increased heart and respiratory rates, febrile response, and leukocytosis in patients often signals a systemic inflammatory response.
- ✓ The physician treated the patient’s rash with systemic drugs rather than with topical medication.
- ✓ The use of imidacloprid, a systemic applied to many vegetable crops, has steadily increased over the past 15 years.

*Systematic* is an adjective that means “related to or consisting of a system”<sup>2</sup> and often indicates that something is done according to or in the manner of a system. *Systematic* should be used when you are referring to something “presented or formulated as a coherent body of ideas or principles,” something “methodical in procedure or plan,” something thorough and consistent in manner, or something related to classification.<sup>2</sup>

- ✓ The clarity of the specific aims and research design in the investigator’s grant proposal reflects the systematic thought she invested in this effort.
- ✓ The peer reviewer used a systematic approach for all reviews; he created a list of basic issues that he checked in the same order in every article.
- ✓ Everything she did—even putting out the trash—showed a systematic effort.
- ✓ The systematic grouping of all plants indigenous to South Texas also took into account plant hardiness zones.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1270.
2. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1269.

# Talking About Age Groups in Biomedical Writing

Talking about the ages of groups of patients in a manuscript may seem to be a trouble-free task. However, authors often run into problems when reporting on patients who are younger or older than a certain age. One common error is leaving out the benchmark age—the point of reference for relative terms such as “older” and “younger.”

- ✗ Certain types of cancer are common in older patients.
- ✗ Overall survival rates are high in younger leukemia patients.

Both of these examples are in need of a specific age to complete the comparison.

- ✓ Certain types of cancer are common in patients older than 60 years.
- ✓ Overall survival rates are high in leukemia patients younger than 20 years.

Although terms such as “elderly” and “young” provide a general idea of what is meant, this is usually insufficient in biomedical writing. Rather, stating the age range or that the patients are older or younger than a specific age is warranted.

- ✗ elderly patients with cardiotoxicity
- ✓ patients with cardiotoxicity who are 60 years of age or older
- ✗ lymphoma recurrence in young patients
- ✓ lymphoma recurrence in patients in their 20s

As a rule, err on the side of specificity when discussing ages. Details can always be removed later if not needed.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:410, 416.



# Than or Then?

*Than* and *then* differ in spelling by one letter and sound similar; these similarities may cause mix-ups in writing, but the meanings and usage of these two words are distinct.

*Than* is most often used as a conjunction in comparisons. *Than* is a lead-in for the second element of a comparison pair<sup>1</sup> and is also used to express an alternative in the phrase *rather than*.

- ✓ Rachel is taller than her brother. [pair: Rachel and her brother]
- ✓ The new drug exhibited a 30% higher cure rate than the standard drug. [pair: new drug and standard drug]
- ✓ The medical team will start with radiation therapy rather than surgery for this patient. [alternative]

On the other hand, *then* usually refers to a point in time and can function as an adverb, noun, or adjective.

- ✓ She gave her opinion and then left the room. [as an adverb, meaning soon after or following]
- ✓ Paul underwent surgery to remove his tumor; since then, he has received chemotherapy. [as a noun, meaning at that time]

- ✓ The then editor-in-chief of the scientific journal revised the style guidelines. [as an adjective, meaning “existing or acting at or belonging to the time mentioned”<sup>2</sup>]

*Then* can also be used in conditional statements and to mean “in addition to.”<sup>2</sup>

- ✓ If she responds to the therapy, then she may withdraw from the program.
- ✓ The shoes cost \$30, and then there is \$2.48 for sales tax.

In writing, remember to use *than* when comparing people, ideas, or items, and use *then* when referring to a point in time.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1293.
2. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1295.

# That or Which?

In written American English, the pronoun *that* is used to introduce a restrictive clause and the pronoun *which* is used to introduce a nonrestrictive clause. In other words, *that* introduces a clause used to specify or identify a noun, and *which* introduces additional information about a noun that has already been identified.

- ✓ The physician recommended eating foods that are high in fiber.
- ✓ The physician recommended eating lentils, which are high in fiber.

In the first sentence, *that* introduces information that is necessary to distinguish what kind of food is being recommended. Without the words following *that*, the meaning of the sentence would change: The physician recommended eating foods. This sentence would leave the reader guessing what types of foods were recommended.

In the second sentence, the type of food being recommended is already identified. *Which* introduces new information about that food, but without these words the meaning of the sentence would still be clear: The physician recommended eating lentils.

You may have noticed that in the examples above, *which* is preceded by a comma, while *that* is not. This is because *that*

introduces a restrictive clause (information that is essential to the meaning of the sentence) and *which* introduces a nonrestrictive clause (nonessential information).

- ✓ The retrovirus was expressed in each of the tissue samples that had been extracted from the patients with pancreatic cancer.
- ✓ The retrovirus was expressed in each of the tissue samples, which we analyzed by flow cytometry.

Although both sentences begin the same way, the first sentence uses *that* to limit the meaning of the phrase “each of the tissue samples” to a particular subset of samples, whereas the second sentence uses *which* to add information about “each of the tissue samples” without changing its essential meaning.

## Bibliography

Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*, 9th ed. New York, NY: Atheneum; 1984:443–446.

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:298.

# That or Who?

Because they introduce grammatically similar clauses, *that* and *who* are sometimes mistakenly interchanged. But each serves a specific purpose. *Who* introduces clauses that refer to human beings (or, optionally, animals), whereas *that* introduces clauses that refer to anything other than humans.

*That* is used to introduce an essential clause that describes a non-human noun.

- ✓ The software programs that I use most often are Microsoft Word and Excel.

Here, *that* refers to something non-human—*the software programs*.

*Who* is used to introduce a clause about a person or persons.

- ✓ He is the man who gave me a ride to work yesterday.

- ✓ We will offer an alternative treatment program for patients who are not good candidates for this study.

In these examples, *who* refers to humans—to *the man* in the first example and to *patients* in the second example. Replacing *who* with *that* would be incorrect here.

Either *who* or *that* may be used in clauses referring to animals, but the writer should consistently use only one or the other within a single manuscript.

## Bibliography

Garner BA. *Garner's Modern American Usage*, 3rd ed. New York, NY: Oxford University Press; 2009:808.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1294, 1429.

# Therapy Failure

Busy clinicians are always looking for convenient ways to document patient care and outcomes. But the widely used jargon “the patient failed therapy”—usually used in the context of cancer chemotherapy—fails the test. Such statements are depersonalizing and thus inappropriate for formal biomedical writing.

A good rule of thumb to remember when writing is that patients do not fail therapy: therapy fails patients.

✗ The patient failed chemotherapy.

Instead, use an alternative, neutral way to report that a treatment was unsuccessful:

- ✓ The chemotherapy did not reduce the size of the patient’s tumor.
- ✓ The chemotherapy was ineffective in this patient.

- ✓ The chemotherapy had no effect on the patient’s tumor.
- ✓ The chemotherapy did not halt progression of the disease.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007.

Bates SE, Benz EJ Jr. Commentary: Troublesome words, linguistic precision, and medical oncology. *Oncologist*. 2009;14:445–447.

Chabner B. “The patient failed therapy”...an expunged phrase. *Oncologist*. 2004;9:719.

Parles K. “The patient failed therapy.” *Oncologist*. 2004;9:719.

# Therefore or Thereby?

*Therefore* and *thereby* are both adverbs. *Therefore* means “for that reason” or “consequently,” and *thereby* means “by that means” or “by means of what has just been mentioned.”<sup>1</sup> To decide which term is correct, determine whether “for that reason” or “by that means” makes sense in the sentence.

