

WORD USAGE IN SCIENTIFIC WRITING

Listed herein are words, terms, and expressions commonly misused or used in ways that sometimes produce ambiguous statements; included are explanations of usage and construction advocated by editors of many scientific journals.

The objective of scientific writing should be to report research findings, and to summarize and synthesize the findings of others, with clarity and precision. Thus, colloquialisms, jargon, contrived acronyms, and "faddish" terminology and expressions should be avoided. Editors recognize that authors are ultimately responsible for all aspects of their publications including grammar, word usage, and clarity and precision of construction. Therefore, this list is intended as a guide, not as dogma.

- ABOVE** — (...the above method; ...as mentioned above). A term often used in reference to something preceding, but not necessarily "above"; a loose reference, convient for writers, but not for readers. Also, remember, if something was mentioned previously, to do so again is redundant.
- ACCURATE** — (...an accurate estimate...). "Accurate" implies *complete freedom from error* or *absolute exactness*. An "estimate" is an approximation. Try "...a reliable estimate."
- AFFECT; EFFECT** — Affect is a verb that means *to influence*. Effect, as a verb, means *to bring about*; as a noun, it means *result*.
- ALiquot** — Means *contained an exact number of times in another*. Commonly misused to mean "subsample."
- ALL OF; BOTH OF** — Just "all" or "both" will suffice in most instances.
- ALSO SEE** — (Also see Jones, 1950). Usually unnecessary as author-date reference is adequate; allow reader to judge whether perusing article is warranted.
- ALTERNATE; ALTERNATIVE** — *Alternate* implies *first one then the other*; *alternative* implies *a choice among two or more incompatible objects, situations, or courses of action*.
- AMONG** — Use when comparing more than two items.
- AND, HENCE; AND, THEREFORE; AND, THUS** — ("The food supply was reduced *and, thus*, the population declined.") Both a conjunction and conjunctive adverb unnecessary. Use one or the other.
- AND/OR** — Use one or the other, not both. Write what is actually meant.
- APPARENTLY; APPARENT** — Means *obviously, clearly, plainly, evidently, seemingly, ostensibly, or observably*. You may know which meaning that you intend, but your reader may not. Consider "obvious(ly)," "clear(ly)," "seeming(ly)," "evident(ly)," "observable," or "observably" to improve clarity.
- APPEAR; APPEARS** — Use "seem(s)." (He always "appears" on the scene, but never *seems* to know what to do.)
- AS** — A conjunction used in reference to a comparison; always associated with a verb, e.g., "Pocket mice carry seeds in their cheekpouches as [NOT like] do kangaroo rats." Do not use in place of the words "that" or "whether." Compare with "like."
- ASSUME** — An active verb often used with an inanimate subject to produce a ludicrous statement. (The hypothesis "assumes" that ... or The model "assumes" ...) Models or hypotheses cannot assume anything! However, to use a model or to test a hypothesis certain assumptions often are required; the person who uses the model or tests the hypothesis must make the assumptions.
- AS WELL AS** — Use "and"; it means the same.
- AT THE PRESENT TIME; AT THIS POINT IN TIME** — Use "currently" or "now"; they mean the same.
- BELOW** — See comments about "above." Directions do not change ambiguity.
- BETWEEN** — Use when comparing only *two* items.
- BUT SEE** — Often used with a literature citation presumably to indicate a contradiction. [Verts (1968) reported that striped skunks in northern Illinois commonly were infected with rabies ("but see" Jones, 1972).] This leaves the reader to wonder about the nature of Jones' contribution; did he report that skunks were never infected with rabies, rarely infected, or always infected? For clarity, present the nature of the contradiction rather than forcing the reader to search the literature.
- BY MEANS OF** — Just "by" will suffice in most instances.
- CARRIED OUT** — (...studies were "carried out" at...) This is a colloquial usage. Try "conducted," "performed," or "...was studied."
- CASE** — Can be ambiguous, misleading, or ludicrous because of different connotations. (In the "case" of Scotch whiskey...) Often used in padded sentences. If absolutely necessary, use "instance"; for example, "in this instance."
- CHECKED** — Imprecise word because of the variety of possible meanings. Commonly used as a synonym for "examined" or "verified" as in "The traps were checked... ." Choose the more precise words.
- CLEAR-CUT; CLEAR-CUTTING** — "Clear-cut" may be used as an adjective to mean *precise, definite, or distinct*, or as a transitive verb to mean *to remove all trees from an area*. However, the word (commonly with a hyphen omitted) has become a jargon term among foresters and others to mean *clear-cutting* or *even-aged forest management*. "Clear-cut" may be used only as an adjective or verb, never as a noun; "clear-cutting" is the noun that means *the area from which all trees were removed*.
- COLLECTIVE NOUNS** — Take singular verbs when the group is regarded as a unit, but plural verbs when the individuals of the group are regarded separately. "One thousand shrews is an adequate sample; however, fewer than 500 shrews were trapped." "To the mixture, 10 g was added."
- COMMAS AND PUNCTUATION** — Not precisely a matter of word usage except in relation to how words are put together.

