Hints on Writing Style

1. Introduction

This paper discusses a number of issues in the written style and the presentation of illustrations that are relatively frequent in student work and gives guidance on avoiding them.
References and bibliography are outside the scope of this paper and are covered in *Guidelines for the presentation of written work in the School of Computing Sciences* and the process of writing a paper is discussed by Smith (2005).
Very often the people you are communicating with will not have any real grasp of the technical matters you are concerned with, but will judge you and your ideas largely on the basis of the quality of your writing and presentation, although the penalties for poor communication may not be as severe as they were 200 years ago:

> The Commissioners ... observe that you make use of many affected and incongruous words... if you hereafter continue that ... way of writing and to murder the language in such a manner, you will be discharged for a fool.[1]

This paper is structured in three sections: Section 2 describes issues in the production of illustrations, including graphs, tables, and diagrams. Section 3 concerns equations. Section 4 contains short discussions of a number of common style issues.

2. Illustrations

Diagrams

Most descriptions of systems or designs are helped by - or require – suitable diagrams. Where a particular formalism is used (e.g. Entity-Relationship Diagram, Data Flow Diagram, Use Case Diagram, Class Diagram, …) the conventions for that type of diagram must be followed. If diagrams are copied or redrawn from other sources it is essential that the source is properly referenced.

Tables

Tables are used to show sets of readings or experimental results. All tables should be numbered and carry short descriptive captions. Units must be stated at the top of each column in the column heading.

Graphs, histograms and other charts

Graphs, histograms and other charts should be numbered and have short descriptive captions. It is important to use a type of chart appropriate for the data being visualised. Usually, continuous data series are best visualised with a line graph, frequency distributions with a histogram, and proportions with a histogram or pie chart. Graphs and histograms that contain several lines or classes need to clearly distinguish the different data by using different colours or line styles. The axes of all graphs and histograms should be marked with the names of the appropriate quantities and units.

[1] Letter from the Secretary to the Commissioners of Excise to the Supervisor of Pontefract, 18th century. Quoted by Gowers (2004:24).

3. Equations

There are two approaches to including equations in a report:

1. Use LaTeX. Recommended. Good for all types of equation or mathematical notation. The only good tool for setting large numbers of complex equations.
2. Use MS Equation Editor (part of the Word package). It is acceptable for simple equations.

4. Style issues

To be effective, reports must describe the work, results and issues clearly, concisely and accurately. Achieving this depends on identifying the readership, since what is clear and concise to one reader may be incomprehensible jargon to another.

Reports that do not develop an argument degenerate into pointless and boring descriptions. Readers cannot be relied upon to think through and see the implications of a simple description - they must be told explicitly.

A good report, like any other narrative, must have a proper beginning, middle and end

Reports are normally written in the past tense. A common mistake is to describe work that has been done using the future tense (as it was in the future when the report was planned…). The occasional use of the first person can make the text more interesting and, when describing a decision, it is often better to say "Given these results, we decided ...". Personal opinions unsupported by other evidence (experimental or cited) are not appropriate in technical writing.

Using the active voice always makes the text more readable. Instead of the passive form: "The stage gain was increased by reducing R", it is better to use the active: "Reducing R increased the stage gain".

There are several common hazards in technical writing; a few of the most common are listed below. A classic (and very readable) discussion of these problems can be found in Gowers (2004); the Guardian style guide - modern, comprehensive and available online (Marsh and Marshall 2004), but Zobel's guide (Zobel 2005) is the only one directed specifically at computer scientists.

Grammar

Poor grammar makes it more difficult for your readers to understand what you are trying to communicate. If the grammar is dubious, many readers will doubt your conclusions.

Many of your readers will be offended or irritated by errors, or will judge the overall quality of your work on its presentation – especially if they don't really understand the technical content.

Some of the most frequent grammatical problems in student writing are:

1. Starting sentences with a main clause, e.g. "The simplest being the use of...", is ungrammatical;
2. Errors such as incorrect agreement in number between noun and verb ("**none** of these factors **were** considered important…", "a **number** of factors **were** taken into consideration…");
3. Constructions like "the user… they" are symptomatic of a modern problem. The number disagreement will worry many readers. However, the desire to avoid "the user… he" is laudable, and "the user… he or she" gets wearing after a time. The best strategy is to write "users… they" wherever possible.

Grammar checkers in modern word processors are not infallible. If you are uncertain about your grammar you should use one, but do not be a slave to its rules. In particular, the Grammar tool in

Word is reasonable, but tends to flag a number of technical terms and phrases in normal use in computing and electronics technical writing.
If you are uncertain how to write reasonable sentences and paragraphs, it is essential that you take appropriate actions to address the problem. Some suggestions:

- If you are dyslexic, make sure that this is properly recorded in the School (see the Dean of Students service).
- If you are not confident with academic written English (e.g. because it is not your native tongue), you should allow plenty of time to read what you've written, get friends to help by reading at least some parts of it, and use a grammar checker.
- If you have managed to get through an English-speaking school system without absorbing the rudiments of grammar you should find a textbook on written English that you can work from and teach yourself. (Books designed for EFL teaching such as (Swan 1995) are often useful.)

Whatever combination of approaches you use, it is important that you find a way of producing reasonably written reports.
However, if you have a specific disability, do not be put off as members of faculty will make appropriate allowances in your assignments. (It is quite possible to become an internationally recognised academic and still find two different ways to spell "use" in the same paragraph!)

