

Notes on Technical Writing*

What follows is taken directly from the *Mathematical Writing* book based on Knuth's writing course offered at Stanford University in the late 1980s. Anything appearing in square brackets is either a reordering or a slight paraphrase of material that also comes from the introductory pages 1 – 5 of the text.

The following are a number of points important in technical writing:

6. The word “we” is often used to avoid the passive voice.
[Example: “We can now prove the following result.” is preferable to “The following result can now be proved.”] But this use of “we” should be used in contexts where it means “you and me together,” not a formal equivalent of “I.” Think of a dialog between author and reader. In most technical writing, “I” should be avoided, unless the author's persona is relevant.

8. Don't omit “that” when it helps the reader to parse the sentence.

Bad: Assume A is a group.

Good: Assume that A is a group.

10. Don't use the style of homework papers, in which a sequence of formulas is merely listed. Tie concepts together with a running commentary.

11. Motivate the reader for what follows.

Perhaps the most important principle of good writing is to keep the reader uppermost in mind: What does the reader know so far? What does the reader expect next and why?

When describing the work of other people it is sometimes safe to provide motivation by simply stating that it is “interesting” or “remarkable”; but it is best to let the results speak for themselves or to give *reasons* why the things seem interesting or remarkable.

When describing your own work, be humble and don't use superlatives of praise, either explicitly or implicitly, even if you are enthusiastic.

12. Many readers will skim over formulas on their first reading of your exposition. Therefore, your sentences should flow smoothly when all but the simplest formulas are replaced by “blah” or some other grunting noise.

14. Don't use the same notation for two different things. Conversely, use consistent notation for the same thing when it appears in several places. For example, don't say “ A_j for $1 \leq j \leq n$ ” and “ A_k for $1 \leq k \leq n$ ” in another place unless there is a good reason. It is often useful to choose names for indices for that i varies from 1 to m and j varies from 1 to n , say, and to stick to consistent usage. Typographic conventions (like lower case letters for elements of sets and uppercase for set) are also useful.

16. Display important formulas of a line by themselves. If you need to refer to some of these formulas from remote parts of the text, give reference numbers to all of the most important ones, even if they aren't references.

17. Sentences should be readable from left to right without ambiguity. Bad examples: “Smith remarked in a paper about the scarcity of data.” “In the theory of rings, groups and other algebraic structures are treated.”

18. Small numbers should be spelled out when used as adjectives, but not when used as names (i.e., when talking about numbers as numbers).

Bad: The method requires 2 passes.

Good: Method 2 is illustrated in Fig. 1; it requires 17 passes. The count was increased by 2. The leftmost 2 in the sequence was changed to a 1.

21. Some words are frequently misspelled:

implement	not	impliment
complement	not	compliment
occurrence	not	occurence
dependent	not	dependant
auxiliary	not	auxillary
feasible	not	feasable
preceding	not	preceeding
referring	not	refering
category	not	catagory
consistent	not	consistant
descendant (noun)	not	descendent
its (belonging to it)	not	it's (it is)

22. Don't say "which" when "that" sounds better. The general rule nowadays is to use "which" only when it is preceded by a comma or by a preposition, or when it is used interrogatively. Experiment to find which is better, "which" or "that" and you'll understand this rule.

Bad: Don't use commas which aren't necessary.

Good: Don't use commas that aren't necessary.

Another common error is to say "less" when the proper word is "fewer."

24. The opening paragraph should be your best paragraph, and its first sentence should be your best sentence. If a paper starts badly, the reader will wince and be resigned to a difficult job of fighting with your prose. Conversely, if the beginning flows smoothly, the reader will be hooked and won't notice occasional lapses in the later parts.

Probably the worst way to start is with a sentence of the form "An x is y ." For example,

Bad: An important method for internal sorting is quicksort.

Good: Quicksort is an important method for internal sorting, because . . .

Bad: A commonly used data structure is the priority queue.

Good: Priority queues are significant components of the data structures needed for many different applications.

25. The normal style rules for English say that commas and periods should be placed inside quotation marks, but other punctuation (like colons, semicolons, question marks, exclamation points) stay outside the quotation marks unless they are part of the quotation. It is generally best to go along with this illogical convention about commas and periods, because it is well established, except when you are using quotation marks to describe some text as a specific string of symbols. For example,

Good: Always end you program with the word "end."

On the other hand, punctuation should always be strictly logical with respect to parentheses and brackets. Put a period inside parentheses if and only if the sentence ending with that period is entirely within the parentheses. The punctuation within parentheses should be correct, independently of the outside context, and the punctuation outside the parentheses should be correct if the parenthesized statement were removed.

Bad: This is bad, (although intentionally so.)

26. Resist the temptation to use long strings of nouns as adjectives: consider the packet switched data communication network protocol problem.

In general, don't use jargon unnecessarily. Even specialists in a field get more pleasure from papers that use a nonspecialist's vocabulary.