The trend is toward less punctuation (particularly fewer commas), but such requires careful writing without misplaced or dangling elements. Use a final comma in series before "and" and "or."

COMPARE WITH; COMPARE TO — To "compare with" means to *examine differences and similarities*; to "compare to" means to *represent as similar*. Usually, one "compares with" and "contrasts to."

COMPRISE — Before common misuse, "comprise" meant to *contain or include*, but not to *constitute or to compose*. The distinction seems useful and worth preserving, therefore, "The whole comprises the parts, but the parts do not comprise the whole."

DATA — A plural noun that agrees with a plural verb or pronoun. "These data..." "Data were..." Not "this data" or "data was." Commonly used with an active verb to produce ludicrous image; for example, "The data show..." Data may be interpreted by an investigator or the investigator may draw inferences from data. Often the word can be omitted without altering the meaning. Also, data don't have size, so avoid "too little data" to describe inadequate samples; try "too few data."

DECREASED — Do not use in place of "lesser." Decreased means to "diminish" (as in size, amount, or strength). Lesser is used primarily as an adjective when making a comparison.

DEMOGRAPHY — A term often applied to the statistical study of animal populations. (The "demography" of a population of *Microtus pennsylvanicus*...) Strictly, "demography" applies *only* to human populations. Try "Changes in attributes of a population of..." or "The dynamics of a population of..."

DIFFER FROM; DIFFER WITH — One thing "differs from" another, although you may "differ with" your colleagues.

DIFFERENT FROM; DIFFERENT THAN — "Different from" always!!

DONE — Research was done in the spring. Could mean either completed or conducted. Use either "Research was completed..." or "Research was conducted..." as appropriate.

DUE TO — "Due" is an adjective often mistakenly used as a preposition. "Due to" implies causality when only a relationship may be intended. Try "related to" or, if causality is intended, use "because of."

DURING THE COURSE OF; IN THE COURSE OF — Just "during" or "in" will suffice.

EITHER...OR; NEITHER...NOR — Apply to no more than two items or categories.

EQUALLY AS GOOD; EQUALLY AS GOOD AS — Just "equally good" will do.

ESTROUS; ESTRUS — Estrous is an adjective, estrus is a noun. "Among species that have estrous cycles, females are receptive only during estrus."

ETC. — Avoid entirely!!

FAST — (Foxes were "fasted"...) To "fast," meaning to *starve* is an intransitive verb. You may "fast," but you can't "fast" another organism, you "starve" it.

FELT — (It was "felt" that...) One feels cloth, but "believes" ideas.

FORMER; LATTER — These words refer only to the first and second of only *two* items or categories.

FREIGHT-TRAIN WORDING — (Overuse of adjectives and noun modifiers). A commonly used system of compounding nouns and adjectives as a shorthand means of communicating with colleagues and subordinates that produces incomprehensible jargon. Does "current breeding evidence" mean *evidence of current breeding* or *current evidence of breeding*? There could be a difference. A good rule is to put the precise subject first for emphasis and to use appropriate prepositions to indicate relationships.

GIVEN — "At a given time..." "Fixed," "specified," or "specific" are more precise. "Given" has several meanings.

HIGH(ER); LOW(ER) — Overused! Commonly used imprecisely or ambiguously for "greater," "less(er)," "larger," "smaller," "more," or "fewer." Sometimes gobbledygook is produced such as, "Occurrences of higher concentrations were lower at higher levels of effluent outflow." Guess what that means!

HYPHENATED COMPOUND MODIFIERS — Hyphenation often is necessary to indicate which adjective or noun modifier is modifying which noun. "A small-grain harvest..." (a harvest of small grain, not a small harvest of grain). Also, "20 liter samples" is different from "20-liter samples." In such situations, hyphenate adverbs that do not end in "ly" as "...a well-developed muscle," but not those that end in "ly" as "...an overly obese muskrat."