- ✗ The hurricane is expected to make landfall tomorrow near Galveston; thereby, the institution is now operating at severity level 1. [Here it would not make sense to say “by that means, the institution is now operating...”]
- ✓ The hurricane is expected to make landfall tomorrow near Galveston; therefore, the institution is now operating at severity level 1. [“For that reason, the institution is now operating...” is clear.]
- ✗ Our goal is to translate this approach into clinical practice and therefore minimize unnecessary testing. [Here it would not make sense to say “...and for that reason minimize unnecessary testing.”]

- ✓ Our goal is to translate this new approach into clinical practice and thereby minimize unnecessary testing. [It does make sense to say “...and by that means minimize unnecessary testing.”]

In some sentences, both “for that reason” and “by that means” make sense. In such sentences, use *therefore* if you wish to emphasize the reason and *thereby* if you wish to emphasize the means.

- ✓ Major hepatectomy can completely eliminate tumor cells in the liver; therefore, it offers patients a chance for cure. [with emphasis on the reason]
- ✓ Major hepatectomy can completely eliminate tumor cells in the liver; thereby, it offers patients a chance for cure. [with emphasis on the means]

## Reference

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1296.

# To Split or To Not Split?

You may have heard that you should never “split an infinitive”—that is, interrupt an infinitive phrase (such as “to be” or “to sleep”). According to this misconception, the phrase “to boldly go” should be rewritten as “to go boldly.”

In fact, there is no such rule. Splitting an infinitive is not inherently incorrect.

- ✓ To fully eradicate the remaining malignant cells, we recommended that the patient undergo another round of chemotherapy. [Here, *fully* modifies *eradicate*.]
- ✓ Patients are treated according to the genetic characteristics of their disease to markedly increase the likelihood of a favorable response. [Here, *markedly* modifies *increase*.]

Sometimes a split infinitive is actually the best way to convey a certain meaning:

- ✗ We decided to recommend screening for the rare disease cautiously.
- ✓ We decided to cautiously recommend screening for the rare disease. [We recommended the screening but voiced a few reservations.]

- ✓ We decided to recommend cautious screening for the rare disease. [We recommended the screening provided it is performed with caution.]

However, sometimes splitting an infinitive can interrupt the flow of a sentence, which can make the sentence difficult to interpret:

- ✗ We expect to, in such cases, find the gene in the third chromosome.
- ✓ We expect, in such cases, to find the gene in the third chromosome.
- ✓ In such cases, we expect to find the gene in the third chromosome.

Don’t avoid splitting an infinitive solely to avoid splitting an infinitive. Instead, aim to write in a way that is easy to understand.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:322.

Hodges JC, Horner WB, Webb SS, Miller RK. *Harbrace College Handbook*, 12th ed. Fort Worth, TX: Harcourt Brace College Publishers; 1994:97.



# Torturous or Tortuous?

*Torturous* and *tortuous* are often confused by writers but have quite different meanings. You can avoid confusing (or inadvertently amusing) readers by making sure you use the intended word.

*Torturous* means unpleasant, painful, difficult, or extremely slow. For example:

- ✓ I almost cried during the torturous meeting.

In biomedical writing, you probably won't use *torturous* very often. If you need to describe something that causes extreme pain, a phrase such as "extremely painful" would be a better choice.

You're much more likely to use *tortuous*, which means winding, crooked, tricky, or circuitous.

- ✓ The scans clearly delineated the tortuous course of the small bowel.
- ✓ The man was driving too quickly along the tortuous road and had an accident.

If you have trouble remembering which word has which meaning, try the following: *torturous* has a second *r* and sounds like "torture us"; if what you're describing isn't something that tortures anyone, then you probably need *tortuous* instead.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1320.

# Toxic Effect or Toxicity?

Many authors use *toxic effect* and *toxicity* interchangeably, but in fact they are not synonyms.

*Toxic* means “pertaining to or caused by a poison or toxin,”<sup>1</sup> and thus a toxic effect is an effect pertaining to or caused by a poison or toxin.

- ✓ Mercury can be toxic even at very low doses.
- ✓ Cigarette smoke contains several different toxic chemicals.
- ✓ Toxic effects of radiation therapy were classified as mild, moderate, or severe according to predefined criteria.

*Toxicity* means “the quality, state, or degree of being poisonous.”<sup>1</sup> Toxicity is not countable—there is no such thing as “one toxicity” or “two toxicities.”

- ✓ The chemotherapy regimens will be compared in terms of their efficacy and toxicity.
- ✓ The toxicity of this drug precludes its use in patients with serious medical comorbidities.

*Toxicity* should not be used to mean *toxic effect*:

- ✗ The most common toxicities were nausea and vomiting and alopecia.
- ✓ The most common toxic effects were nausea and vomiting and alopecia.
- ✗ In several patients, the dose-limiting toxicity was grade 4 thrombocytopenia.
- ✓ In several patients, the dose-limiting toxic effect was grade 4 thrombocytopenia.

To avoid confusing these terms, remember, *toxicity* refers to the cause, and *toxic effect* refers to the effect.

## Reference

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:403.

# Track or Tract?

*Tract* and *track* sound similar, but the words have distinct definitions. In biomedical writing, *tract* designates an organ system (as in the gastrointestinal tract, the respiratory tract, or the urinary tract); *tract* can also refer to a bundle of nerve fibers.<sup>1,2</sup>

*Track*, however, means a path or trail or, more abstractly, “the course along which something moves or progresses.”<sup>1</sup> This more abstract definition of *track* is the one likely to lead to confusion in biomedical writing.

- ✓ Obese individuals have a significantly higher risk of urinary tract [referring to the organ system] infections.

- ✓ As she inserted the needle into the lesion, she monitored the needle’s track [referring to the course along which the needle moved] using ultrasonography.

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1324.
2. *Dorland’s Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:1946–1947.

# Tricky Idioms

When used appropriately, idioms—expressions that are peculiar because of their grammar or because their meanings cannot be easily determined on their own—can be creative ways to express ideas and concepts. When a writer gets an idiom wrong, though, confusion can result; the writer may even inadvertently state the opposite of what was intended. Three frequently misstated idioms are described below.

## 1. *Couldn't* (not *could*) care less

Maybe the ultimate expression of indifference about something is to say that you “couldn’t care less” about it. The very common way people get this idiom wrong is by saying they “could care less.” However, “could care less” means that although the speaker doesn’t care much about the topic at hand, he or she does care a little. A logical question arises: how much less could the speaker care about it?

- ✗ My dog could care less about the new toy I bought her.
- ✓ My dog couldn’t care less about the new toy I bought her.

## 2. For all *intents and* (not *intensive*) purposes

Another way to say “essentially” or “in essence” is “for all intents and purposes.” In other words, something may not be strictly true, but in any practical sense, it might as well be true. Like a misheard song lyric, this idiom is frequently misstated as “for all intensive purposes.” Some purposes may indeed be intensive, but that is certainly not what is meant in this idiom.

- ✗ For all intensive purposes, the mayor-elect is in charge of the city.
- ✓ For all intents and purposes, the mayor-elect is in charge of the city.

## 3. First-come, first-*served* (not first-*serve*)

When a service is offered to people without the option of making a reservation or appointment, that service is typically said to be offered on a “first-come, first-served” basis. Literally, those who arrive first will be served first, whereas those who arrive later or are farther back in line will be served later. The common error in using this idiom is to say “first-come, first-serve.” This flips the idiom around, suggesting that the first to arrive will serve others instead of being served.

- ✗ The number of flu vaccines is limited, so they will be administered on a first-come, first-serve basis.
- ✓ The number of flu vaccines is limited, so they will be administered on a first-come, first-served basis.

## Bibliography

*Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:616.

# Turbid or Turgid?

The words *turbid* and *turgid* are often confused. Both words are adjectives, but their meanings are entirely different.

*Turbid* means opaque, muddy, or unclear. *Turbid* is most often used to describe liquids with high concentrations of solid particles.<sup>1,2</sup>

- ✓ The paper described a method for determining enzyme activity in turbid suspensions.
- ✓ The turbid river water was unsafe for drinking or swimming.