Spelling

There is no excuse for mis-spellings, given the widespread availability of spelling checkers. Word processors now include a thesaurus, which can be used to give you an idea of what each word means. If you're not sure, or if the word has been changed to a spelling recommended by a spelling checker, use the dictionary to make sure it's the one you want. (You can access the Oxford English Dictionary online from any UEA computer http://www.oed.com/)

Punctuation

This section contains brief notes on the more common forms of punctuation.
Punctuation and parentheses should be placed next to the preceding word, e.g.
"... records, hence ... (Robson 2000)." not "... records , hence ... (Robson 2000) .":
Sentences end with a **full stop**.

- A **semi-colon** is used in two situations. First, to join short related sentences, for example "Hyphenation in English is tricky; there are no clear rules." Second, to separate list items where the items in the list contain commas, for example, "The speakers will be Mounia Lalmas, Glasgow; Jamie Callan, UMass; and Justin Zobel, RMIT.". Semi-colons are never used to introduce lists.
- A **colon** introduces a list. Always use ":" not ":-".
- **Commas** delimit clauses in sentences and separate items in lists. When they are used to delimit clauses in sentences they are often used in pairs. A simple list is punctuated with a comma between each item and the next, except for the last item, which is preceded by "and", for example ". If the items in the list contain "and" it is best to put a comma before the "and" that precedes the last item, for example "members of the armed forces, civil and crown servants, and local government officers"
- **Parentheses** contain asides and amplifications in a sentence; make sure that the sentence reads correctly without the text inside the parentheses.

- **Slashes** have no clear semantics in English, so it is never clear whether a slash means “and” or “or”, therefore they should be avoided in scientific or technical writing. The exception to this is the term “and/or”.
- **Dashes** should be avoided in formal reports, as it always gives an air of casual informality, which is not what you want in these circumstances.
- **Apostrophes** are unnecessarily problematic for many people. They have two uses:
  - Ownership: to form the possessive (e.g. “the system’s average response time was 12 seconds”). The rules for their use are:
    1. If the word is singular add “'s”,
       (For example: "the student's books" means the books belonging to the student.)
    2. If the word is plural and ends in s add “s'”,
       (For example: "the students' books" means the books belonging to the students.)
    3. The possessive of "it" is "its",
       (For example "the bank changed its policy on unauthorised overdrafts".)
       Note: "It's" is the contraction of “it is”. (For example "it's raining again".)
  - Contraction: to show that letters have been left out in colloquial forms (e.g. “don't switch the computer off”); contractions are not usually appropriate for academic writing.
  - Apostrophe’s are never used to form plurals, even though it's tempting with TLA's and dates (spot the two errors!)

Journalese

There are many phrases that journalists use to quickly turn out newspaper and magazine text; these are not suitable for technical writing. Some examples:
"Intel has taken the lead in promoting wireless chip technologies ..."
"Its author EDS health and safety officer Mike Reynolds ..."
"US manufacturer Pixelworks has claimed a breakthrough ..."
"John Glauert, a professor at the University of East Anglia says ..."

Woolly Phrases

Avoid long and imprecise phrases where concise alternatives exist. A few examples:

> “in the case of”, “in this direction”, “in regard to due to the fact that”, “with reference to”, “in so far as ..... is concerned”, “in this respect”, “according as to whether”, “in spite of the fact that”, “with a view to”, “for the purpose of”, “in point of fact”.

Spurious Precision

It is important to avoid claiming a precision greater than that which is justified by the experiment or analysis, e.g. "Some wear was detected". If the amount is important then quote it precisely. It is meaningless and irritating to litter your reports with figures such as 31.67% (of a sample of 19). In such cases it is better to make a general statement that all percentages have been rounded and avoid the impression of spurious accuracy.

Elegant Variation

If you are writing technically about spades, call a spade a "spade" throughout and not "a highly evolved digging tool" in one paragraph and "an ancient agricultural implement" in another. Remember that your aim is to communicate clearly and unambiguously.

Vague Pronouns

Make sure that every "it" or "this" has a subject to which it clearly refers, e.g. "The directive properties of the hybrid junction can be used to separate the reflected component from the incident wave. This (?) is then added to a wave .....".

One word or two?

Some terms can be written as a single word or as two words. Some common words can be written as two but are normally written as one: "cannot" (not "can not") is the most common. Use a dictionary if you are in doubt.

"If you take hyphens seriously you will surely go mad" (OUP of New York style book, quoted in (Gowers 2004)). Hyphenation in English is tricky and there are no clear rules. The best advice is to follow the same conventions as you see in the books and articles you read. Otherwise it is best to consider if a hyphen may improve or clarify your meaning. For example, in the mid-1990s the Guardian published an article that was uncomplimentary towards "black cab drivers". Many readers read this as "cab drivers with black skin", and complained. The writer's intended meaning was "drivers of black cabs" (i.e. London taxis). If the writer had written "black-cab drivers" there would have been no ambiguity.

Emphasis

In general you should avoid italicising words for emphasis - it is rarely justified in a technical report. Underlining is the typewriter or longhand equivalent of italics, and is not required for word processed documents. Occasionally it may help the reader to have important technical concepts or key words at the start of list items in a bold font.

Capitalisation

In English, proper nouns and words that start sentences are capitalised. Other nouns are not capitalised.

5. Conclusions

In this paper we have presented descriptions of a number of common stylistic problems and ways of avoiding them. A fuller discussion of the issues affecting writing on computing can be found in Zobel (1997) and in the many general guides to written English.

References

Gowers E. (2004) *The Complete Plain Words*, 3e, Penguin

Marsh D., and Marshall N. (eds) (2004) *The Guardian style guide* http://www.guardian.co.uk/styleguide/

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