IMPORTANT — Something simply can't be "important" without reason, and usually it is the *reason* that is of interest to the reader. (Dandelions are an "important" item in the diet of cottontails.) Are dandelions "important" because cottontails eat more of them? Are they "important" because more cottontails eat them? Are they "important" because they provide some nutritional requirement of cottontails not available in other plants? Try "Dandelions occurred more frequently than other plants in material obtained from cottontail stomachs." or "More cottontails ate dandelions than any other food item."

INCREASED — Do not use in place of "greater." Increased means an "addition" or "enlargement" (as in size, quality, extent, number, intensity, value, or substance). Greater means to be large in spatial dimension, or remarkable in intensity, magnitude, power, or effectiveness.

IN FACT; AS A MATTER OF FACT — Usage tends to weaken preceding and subsequent statements by implying that they might be less than factual. If a lead word is essential, try "indeed."

IN ORDER TO — "To" will suffice; the remainder is padding.

INTERESTING; INTERESTING TO NOTE — Presumptuous! Let the reader decide what is interesting. What is interesting to you may not be to the reader.

IN VIEW OF THE FACT THAT — Overly wordy, try "because."

IRREGARDLESS — No such word! Use “regardless” or “irrespective.”

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IT SHOULD BE MENTIONED (NOTED, POINTED OUT, EMPHASIZED) — Such phrases add nothing but words. Get to the point, omit the padding.

IT WAS FOUND (DETERMINED, DECIDED) — Could be evasive; write frankly and directly. Instead of, “It was found that some skunks have more than 12 mammae,” write “Some skunks have more than 12 mammae.”

LATIN PLURALS — Be careful to distinguish between plurals and singulars. “Mental foramina were examined.” “The mental foramen was examined.” Other examples are: uterus (uteri), spermatozoon (spermatozoa), testis (testes), vagina (vaginae), pinna (pinnae), naris (nares), phalanx (phalanges), and radius (radii).

LESS(ER); FEW(ER) — “Less” refers to quantity; “few” refers to number. “He drank less beer today, so there were fewer empty cans.”

LIKE — A preposition, always associated with an object (nouns, pronouns, or noun phrases). Used correctly when it replaces the phrases “similar to” or “similarly to.” E.g., Grasshopper mice howl like [NOT as] coyotes. Compare with “as.”

LIVETRAP; LIVE TRAP — Livetrapped (one word) is a verb, whereas live trap (two words) is a noun. Therefore, animals are “livetrapped” in “live traps.” Hyphenate “live trap” only when used as a noun modifier as in “live-trap grid.”

MAJORITY; VAST MAJORITY — “Majority” means *more than half*. “Vast” suggests *immensity of extent*. In almost all instances “most” will be more precise.

MASS — Often confused with “weight.” Bodies have mass, where forces are measured in units of weight. Thus, “The average mass of adult *Micromys oregoni* from the Coast Range is 19.1 g.” or “The pregnant *Peromyscus* weighed 6 g more than the heaviest nulliparous specimen.” That is, the pregnant one exerted a force greater than the heaviest nulliparous one equivalent to the Earth’s pull on a 6-g mass.

MEAN — Can impart different meaning than intended if not careful. “Mean deer lengths...” (Are these longer than docile deer lengths?) Try “Mean lengths of the deer...”. Be careful of “average” for the same reason. Average deer may not be longer than exceptional deer.

MEASUREMENTS — Measurements are recorded; they are never “taken” or “made.” Dimensions or characters are measured. See taken.

MOISTER — Better use “more moist,” “more mesic,” or “wetter.”

NON — a prefix, usually not hyphenated. Avoid overuse. Don’t use “non” to substitute for established negative prefixes or where “not ...” will serve. Use “incorrect” or “not correct,” never “noncorrect.” Similarly, use “unreliable” or “not reliable,” “uninfected” or “not infected,” and “not significantly different.”

NOT INCORRECT; NOT INCONSISTENT WITH; NOT UNCOMMON — Double negatives become incomprehensible. Use “correct,” “consistent with,” or “common” to express positive concepts of correctness,

consistency, or commonness.

ON AVERAGE — A colloquial usage. Probably unnecessary in science writing. Write “The average length of ... was greater.” or “The distance between traps averages 1.5 m greater on the new grid.”

ONCE; WHEN — Avoid use of “once” to mean *when* as “once” can mean *one time*, *formerly*, *simultaneously*, or *immediately*. When (not “once”) the mouse located the cache it began to fill its cheek pouches.”