As a medical term, *turgid* specifically means “swollen and congested.”<sup>2</sup> More generally, *turgid* can mean distended or “excessively embellished in style or language” (i.e., pompous) and

is sometimes used to describe writing that has an overly academic style.<sup>1</sup>

- ✓ An appendectomy was performed, revealing an inflamed, turgid appendix.
- ✓ His turgid prose made the article very difficult to understand.

## References

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1348.
2. *Dorland's Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:1991.

# Unpacking the Noun Cluster

A phrase made of nothing but nouns can be hard to understand. Although a noun can sometimes be effective as a modifier in front of another noun, at other times this placement causes confusion. The alternative is to move the modifying noun to a prepositional phrase after the noun being modified.

When one or more nouns appear as modifiers in front of another noun, the result is a *noun cluster*. It is not always clear how the words in a noun cluster relate to each other:

- ✗ The study included patients with liver colorectal cancer metastases.
- ✗ The gene is expressed in frog lymph heart muscle.

To clarify a noun cluster, prepositional phrases are useful:

- ✓ The study included patients with metastases to the liver from colorectal cancer.
- ✓ The gene is expressed in the muscles of lymph hearts in frogs.

Noun clusters that contain adjectives also can be ambiguous:

- ✗ Our results were similar to those previously found in p27-deficient mouse tumors.

This can be interpreted two different ways; only the author knows which was intended. A preposition and a hyphen are needed:

- ✓ Our results were similar to those previously found in p27-deficient tumors in mice.
- ✓ Our results were similar to those previously found in the tumors of p27-deficient mice.

However, when the relationship between a noun and its modifier is unlikely to be misunderstood, placing the modifier in front of the noun is more concise:

- ✗ The patient was diagnosed with cancer of the gallbladder.
- ✓ The patient was diagnosed with gallbladder cancer.

## Bibliography

Zeiger M. *Essentials of Writing Biomedical Research Papers*. New York, NY: McGraw-Hill; 1991:27–29.



# Using Biopsy Correctly

The word *biopsy* means “the removal and examination, usually microscopic, of tissue from the living body, performed to establish precise diagnosis.”<sup>1</sup> *Biopsy* once was used only as a noun (referring to the procedure), but over time, the use of *biopsy* as a verb (meaning “to perform the procedure”) has gained acceptance.

- ✓ She underwent a biopsy of the lump found in her left breast. [Noun indicating the procedure itself]
- ✓ The dermatologist biopsied the skin lesion. [Verb meaning “to perform the procedure”]

Observations about a biopsy are made in relation to the results of the procedure rather than to the procedure itself.<sup>2</sup> It doesn’t make

sense to refer to a normal or abnormal procedure, but the results of a biopsy could be normal or abnormal.

- ✗ The aspiration biopsy was abnormal.
- ✓ Results of the aspiration biopsy were abnormal.

## References

1. *Dorland’s Illustrated Medical Dictionary*, 32nd ed. Philadelphia, PA: Elsevier; 2012:218.
2. *AMA Manual of Style*, 10th ed. New York: Oxford University Press; 2007:387.

# Using Commas in Lists

In sentences containing lists, commas are used to separate the listed items. In biomedical writing, where the potential for ambiguity is high, a conjunction (*and*, *or*) preceding the final item does not eliminate the need for a comma. The comma before the conjunction is known as the serial comma.

- ✓ The book has been translated into Portuguese, Chinese, Dutch, and Arabic.
- ✓ We will have to increase revenue, decrease expenses, or cancel the project.

The serial comma appears immediately after *Dutch* in the first example and after *expenses* in the second example.

Omitting the serial comma can create ambiguity if some of the items are groups or pairs.

- ✗ The efficacies of radiation therapy, chemotherapy and resection and chemoradiation depend on the stage of the tumor.

A serial comma after *chemotherapy* would indicate that resection and chemoradiation together make up the third item in this series. Alternatively, a serial comma after *resection* would indicate that chemotherapy and resection together make up the second item.

The serial comma can also unambiguously indicate that the list in question consists of separate items. Consider the following sentence:

- ✗ The treatment group included 24 patients with stage IV disease, 15 patients older than 72 years and 9 patients younger than 30 years.

As punctuated, this sentence could be read to mean that the 15 patients older than 72 years and the 9 patients younger than 30 years are part of the group of 24 patients with stage IV disease. Adding a comma before *and* makes clear that the three subgroups are separate.

Even though some sentences would be clear without it, using the serial comma in all lists of three or more items is a simpler rule to follow than using it selectively. This rule also reduces the likelihood of needlessly distracting the reader with inconsistent punctuation.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:337, 338.

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:312, 313.

*Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 7th ed. Reston, VA: The Rockefeller University Press; 2006:66.

# Using Commas with Coordinating Conjunctions

Coordinating conjunctions are small words—such as *and*, *but*, *or*, and *so*—that join parts of a sentence that are grammatically equivalent.<sup>1</sup> Writers often are unsure about whether to use commas before and after these words.

Do use a comma before a coordinating conjunction if the text that follows the conjunction could stand as an independent clause (i.e., as a complete sentence). If the text that follows the conjunction is not able to stand as a complete sentence, no comma is needed before the conjunction.

- ✓ Tumor recurrence after standard therapy is common, so new treatments are needed. [A comma is needed before *so* because a complete sentence—“new treatments are needed”—follows.]
- ✓ Tumor recurrence after standard therapy is common and results in poor prognosis. [No comma is needed before *and* because “results in poor prognosis” could not stand as a complete sentence.]

No comma is needed after a coordinating conjunction unless it is followed by a comment or explanation that is nonessential to the sentence. A good way to test whether a phrase is nonessential is to see whether the sentence still makes sense and has the same meaning if the phrase is removed. Such nonessential phrases are usually enclosed by commas.

- ✓ I can meet you at the Waterfall Café or, if you prefer, on the skybridge. [A comma is needed after *or* because the nonessential phrase “if you prefer” must be enclosed by commas.]
- ✓ I can meet you at noon at the Waterfall Café or after 1:00 pm on the skybridge. [No commas enclose “after 1:00 pm” because that phrase is essential; omitting it changes the meaning of the sentence.]

Note that when the conjunctions *and* and *or* are used in lists of three or more items, a comma should be used before the conjunction even if the items in the list are not independent clauses.

- ✓ We tested cell proliferation, migration, and invasion.

## Reference

1. Hodges JC, Horner WB, Webb SS, Miller RK. *Harbrace College Handbook*, 13th ed. Fort Worth, TX: Harcourt Brace College Publishers; 1998:185–186.

# Using Commas with Dates and Locations

Proper placement of commas can be one of the most perplexing issues in writing. Comma errors are common in describing dates or locations that include a city and a state or country. But comma placement with dates and locations is easy if you remember a few rules. For locations in the United States, the rule is quite simple: insert a comma after both the city name and state name in the absence of a zip code. If, however, a zip code is included, omit the comma after the state name.

- ✓ The patient was born in Houston, Texas, in 1975.
- ✓ Please deliver to MD Anderson at 1515 Holcombe Boulevard, Houston, Texas 77030.

When describing international locations, insert a comma after both the city name and the country name.

- ✓ The conference was held in Paris, France, in 2012.

In dates, comma placement is determined by whether (and where)

the day is included. If only the month and year are given, no commas are used. However, when the day follows the month, a comma should be placed after both the day and year.

- ✓ The patient first noticed symptoms in August 2012 but did not see a physician until January 2013.
- ✓ We initiated our study on August 21, 2012, after receiving IRB approval.

When the day precedes the month (a common practice outside the United States), no commas are used.

- ✓ The study began on 1 March 2012 and concluded on 28 February 2013.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:340.

