Some Comments on Technical Writing

Here is a list of suggestions concerning technical writing. Some of these items are a matter of personal style, and some are general rules to live (and write) by. The idea is for you to improve your own natural style of writing by incorporating these suggestions into your writing.

- Use present tense for anything mentioned in a report or in a model. Future tense should be reserved for describing work that has not been done, but is expected (extensions of the model being reported, for example). Past tense should be reserved for nonrepeatable or specific events. In particular, the derivation of equations is timeless – if it can be derived today, then it can be derived next week in the same way – so all mathematics should be described in the present tense. Also, any past or future events *in a model* should be in present tense. For example, in a study of saving for retirement, the assumption that interest rates remain constant during the timespan of the model should be reported as 'It is convenient to assume that the interest rate remains constant' rather than as 'It is convenient to assume that the interest rate will be constant for 20 years'.

- Be concise, but explain yourself. No one wants to read a 20 page report that should be only 5 pages. But on the other hand, don't assume that the reader is as familiar with the topic as you are. Provide a complete background of the problem, and never fail to explain the significance of the results you obtained.

- Write in complete sentences, but don't let them get too long. It is better to break a complex idea into several sentences than to stupify the reader with a 5 line monstrosity. Maintain consistency in tense, person, and look for parallel grammatical structures. I wrote that wrong deliberately! Maintain consistency in tense and person, and use parallel grammatical structures.

- Important equations, expressions or inequalities (label these correctly) should be set off from the text to attract attention. Minor equations can be imbedded in the text. In either case, though, these constructs are part of the sentence structure and should be punctuated accordingly. They usually act as nouns, although the symbols $=, <, >, \leq, \geq$ can be treated as verbs. For example, consider the following:

The logistic growth model is

$$P(t) = \frac{(r/a)P(0)e^{rt}}{P(0)(e^{rt} - 1) + (r/a)}. \tag{1}$$

P is the population at time t, r is the growth rate, a is the coefficient of the environmental modification term, and r/a is the carrying capacity – the maximum sustainable population.

To find the doubling time, set $P(t) = 2P(0)$, and isolate the exponential term before applying the natural logarithm to both sides. The doubling time is

$$t_l = \frac{1}{r} \ln \left(\frac{2P(0) - 2r/a}{2P(0) - r/a} \right). \tag{2}$$

Since this expression depends on the initial population and the carrying capacity, the conditions under which it is valid are more complicated than in the first model. The argument of the logarithm must be strictly positive, which implies that

$$2(P(0) - r/a) < 0 \quad \text{and} \quad 2P(0) - r/a < 0 \tag{3}$$

or

$$2(P(0) - r/a) > 0 \quad \text{and} \quad 2P(0) - r/a > 0. \tag{4}$$

- Writing a report usually has very little to do with solving a problem. Don't write a report as a diary of what you did in the order that you did it. Instead, once you have solved the problem, write an outline containing the background that the reader needs, a description of the solution method and the interpretation of results, and write the report based on what you want and need to tell the reader. This can be rather annoying at times, because quite often, the hard part of the solution (the part that took 3 weeks of your life to complete) shows up as a single sentence. Tough! The reader doesn't want to hear your sad story about how it took 17 attempts to set up the equation properly.

- When presenting results in tables or figures, be sure to include complete information about the results. Tables and figures are highly visible, so the casual reader will naturally be drawn to them first. Include captions to present all the pertinent information, even if that information appears in the text as well. For the report to be readable, it must present the main points in an easily identifiable format. This is why abstracts and conclusions are included, too.

- There are many different acceptable styles of writing, but technical writing demands more formality and structure than, say, writing a letter to a friend. It is very common for papers and articles to be written in first person (using personal pronouns, in particular, 'we'), but just because 'everybody does it' doesn't make it right. It seems to me that the reason people use first person is simply that no one ever told them that it is not the best for technical writing. Using first person does add an air of friendliness that is desirable in, say, textbooks, but when writing technical works, it is important to maintain a sense of professional detachment, to assure the reader that what you write is fair and objective, and that it can be believed. Therefore, I suggest that you use third person. Consider the following sentences:

  We all know that Lake Erie is more polluted than Lake Ontario. (too informal)

  It has been observed that Lake Erie is more polluted than Lake Ontario. (too stuffy?)

  Note that Lake Erie is more polluted than Lake Ontario. (too wordy?)

  Lake Erie is more polluted than Lake Ontario.

- Read the third paragraph on page 3 of the text, starting with "One cannot ...". It's not a bad paragraph, but let's be very picky for a moment. The first sentence uses third person ("One"). The next 3 sentences have a change in tone, with no pronouns at all. Then it's back to third person ("one"), then there's a switch to first person ("we") in the final sentence, with a switch back to impersonal tone at the end of the sentence. This paragraph probably doesn't need to be rewritten, and might not be easy to rewrite easily, but the point is for you to think about consistency in tone when you are writing. Attending to these small issues can have a big impact on the overall impression that your document provides.