OUT; IN — (...14 “out” of 17...), (...14 “in” 17...), or (...to find “out” if...). In most instances, “out” and “in” can be omitted without altering the meaning. Use of “...14 of 17...” and “...to find...” or “...to determine...”

PARAMETER — A perfectly good word that means *an arbitrary constant each of which values characterizes a member of a system or a characteristic element or constant factor*. However, the word has been misused in so many ways that it might be better to avoid using it. Try “characteristic,” “dimension,” or “distance.”

PARTIALLY; PARTLY — “Partially” implies *bias in favor of one or the other*. “Partly” is the more precise term when the concept of *proportion* or *portion* is meant.

PERCENT; PERCENTAGE — Use the percent sign (%) with numerals; use percentage in reference to *proportion of the whole expressed in hundredths*. Compare with proportion.

PREDOMINATE; PREDOMINANT — “Predominate” is a verb, “predominant” an adjective. The adverb is “predominantly” not “predominately.”

PREFER; PREFERENCE — (Cottontails “prefer” brushy habitats.) or (The habitat “preference” of mule deer was investigated.) Likely what is intended is “Brushy habitats support more cottontails.” and “The dispersion of a mule deer population in relation to vegetation was investigated.” Avoid use of “prefer” or “preference” when implications of cognitive ability in animals are not desired or not relevant.

PREVALENCE; INCIDENCE — “Prevalence” means *the number per unit of population at a specific time*. “Incidence” means *the number in a population per unit time*. “The reported incidence of rabies in skunks in northwestern Illinois averaged 23 cases per year.” “The prevalence of rabies in skunks in 1961 was 23 per 1,000 examined.”

PRIOR TO; PREVIOUS TO — “Previous” and “prior” are adjectives that modify nouns. There are “prior” and “previous” events, that occur *before* something else. Likewise, there are “subsequent” events that occur *after* something else. However, events do not occur “previous to,” “prior to,” or “subsequent to” something else. Use “before,” “preceding,” or “after” as the situation requires.

PROBLEM — Indicates *a question open to inquiry* or *a proposition stating something to be done*. Often misused. The potassium “problem” in deer caused... The sentence needs to be rewritten. Perhaps a better way to express the meaning would be, “Inadequate potassium in deer caused...” or “Failure to meet the potassium requirements in deer caused...”

PROPER NOUNS AS MODIFIERS — Avoid by use of appropriate prepositions and by emphasizing the precise subject. Instead

of, "*Peromyscus* metabolic rates..." try "Metabolic rates of *Peromyscus*..." Instead of "North Carolina faunas..." use "Faunas of North Carolina..."

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PROPORTION — Use in the sense of "part," e.g., the relation of one part to another or to the whole with respect to magnitude, quantity, or degree. Compare with percent.

PROVEN — "Proven" is an adjective, but "proved" is the past participle. Be careful of this word; rarely is anything "proven" in science. We test hypotheses and sometimes fail to reject one, but this is not proof.

PROVIDED; PROVIDING — "Provided" usually followed by "that" is the conjunction; "providing" is the participle.

RADIOCOLLAR — Hyphenated when used as a noun, e.g., "Researchers equip animals with radio-collars." But, one word when used as a verb, e.g., "Researchers radiocollar animals."

REASON WHY — Omit "why." The "reason" is the "why."

RESPECTIVE; RESPECTIVELY — Avoid use if possible.

SAID — Often used incorrectly as, "Jones (1950) said ..." Nothing was "said," so use "wrote," "noted," "suggested," "reported," "recorded," or some other term.

SCAT — Commonly used as a synonym for fecal dropping but imprecise because of numerous other meanings. Consider substituting "feces," "fecal droppings," "fecal passage," "fecal pellets," or "excrement" for greater clarity.

SEE — [See Smith (1980).] Superfluous! The reference alone is adequate.

SINCE — "Since" has a time connotation, from some time in the past to the present. For clarity, do NOT use as a synonym for "because."

SMALL IN SIZE; RECTANGULAR IN SHAPE; GREEN IN COLOR; TENUOUS IN NATURE — All superfluous. Use "small," "rectangular," "green," and "tenuous" alone.