# Using Either/Or and Neither/Nor Constructions

In sentences containing *either/or* constructions, the word sequence after *either* should have the same structure as the word sequence after *or*—i.e., the two sequences should be grammatically parallel. Thus, the parts of speech in the first word sequence should match as closely as possible the parts of speech in the second.

- ✗ Tissue samples were obtained from patients either at Banner MD Anderson Cancer Center or MD Anderson Cancer Center Orlando.

In the example above, *either* is followed by the preposition *at*, but *or* is not followed by a preposition. In the following examples, the phrases after *either* and *or* have been rendered grammatically parallel.

- ✓ Tissue samples were obtained from patients either at Banner MD Anderson Cancer Center or at MD Anderson Cancer Center Orlando.
- ✓ Tissue samples were obtained from patients at either Banner MD Anderson Cancer Center or MD Anderson Cancer Center Orlando.

In the first example, both *either* and *or* are followed by *at*. In the second example, both *either* and *or* are followed by a noun—in this case, the particular cancer center.

Consistent ordering of information is also an important element in maintaining parallel structure. In the next example, the phrase preceded by *either* and the phrase preceded by *or* contain similar pieces of information, but the phrases do not parallel each other in terms of how the parts of speech are arranged.

- ✗ No toxic effects were observed either with weekly paclitaxel at 75 mg/m<sup>2</sup> intravenously or 1250 mg daily oral lapatinib.

Consistent wording of the two phrases specifying the medication choices makes for a clearer sentence.

- ✓ No toxic effects were observed either with weekly intravenous paclitaxel at 75 mg/m<sup>2</sup> or with daily oral lapatinib at 1250 mg.
- ✓ No toxic effects were observed with either 75 mg/m<sup>2</sup> intravenous paclitaxel administered weekly or 1250 mg oral lapatinib administered daily.

In the first of these correct examples, both options specify the frequency of administration, mode of administration, drug name, and dose, in that order. In the second correct example, both options specify the dose, mode of administration, drug name, and frequency of administration, again in that order.

*Neither/nor* sentence constructions should also be parallel.

- ✗ We hypothesized that the hyperthermia treatment would neither reduce mitochondrial function nor that the treatment would raise autophagosome levels.
- ✓ We hypothesized that the hyperthermia treatment would neither reduce mitochondrial function nor raise autophagosome levels.

- ✓ We hypothesized neither that the hyperthermia treatment would reduce mitochondrial function nor that the treatment would raise autophagosome levels.

Both of the correct examples have *neither/nor* parallelism, but the first describes what was hypothesized whereas the second describes what was not hypothesized. As these examples illustrate, parallelism can be a matter not only of form but also of meaning.

## **Bibliography**

*The Chicago Manual of Style*, 15th ed. Chicago, IL: University of Chicago Press; 2003:255.

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:399, 830.



# Using “Etc” in Lists

We often see the abbreviation *etc* (for *et cetera*) used at the end of a list in a sentence to mean “and so forth,” “and so on,” or “and other things of the same kind.” In other words, *etc* indicates that just some items, rather than the full list of items, have been mentioned.

- ✓ Aspirin is used to treat headaches, control fever, reduce inflammation, prevent heart attacks, etc.

It’s acceptable to use *etc* in technical writing, but it should be used with discretion. For example, when using *etc*, you should ensure that you are not omitting important parts of a list; also, you should avoid *etc* if you have already mentioned most of the items of a list.

- ✗ The drug regimen FCR consists of fludarabine, cyclophosphamide, etc. [Avoid *etc* because only one item is missing.]
- ✓ The drug regimen FCR consists of fludarabine, cyclophosphamide, and rituximab.

You should never use *etc* when you introduce your list with “such as,” “for example,” “include,” or “including.” To do so creates a redundancy.

- ✗ Patients with this condition often present with symptoms such as fatigue, dyspnea, etc. [The use of *such as* makes it clear that the list that follows is incomplete, so adding *etc* would be redundant.]
- ✓ Patients with this condition often present with symptoms such as fatigue and dyspnea.
- ✗ The subtypes of NSCLC include adenocarcinoma, squamous cell carcinoma, large cell carcinoma, etc.
- ✓ The most common subtypes of NSCLC are adenocarcinoma, squamous cell carcinoma, large cell carcinoma, adenosquamous carcinoma, and sarcomatoid carcinoma.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:393.

Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*. New York, NY: Atheneum; 1965:170.

Strunk W Jr, White EB. *The Elements of Style*, 3rd ed. Needham Heights, MA: Allyn & Bacon; 1979:45–46.

# Using Histology, Pathology, and Similar Terms Correctly

In the clinic, we may say we are waiting for the *pathology* before finalizing a diagnosis. In formal writing, however, this usage comes across as jargon. As noted in the *AMA Manual of Style*, “-ology” denotes “the science of” or “the study of,” and words that end with this suffix are considered abstract and general.<sup>1</sup> Thus, “-ology” words should be avoided when referring to specific patients or cases.

For precision, then, *pathology* is the branch of medicine that studies the characteristics and diagnosis of disease, and the term should not be used to refer to the samples or findings in a specific patient or case.

- ✗ Pathology from other institutions was available for 95 patients.
- ✓ Pathologic results from other institutions were available for 95 patients.
- ✓ Pathologic specimens from other institutions were available for 95 patients.

Similarly, *histology* is the study of tissue structure and composition in general, and *cytology* is the study of cell structure and function. These terms should not be used to refer to a particular patient’s tissue or cell characteristics.

- ✗ The histology was benign teratoma.
- ✓ The histologic features indicated benign teratoma.
- ✓ Histologic analysis revealed benign teratoma.
- ✓ She is an expert in teratoma histology.
- ✗ If the cytology is insufficient for diagnosis, obtain additional cores.
- ✓ If the cytologic sample is insufficient for diagnosis, obtain additional cores.

## Reference

1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:399.

# Using May, Possibly, Potentially, and Suggest

Writers should be careful when using words that indicate likelihood or possibility, such as *suggest* (“to mention or imply as a possibility”) and *may* (“used to indicate possibility or probability”).<sup>1</sup> Because both *suggest* and *may* can be used to indicate a possibility, using them together in the same sentence usually creates a redundancy.

Consider the following:

- ✗ Our findings suggest that drug X may cause hair loss in mice. [Either “suggest” or “may” needs to be replaced or removed.]
- ✗ It is possible that drug X possibly causes hair loss in mice. [Clearly, either “It is possible” or “possibly” should be omitted.]
- ✗ Our findings may suggest that drug X causes hair loss in mice. [While the meaning has shifted, the redundancy remains.]
- ✓ Our findings suggest that drug X causes hair loss in mice.
- ✓ Drug X may cause hair loss in mice.

Similarly, the use of *may* with the adverb *potentially* (“existing in possibility”<sup>1</sup>) or *possibly* also creates a redundancy:

- ✗ Drug Y may potentially reverse the effects of drug X in mice.
- ✗ Drug Y may possibly reverse the effects of drug X in mice.
- ✗ Our findings suggest that drug Z may potentially increase hair growth in mice.
- ✓ Drug Y may reverse the effects of drug X in mice.
- ✓ Drug Y potentially reverses the effects of drug X in mice.
- ✓ Our findings suggest that drug Z increases hair growth in mice.
- ✓ Drug Z may increase hair growth in mice.
- ✓ Drug Z potentially increases hair growth in mice.

Writers should avoid using *may*, *suggest*, *potentially*, and/or *possibly* together in the same statement. Just one of these words is almost always sufficient.

## Reference

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:767, 968, 971, 1249.

# Using Periods in Scientific Writing

Fundamentally, the period is used to signify the end of a sentence. Sentences allow us to understand information a chunk at a time. When we reach a period, we subconsciously stop and digest that chunk of information before going on to the next.

Periods are also commonly used in abbreviations, such as *et al.*, *e.g.*, *Dr.*, *Blvd.*, and *Washington, D.C.* However, this practice falls into the category of style: some style manuals and publishers use periods for these abbreviations, and others do not. The important thing to remember is to use a consistent style throughout your manuscript or grant.

- ✗ Gustav Morales, M.D., and Chris Lee, PhD
- ✓ Gustav Morales, MD, and Chris Lee, PhD
- ✓ Gustav Morales, M.D., and Chris Lee, Ph.D.

Here are some questions about periods that we are often asked:

Should I place a period before or after a closing quotation mark?  
In American usage, the period is placed before a closing quotation mark.

- ✓ Our review article is titled “Targeted Therapy Options for Breast Cancer.”
- ✓ The vial should be labeled “THR.”

Should I place a period before or after a closing parenthesis or bracket? The period is placed before a closing parenthesis or bracket if the words enclosed by parentheses or brackets

constitute a complete sentence; note that in the first example below, two periods are used: one for the complete sentence outside the parentheses and one for the complete sentence inside the parentheses. When the material within parentheses or brackets is not a complete sentence, no period appears inside the closing mark; instead, the period goes at the end of the sentence (which could be just after the closing parenthesis, as in this sentence and in the second example below).

- ✓ Dr. Singh and I make a good writing team. (We wrote five articles together last year.)
- ✓ We just finished our review article (“Targeted Therapy Options for Breast Cancer”).

Which is correct, “M. D. Anderson” or “MD Anderson”? The initials *M* and *D* in our institution name used to be written with periods and a space between them. However, with the new logo in 2010, the institution adopted a uniform style of using no periods or space in these initials: The University of Texas MD Anderson Cancer Center.

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:333–335.

*The Chicago Manual of Style*, 16th ed. Chicago, IL: The University of Chicago Press; 2010:243–244, 559–564.

# Using Precise Adjectives in Comparisons

Scientific writing frequently contains comparisons. Researchers try to answer such questions as “Which treatment has a higher response rate?” or “How does a particular agent affect protein levels in different cell lines?” When reporting the results of these comparisons, it’s important to specify what is being compared and to use precise, appropriate comparison adjectives.

For example, when reporting survival results, the comparison adjective used is determined by whether survival rate or survival duration is meant. The adjective *higher* is used when discussing rates, whereas *longer* is used when discussing durations.

- ✗ Survival was greater in group A than in group B.
- ✓ The 5-year overall survival rate was higher in group A than in group B.
- ✓ The mean overall survival duration was longer in group A than in group B.
- ✗ Hospital stay was slightly worse for the elderly patients (11.6 vs. 9.2 days;  $p = 0.31$ ), but the difference was not significant.
- ✓ Hospital stay was slightly longer for the elderly patients (11.6 vs. 9.2 days;  $p = 0.31$ ), but the difference was not significant.

- ✗ The use of mesh was greater in obese patients than in non-obese patients.
- ✓ The use of mesh was more frequent in obese patients than in non-obese patients.

When comparing values in two (or more) different groups, do not use *increased* or *decreased* as adjectives. However, using these words as verbs is acceptable.

- ✗ DRD2 protein levels were increased [adjective] in the GSC cell line compared with the GBM cell line.
- ✓ DRD2 protein levels were higher in the GSC cell line than in the GBM cell line.

but

- ✓ DRD2 protein levels in the GSC cell line increased [verb] after treatment with CBD.



# Using Respectively Effectively

According to the *AMA Manual of Style*, *respectively* is used to indicate a one-to-one correspondence between members of two series.

- ✓ At 5 years, the overall survival rates for patients with adenocarcinoma and squamous cell carcinoma were 34% and 58%, respectively ( $P < .01$ ).

The one-to-one correspondence indicated by this sentence can be illustrated using a table:

| Disease                 | Survival Rate |
|-------------------------|---------------|
| Adenocarcinoma          | 34%           |
| Squamous cell carcinoma | 58%           |

Here's another example:

- ✓ Serum leptin levels at baseline were similar for the low-fat and normal-fat groups ( $41.8 \pm 24.2$  and  $45.6 \pm 20.6$  ng/mL, respectively).

| Group      | Leptin Level, ng/mL |
|------------|---------------------|
| Low-fat    | $41.8 \pm 24.2$     |
| Normal-fat | $45.6 \pm 20.6$     |

Sometimes authors use *respectively* when it is not needed. When the correspondence between items in a sentence is clear

without *respectively*, as in the following examples, *respectively* is superfluous and should not be used.

- ✗ Patients with stage I disease were more likely to receive targeted therapy (90%) than were those with stage II (50%), III (71%), or IV disease (73%), respectively ( $P < .001$ ).
- ✓ Patients with stage I disease were more likely to receive targeted therapy (90%) than were those with stage II (50%), III (71%), or IV disease (73%) ( $P < .001$ ).
- ✗ Patients in group A had a significantly higher 5-year survival rate than patients in group B (75% versus 67%, respectively;  $P = .01$ ).
- ✓ Patients in group A had a significantly higher 5-year survival rate than patients in group B (75% versus 67%;  $P = .01$ ).

## Bibliography

*AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:826.



# Using Semicolons

Semicolons are used in two ways. First, semicolons connect two closely related independent clauses (i.e., parts of a sentence that can function as complete sentences).

- ✓ This cancer is most commonly diagnosed in patients aged 50 years or older; only 2% of patients are younger than 50 years at diagnosis.

In this example, the two clauses (the parts of the sentence on each side of the semicolon) could also be written as two complete sentences, or they could be connected by a coordinating conjunction, such as *and*. However, a comma alone could not connect the sentences, and a coordinating conjunction is not needed if a semicolon is used. Note that the first word after the semicolon is not capitalized.

- ✓ This cancer is most commonly diagnosed in patients aged 50 years or older. Only 2% of patients are younger than 50 years at diagnosis.
- ✓ This cancer is most commonly diagnosed in patients aged 50 years or older, and only 2% of patients are younger than 50 years at diagnosis.
- ✗ This cancer is most commonly diagnosed in patients aged 50 years or older, only 2% of patients are younger than 50 years at diagnosis.

The second use of semicolons is to separate parallel phrases within a sentence (such as items in a list) that contain commas themselves.

- ✓ Patients were recruited from several locations, including Houston, Texas; New Orleans, Louisiana; and Atlanta, Georgia.
- ✓ Exclusion criteria included stage II, III, or IV disease; inability to speak English; and certain comorbidities, such as severe hypertension, type II diabetes, and compromised immunity.

In each of these examples, the sentence includes a series of phrases containing commas, and the semicolon clarifies which items within that list should be grouped together.

## Bibliography

Hodges JC, Horner WB, Webb SS, Miller RK. *Harbrace College Handbook*, 13th ed. Fort Worth, TX: Harcourt Brace College Publishers; 1998:107–108.

# Using Shorter Rather than Longer Words

Effective scientific writing presents information concisely whenever possible, although never at the expense of clarity. One way to achieve conciseness is through the use of short, plain words.

Some writers intentionally choose long, ornate, and occasionally even obscure terms in the belief that such language reflects broad knowledge and scholarship. But in fact, the use of short words when possible is more effective for expressing technical concepts, especially scientific concepts, in English. Of course, some technical terms are needed to convey biomedical concepts. However, given that the scientific writer's ideas and concepts are themselves complex, the words used to express those ideas most clearly are short, simple, and understandable ones.