SPORTSMEN'S PLURALS — Hunters and anglers regularly use "zero plurals" by omitting the "s," "es," or "ies." Always use zero plurals for "bison," "cattle," "deer," "moose," and "sheep"; both zero plurals and plurals formed with a suffix can be used with "elk," "fish," and "trout," but the suffix indicates a diversity of kinds (The northern "elks" are larger than the southern races.), but use the appropriate suffix to form the plurals for "antelope," "bear," "beaver," "buffalo," "caribou," "cat," "cougar," "coyote," "ermine," "fisher," "fox," "hare," "jaguar," "lemming," "lion," "lynx," "marten," "mink," "muskrat," "opossum," "otter," "peccary," "pig," "pronghorn," "puma," "rabbit," "raccoon," "rat," "seal," "skunk," "squirrel," "walrus," "weasel," "whale," "wolf," and "wolverine."

SWITCHING TENSES — "Wilson (1980) and Genoways (1979) 'have reported' that grammatical errors 'are' common in manuscripts that 'were' submitted for publication." Use the simple past tense — "found," "were," "had," "occurred" — to report the findings of others; use the present tense for describing organisms. However, do not change tenses within paragraphs. Avoid use of the emphatic mood (When they "did" occur...), and be careful to use the subjunctive (If the bait "were" fresh, it would attract animals).

TAKEN — [Data were "taken" from Smith (1982).] Smith's data may have been used, but they were not "taken" (extracted) from Smith! Likewise, one does not "take" or "make" measurements; "dimensions," "characters," or "features" are measured.

TAXA AND VERB AGREEMENT — Scientific names of all taxonomic levels (kingdom, order, family, genus, species, subspecies) take singular verbs.

THAT; WHICH — These are two words "that" can help, when needed, to make intended meanings and relationships unmistakable, "which" often is of prime importance in science writing. If the clause can be omitted without leaving the modified noun incomplete, use "which" and enclose the clause with commas or parentheses; otherwise, use "that."

THIS; THESE — These pronouns (among others) commonly are used to begin sentences when the antecedents to which they refer are unclear. (Elephants, whales, and bats are mammals, although bats fly like birds. "These" animals are endothermic.) It is unclear whether just the mammals are endothermic, just the birds, or both the birds and mammals. Make sure that the antecedents of "these" pronouns are clear!

TO BE — Frequently unnecessary. (The difference was found "to be" significant.) Omit "found to be." There is no change in meaning.

TO SEE — (More research is needed "to see" if foxes kill cats.) "To see" means *to perceive by the eye*. Substitute "to determine," "to ascertain," or "to detect."

TOTAL — (A "total" of 10 squirrels was observed.) Commonly superfluous as, "Ten squirrels were observed" means the same thing. When absolutely necessary to use "A total of..." as the subject, note that it takes a singular verb irrespective of the magnitude of the total to which reference is made.

TRAPPED — "Trapped" means *to capture in traps*. Therefore, "...study areas were trapped..." produces a ludicrous assertion; "study areas were sampled!" Use "Traps were set for 3 nights on four study areas."

USING — This word probably is responsible for more ludicrous assertions in the literature than any other. (Cottontails were caught "using" live traps.) Although cottontails may be caught in live traps, they do not use them. Try the prepositions "in" or "with," or the phrase "by use of" to avoid ambiguous meanings (dangling participle).

UTILIZATION; UTILIZE — "Use" will suffice.

VARYING; VARIOUS; DIFFERENT; DIFFERING — Commonly misused as synonyms. "Varying" amounts or "differing" conditions imply *individually changing amounts or conditions* rather than a selection of various amounts or different conditions.

VERY; QUITE; SOMEWHAT; CONSIDERABLE — Avoid modifiers that impart indefinite measure. For example, "A 'very' large bear..." does not provide an indication of how large or provide a scale for judging the relative size of the bear. Either write "a large bear..." or better, "A 3-m tall bear..."

WHERE — Implies a *locality, position, or direction*. Do not use for "in which" or "for which." [Direct relationships in which (*not* where) muskrats and minks...]

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WHICH IS; THAT WERE; WHO ARE — Usually superfluous. (The data “that were” related to age were analyzed first.) Omit “that were”; it doesn’t change the meaning. (The site, which is located near Corvallis,) Omit “which is.”

WHILE — Implies simultaneity. Often misused for “although” or “whereas.” [*Dipodomys merriami* has four toes on each hind foot, whereas (*not* while) *D. ordii* has five.] [Although (*not* while) deer sometimes chase coyotes, rabbits never do.]

The foregoing was based on a list provided by the Iowa Experiment Station Publications at Iowa State University and has been added to by many American Society of Mammalogists editors. The list was modified and many words commonly misused in manuscripts submitted for publication in the *Journal of Mammalogy* and *Mammalian Species* were added.

Leslie Carraway, Associate Editor
Mammalian Species
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