Here are some commonly used long or complex words paired with shorter but equally effective options:

|                |           |
|----------------|-----------|
| ✗ assistance   | ✓ help    |
| ✗ elucidate    | ✓ explain |
| ✗ encounter    | ✓ meet    |
| ✗ endeavor     | ✓ try     |
| ✗ equivalent   | ✓ equal   |
| ✗ methodology  | ✓ method  |
| ✗ remuneration | ✓ payment |
| ✗ terminate    | ✓ end     |

|              |                |
|--------------|----------------|
| ✗ ultimately | ✓ finally/last |
| ✗ utilize    | ✓ use          |

The following passage may be rewritten using shorter terms, producing a clearer piece of writing that still conveys the intended meaning. The amended terms appear in italics.

- ✗ To *facilitate the monitoring* of shifts in the patient's position during imaging studies and to achieve *optimum* results, we *instituted* the scanning protocol and checked the sensory devices *preliminary to* and *following* each procedure.
- ✓ To *help monitor* shifts in the patient's position during imaging studies and to achieve the *best* results, we *started* the scanning protocol and checked the sensory devices *before* and *after* each procedure.

Remember that the goal of using a shorter word should be to convey the writer's meaning more concisely and at least as clearly as is achieved with a long word.

## Bibliography

Campbell E. *ESL Resource Book for Engineers and Scientists*. New York, NY: John Wiley & Sons; 1995.

Cohesion and clarity. In: *Writing and Publishing Scientific Articles*. Houston, TX: Department of Scientific Publications, The University of Texas MD Anderson Cancer Center; 2006.

# Using the Word “Faculty” Correctly

When the word *faculty* refers to people with academic appointments, it is a collective noun, meaning it refers to a group. Collective nouns do not follow the usual rules for singular and plural forms or for verb choice.

*Faculty* is treated as a singular term when it refers to the group as a whole and as a plural term when it refers to the individuals who make up the group.

- ✓ The MD Anderson faculty is renowned for cancer care. [The emphasis is on the group as a whole, so a singular verb is used.]
- ✓ All faculty are participating in the conference. [The emphasis is on the individual group members, so a plural verb is used.]

When multiple individuals from the *faculty* are being discussed, writers sometimes make the word *faculty* plural by adding an “s” (i.e., *faculties*). However, this use of *faculties* is incorrect. In such cases, the correct wording would be *faculty* or *faculty members*.

- ✗ The committee consists of faculties from five different departments.
- ✓ The committee consists of faculty from five different departments.
- ✓ The committee consists of faculty members from five different departments.
- ✗ He has mentored more than 50 trainees and junior faculties.
- ✓ He has mentored more than 50 trainees and junior faculty.

The word *faculties* can be used to refer to the collective faculty members of multiple institutions, but this usage is not very common.

- ✓ Members of the faculties of 15 universities participated in the survey.

Another common mistake is to use the word *faculty* as a singular noun when referring to one individual from the faculty. Instead, such an individual should be referred to as a *faculty member*.

- ✗ I am a faculty at MD Anderson Cancer Center.
- ✓ I am a faculty member at MD Anderson Cancer Center.
- ✗ Each faculty has an assigned office.
- ✓ Each faculty member has an assigned office.
- ✓ All faculty have assigned offices. [Switching to plural allows the word *member* to be dropped.]

The word *faculty* can also be used to refer to an aptitude or ability. In this sense, standard singular and plural forms are used, so *faculties* is appropriate as a plural.

- ✓ She has a faculty for math.
- ✓ At 84 years old, she still has all her faculties.

For more on collective nouns, please see our previous post on the topic (p. 61).

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:448.

# Various or Varying?

Although *various* and *varying* sound similar and are from the same word family, they have different uses.

*Various* is an adjective that refers to groups containing different kinds of things. For instance,

- ✓ The bowl was filled with various coins.
- ✓ The tumor contained various cell types.

On the other hand, *varying* refers to some sort of change and is a

form of the verb *to vary*. It may also be used as an adjective.

- ✓ Because of the protein's instability, we found varying concentrations over the study period.
- ✓ His wildly varying moods irritated his colleagues.

## Bibliography

*Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1384.

# Verb Choice When the Subject is Followed by a Phrase in Parentheses

A basic rule in English is that a verb must agree in number with its subject. A singular subject requires a singular verb (e.g., “CRISPR has revolutionized gene editing”), and a plural subject requires a plural verb (e.g., “Immune checkpoint inhibitors have revolutionized the treatment of many cancers”).

Some constructions can cause confusion regarding whether the subject is singular or plural. One such construction is a subject followed by a phrase in parentheses. The respected language expert Bryan Garner notes that “words contained within parentheses do not affect the syntax of the rest of the sentence.”<sup>1</sup> Thus, such words should be ignored when the author determines whether a singular or plural verb is required.

- ✗ This result (and the conclusion it led to) were surprising.
- ✓ This result (and the conclusion it led to) was surprising.

If using a singular verb seems awkward, it may be better to rewrite without parentheses and use a plural verb instead.

- ✓ This result and the conclusion it led to were surprising.

## Reference

1. Garner B. *Garner’s Modern English Usage*, 4th ed. New York, NY: Oxford University Press; 2016:752.



# Versus vs. the Alternatives

*Versus* (abbreviated as “vs.” or sometimes “v.”, with or without the period) is a preposition that means “against.” It is most frequently used in legal settings, in particular, to name court cases involving two opposing persons or entities (e.g., “Jamison v. the State of Texas”).

In biomedical writing, *versus* appears in specific terms (e.g., *graft-versus-host disease*). Typically in these cases, the idea of an attack or direct conflict between one thing and another (e.g., donor and host tissues) is conveyed.

However, biomedical authors frequently use *versus* more loosely, where a simple conjunction (e.g., and) is appropriate or a comparison or contrast is intended, rather than direct conflict. Consider the following:

- ✗ Group A mice had a response rate of 53.5% versus 43.2% in group B mice ( $P = 0.03$ ).

In this case, the writer is presenting and comparing the two response rates, so more accurate ways of writing the sentence would be:

- ✓ The response rate in group A mice was 53.6%, compared with 43.2% in group B mice ( $P = 0.03$ ).
- ✓ Group A mice had a response rate of 53.6%, which was significantly higher than the response rate of 43.2% in group B mice ( $P = 0.03$ ).

If the two response rates were simply being reported, without any statistical analysis, then a better choice would be:

- ✓ The response rate was 53.6% in group A mice and 43.2% in group B mice.

Article titles seem to be particularly prone to misuse of *versus*. For example:

- ✗ Chemoradiation vs. Radiotherapy Alone for Unresectable Pancreatic Cancer

In this case, the author probably means to compare the two modalities in terms of certain metrics (response rates, side effect profiles, and so on). Thus, a better title would reflect the comparative aspect of the study:

- ✓ Chemoradiation Compared with Radiotherapy Alone for Unresectable Pancreatic Cancer

Also watch for instances of writing in which both *versus* and a comparison are stated:

- ✗ We next compared the survival outcomes for the group of patients undergoing radical surgery versus those undergoing limited tumor resection.

In this case, *versus* should be replaced with a simple “and” to make the sentence clear and grammatically correct.

## Bibliography

*Scientific Style and Format: The CSE Manual for Authors, Editors, and Publishers*, 7th ed. Reston, VA: Council of Science Editors; 2006.



# Versus vs. Verses

The words *versus* and *verses* sound similar and differ in spelling by only one letter, but they have very different meanings. Which one should you use?

One common meaning of the word *versus* is “in contrast to” or “as an alternative of.”<sup>1</sup> *Versus* is used to compare or contrast two things (e.g., “grade I/II versus grade III tumor” or “chlorpromazine versus haloperidol in the first-line setting”). Note that *versus* is commonly abbreviated *vs.*, with or without a period (some journals italicize *versus*, as it is a Latin word).

- ✓ RSV-IGIV resulted in a lower rate of respiratory syncytial virus hospitalization (15% in the placebo group versus 6% in the RSV-IGIV group,  $p < 0.001$ ).
- ✓ The proportion of patients who reported health problems was summarized both overall and by type of treatment (surgery alone versus combined treatment).

*Versus* also means “against.”<sup>1</sup> In medicine, this usage is demonstrated in the term “graft-versus-host disease,” in which the grafted cells attack the host. Two other common domains of this usage are the legal profession, where *versus* is used in case citations (e.g., *Brown v Board of Education of Topeka*; note that *versus* is often abbreviated *v* in legal writing), and pop culture (e.g., *Godzilla vs. Mothra*).

The word *verses* is the plural of the noun *verse*, which is one or more lines of structured, often rhythmic writing (e.g., part or all of a poem or hymn).<sup>1</sup> The word *verses* is also commonly used to describe the short divisions of text in the Bible. The term *verses* is rarely used in medical writing.

- ✓ In a survey of cancer patients’ favorite reading materials, the most commonly cited book was the Bible. Respondents stated that the verses gave them hope and strength.

Famous poetic verses you may be familiar with include “How do I love thee? Let me count the ways”<sup>2</sup> and “Shall I compare thee to a summer’s day.”<sup>3</sup>

## References

1. *Merriam-Webster’s Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1390.
2. Elizabeth Barrett Browning, “Sonnet from the Portuguese.” *English Poetry II: From Collins to Fitzgerald*, vol. 41. New York, NY: Collier & Son; 1937. <http://www.bartleby.com/41/>
3. *The Oxford Shakespeare: The Complete Works of William Shakespeare*. London, UK: Oxford University Press; 1914. <http://www.bartleby.com/70/>

# Waiver or Waver?

*Waver* and *waiver* are homophones, which means they sound exactly the same; however, the two words have completely different definitions.

*Waver* (a verb) means to go back and forth, be indecisive, fluctuate, or be unsteady.<sup>1</sup>

- ✓ The postdoctoral fellow wavered between going home after a busy day of research and staying out with her friends.

In contrast, a *waiver* (a noun) is “the act of intentionally relinquishing or abandoning a known right, claim, or privilege.”<sup>2</sup>

A *waiver* may consist of an official document stating that someone has given up a right. (The related verb is *waive*.)

- ✓ The first-year medical student signed an insurance waiver when she started medical school, forgoing enrollment in the school’s health insurance plan because she was still covered under her parents’ plan.

- ✓ The researchers applied for a waiver of the informed consent requirement for their study.

## References

1. *Merriam-Webster Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1415.
2. *Merriam-Webster Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1406.

# The What, When, and Where of *Their*, *There*, and *They're*

- ✓ They're eating their lunch over there.
- ✓ Although their house is small, they're very happy living there.

*They're*, *their*, and *there* share pronunciations, leading to confusion about when to use each term. But as the examples above indicate, each word has a distinct meaning. What's it all about?

Both *they're* and *their* are related to *they*, a third-person pronoun that refers to a group of two or more people. *They're* is a contraction of *they are*. This means that in the following examples, the speaker could use *they're* or *they are*; *they're* is simply less formal than *they are*.

- ✓ Leslie and Robin have accepted positions as software engineers, so they're moving to Silicon Valley in June.
- ✓ They're dedicated biomedical editors with many years of experience.

Just as *your* is the possessive form of *you*, *their* is the possessive form of *they*.

- ✓ Their house is that yellow one on Wisteria Lane.

*There* is not related to *their* or *they're*. According to *Merriam-Webster's Collegiate Dictionary*, *there* is used to mean “that place” or “that point or stage”<sup>1</sup>—a place or time that is not immediately adjacent or close to the speaker.

- ✓ Having enjoyed the mild summers in Maine, Martin moved there as soon as he retired from MD Anderson. [indicating a place]
- ✓ Let me stop you there so that I can explain angiogenesis to the audience. [indicating a point or stage]

## Reference

1. *Merriam-Webster's Collegiate Dictionary*, 11th ed. Springfield, MA: Merriam-Webster; 2003:1296.

# When and How to Use Cautious or Hedging Language

Reporting study results is sometimes tricky when a result implies rather than proves something to be true. In such instances, the use of cautious, or “hedging,” language is warranted.

- ✓ The analysis *suggested* that all of the mice had expression of the protein.
- ✓ Our findings indicated that the patients *may have* had long-term exposure to this carcinogen.
- ✓ These *potential* toxic effects preclude the use of the drug in children.

A pitfall when using hedging language is overdoing it, which can cause readers to believe that you are so unsure of your findings that the results cannot be trusted.

- ✗ Overdone hedging: Such toxicity *may suggest* that the drug is *possibly* unsafe for geriatric patients.
- ✓ Appropriate hedging: Such toxicity *suggests* that the drug is unsafe for geriatric patients.
- ✓ Appropriate hedging: Such toxicity means that the drug *may be* unsafe for geriatric patients.

- ✗ Overdone hedging: *We believe* the microarray data *appeared to imply* that the genes *could be* expressed in all of the cell lines.
- ✓ Appropriate hedging: The microarray data *implied* that the genes were expressed in all of the cell lines.
- ✓ Appropriate hedging: The microarray data *appeared to demonstrate* that the genes were expressed in all of the cell lines.

If your findings are solid, don’t use hedging language at all. If you are confident in your research, you should express that confidence when you report your results.

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# When Do You Use Whose?

“I could a tale unfold whose lightest word  
Would harrow up thy soul.”

—Shakespeare, *Hamlet*

The harrowing of souls is not our interest today. Shakespeare’s use of *whose* is worth considering, however. *Whose* is the possessive form of *who*. We might ask, “Whose house is that?” or “Whose scalpel is this?”

*Who* should be used only in relation to people and animals (*that* may also be used with animals). We therefore don’t speak of “flowers who are colorful” or “companies who are large.” In contrast, *whose* can be used in relation to inanimate things as well as people and animals.

- ✓ Audrey wants to invest in the mining company whose stock price just crashed.
- ✓ Over the summer, Lamar visited the Lake Palace Hotel, whose architecture is internationally renowned.
- ✓ Rajiv and Mei sat through a film whose ending was frustratingly predictable.

The mining company, the hotel, and the film are all inanimate things. In some of these samples, the phrase *of which* might be used instead of *whose*. We might instead say, “Lamar visited the Lake Palace Hotel, the architecture of which is internationally

renowned.” But this alternative often produces awkward results.

- ✗ Maple syrup is a condiment the presence of which on a stack of pancakes is essential.
- ✓ Maple syrup is a condiment whose presence on a stack of pancakes is essential.

A natural sounding *whose* is preferable to an unnatural sounding *of which*.

Finally, *whose* should not be confused with *who’s*. The second term is a contraction of *who is*. In casual conversation, you might avoid the formality of *who is* and simply ask, “Who’s attending the employee appreciation lunch?” In moments of frustration, you might inquire of a colleague, “Who’s going to edit this manuscript?” Your colleague may refer you to the Department of Scientific Publications, whose editors use *who*, *whose*, and *who’s* carefully and correctly.

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Bernstein TM. *The Careful Writer: A Guide to Modern English Usage*. New York, NY: Atheneum; 1984:479.

*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:300.

*Merriam-Webster’s Dictionary of English Usage*. Springfield, MA: Merriam-Webster; 1994:1431.



# When to Use Commas in a Series of Adjectives

When two or more adjectives precede a noun, commas are sometimes—but not always—needed to separate the adjectives. Fortunately, a simple test can help you decide whether to insert commas in a series of adjectives.

If the sentence or phrase still sounds right when you change the order of the adjectives or insert the word *and* between them, the adjectives are considered “coordinate” adjectives; that is, they are functionally equivalent.<sup>1,2</sup> Strings of coordinate adjectives are separated by commas when they appear before a noun.

- ✓ The hikers were exhausted after a day on the long, hot, dusty trail. [“The long and hot and dusty trail” makes sense, so the adjectives are coordinate and require commas.]
- ✓ Researchers are investigating the effects of a low-carbohydrate, high-fat diet on insulin levels in mice. [The order of the adjectives *low-carbohydrate* and *high-fat* can be switched without affecting the meaning of the sentence; therefore, a comma is needed.]
- ✓ A randomized, double-blind, placebo-controlled, phase III trial demonstrated that the combination therapy extended survival by a median of 7.2 months. [The order of the adjectives can be changed to “a double-blind, randomized, phase III, placebo-controlled trial,” so they are coordinate adjectives and must be separated by commas.]

However, if the adjectives cannot be switched, or if inserting *and* between them results in an awkward-sounding phrase, the adjectives are not coordinate. In these cases, one or more of the adjectives forms a unit with the noun and must stay “attached” to it.

- ✓ Emily wore her favorite blue boots to the party. [Rephrasing as “blue favorite boots” or “favorite and blue boots” doesn’t sound natural, so no comma is needed here.]
- ✓ Presurgical functional assessments revealed high levels of cancer-related fatigue in the study population. [The adjective *presurgical* describes the entire unit formed by the words *functional* and *assessments* and can’t be switched with *functional*, so these are not coordinate adjectives. No comma is used.]
- ✓ Nonmetastatic hepatocellular carcinoma is commonly treated with surgery. [“Nonmetastatic and hepatocellular carcinoma” changes the meaning because the adjective *nonmetastatic* modifies the phrase *hepatocellular carcinoma*, not just the noun *carcinoma*. No commas are needed.]

A useful mnemonic device to help you remember this rule emphasizes the notes: “**C**annot switch, do **n**ot use a comma.”<sup>3</sup>



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1. *The Chicago Manual of Style*, 17th ed. Chicago, IL: University of Chicago Press; 2017:381.
2. Hodges JC, Horner WB, Webb SS, Miller RK. *Harbrace College Handbook*, 12th ed. Fort Worth, TX: Harcourt Brace College Publishers; 1994:133.
3. Lester M, Beason L. *The McGraw-Hill Handbook of English Grammar and Usage*, 2nd ed. New York, NY: McGraw-Hill; 2013:230.

# Who or Whom?

Many writers have difficulty deciding whether to use *who* or *whom*. Adding to the confusion is the fact that *whom* is seldom used in informal or spoken English. In writing, however, there is a distinction between the two words.

The pronoun *who* is nominative, which means it functions as the subject of a verb or as a predicate nominative (renaming the subject).

- ✓ Who did it? [Here, *who* is the subject of the verb *did*.]
- ✓ She did, that's who. [Here, *who* is a predicate nominative, renaming *she*.]

The pronoun *whom* is objective, which means it functions as the direct or indirect object of a verb or as the object of a preposition.

- ✓ Ask not for whom the bell tolls. [Here, *whom* is the object of the preposition *for*.]

- ✓ He was one of the patients whom the initial treatment had not affected. [Here, *whom* is the object of the verb phrase *had affected*.]

One way to determine whether *who* or *whom* is correct is to replace *who* or *whom*—or to answer the question asked—with *he* or *him*. If you would use *he*, then *who* is correct; if you would use *him*, then *whom* is correct.

- ✓ Who should be tested for hepatitis B? [Answer: “He should be tested.”]
- ✓ To whom can patients turn for support? [Answer: “Patients can turn to him.”]

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*The Chicago Manual of Style*, 15th ed. Chicago, IL: The University of Chicago Press; 2003:300.

# Writers Imply; Readers Infer

The terms *imply* and *infer* are frequently incorrectly interchanged. They have related meanings, but in a sense they represent opposite sides of communications. *Imply* means “to suggest or to indicate or express indirectly,”<sup>1</sup> as a speaker or writer might do; that is, the person creating the message can imply something. *Infer* means “to conclude or to draw conclusions from facts, statements, or indications”<sup>1</sup>; these are actions performed by the receiver or interpreter of a message—the listener or reader, for instance.

Or as usage guru Theodore Bernstein puts it, “The *implier* is the pitcher; the *inferrer* is the catcher.”<sup>2</sup>

- ✓ The researchers claimed that their results implied a relationship between the two variables even though

the association was not significant on univariate analysis.

- ✓ Without more information, we cannot infer that a low serum sodium concentration increases the frequency of falls.

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1. *AMA Manual of Style*, 10th ed. New York, NY: Oxford University Press; 2007:397.
2. Bernstein TM. *The Careful Writer: A Modern Guide to English Usage*. New York, NY: The Free Press; 1965:226, 227.

# Writing Clear Comparisons

Comparisons often appear in medical writing. Unfortunately, the wording used to describe comparisons is often imprecise and inaccurate. Imprecise wording obscures the relationships between the items being compared, burdens the reader, and obstructs comprehension. When writing about comparisons, following some simple guidelines can ensure precise descriptions that convey relationships clearly.

When indicating similarities between items, *as* is often the word you want to use.

- ✓ Patients with solid tumors were as likely as patients with hematologic cancers to report fatigue.

When indicating that one item is greater than another (such as with words like *more*, *faster*, *stronger*), *than* is usually preferred. In these cases, *compared with* would be redundant.

- ✗ Patients who underwent surgery followed by adjuvant chemotherapy reported greater fatigue compared with patients who underwent surgery alone.
- ✓ Patients who underwent surgery followed by adjuvant chemotherapy reported greater fatigue than did patients who underwent surgery alone.

When comparing three or more items (such as with words like *most*, *fastest*, *strongest*), *compared with* or *compared to* is the appropriate term.

- ✓ Patients with hematologic cancers reported the greatest fatigue compared with patients with prostate and breast cancers.

When should you avoid using the word *compare*? When making statements that do not indicate degrees of comparison between items (for example, something is red, and something else is blue), it may be better to avoid the word *compare*. Otherwise, readers are left wondering how the items are related.

- ✗ Patients with prostate cancer reported fatigue, compared with patients with breast cancer, who reported insomnia.

In these cases, it can be helpful to indicate the relationship between items. If you do not intend to indicate a relationship, using *and* is a better choice to link your ideas together.

- ✓ More patients with prostate cancer reported fatigue than did patients with breast cancer. [indicating a relationship]
- ✓ Patients with prostate cancer reported fatigue, and patients with breast cancer reported insomnia. [not indicating a relationship]

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Witte F. *Basic Grammar and Usage: A Core Curriculum Workshop of the American Medical Writers Association*. Dubuque, IA: Kendall Hunt; 2008.

# Your or You're?

These two words are similar in both appearance and sound but have very different uses.

The word *your* is a possessive pronoun that functions in the same way as *his*, *her*, *our*, *my*, and *their*. These words modify a noun and indicate possession. *Your* is used when you want to designate something that belongs to the person with whom you are communicating.

- ✓ That was your first test of the week.
- ✓ Your complete blood count results indicate a diagnosis of anemia.

In both cases, you can replace *your* with any other possessive adjective, such as *my* or *his*, and still have a coherent sentence.

*You're*, however, is a contraction of *you are*; a contraction combines two words into one word by removing one or more letters. *You're* is similar in construction to other contractions, such as *wouldn't* (shortened version of *would not*) or *we've* (shortened version of *we have*).

- ✓ You're going to meet with two people during this interview.

- ✓ Please let the clinic know when you're going to run the tests.

In both cases, you can replace *you're* with *you are*, and the message remains the same.

If you do not know which word to use, try substituting *you are* in your sentence. If the substitution makes sense, then *you're* belongs in your sentence; if the substitution doesn't work, you likely meant to use *your*.

Although the two words are pronounced the same, using them incorrectly can confuse the reader and can make your writing seem unprofessional. Note, however, that since biomedical writing typically requires formal language (i.e., no contractions), the more casual term *you're* is rarely used.

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