Typography for writers

Typewriters, word processors, and typesetting – a little history

For nearly a century, manuscripts for publication were created with typewriters that had fixed width fonts we now refer to as monospaced fonts or just typewriter fonts. Preparing a typescript for publication required that font changes needed by the typesetter were indicated in a few simple ways: italics was requested by underlining (used for journal titles and book titles), boldface was requested by a wavy line hand-drawn under a symbol or word (used for vectors, tensors, and matrices in mathematics; keywords in textbooks), and regular mathematics was made italic or roman based on context (mathematical typesetting was a specialized branch of the printing trade). Not much else was available.

The path from hand-marked typescript to printed work usually involved a scientific editor, a house editor trained in printing and typography, a designer who had established the basic font choices and layout, and a typesetting technician who could translate the manuscript and its markings into a good-looking page. Limitations of typewriters were overcome by a group of professionals acting between the author and the printing press.

In the 1980s, a combination of graphical user interface (GUI) operating systems, desktop laser printers, and software improvements all came together to produce desktop publishing. Macintosh computers, Apple LaserWriter printers, Adobe PostScript page description language, and Aldus PageMaker page layout software all came out in 1984 and 1985, and that is generally considered the beginning of the way we currently operate. The combination of all of these cost about $10000 at first so it was still a serious commitment restricted to professional uses. Software and hardware improvements allowed WYSIWYG editing (pronounced “wizzy-wig,” stands for “what you see is what you get”) in which the screen shows a close approximation to the final typeset product. Between the level of typewriters and page-layout publishing software is the world of word processors. Word processors originally (1970s) were standalone combinations of hardware and software that cost as much as the typical annual salary of a secretarial worker, so market penetration was small. By the mid 1990s, computers were cheap and ubiquitous, and a level of quality close to desktop publishing was available to every scientist and student.

With desktop publishing and the common expectation that authors will provide publishers with a document that is nearly camera-ready, we have eliminated most of the professionals between an author and the final publication, giving the author greater control, and reducing publication costs. Technology has changed faster than the training of typists, so authors should know a few things about typography.

Typographic suggestions

Fonts. Do not get carried away with using too many fonts, but do not feel compelled to use the default font of your word processor. The most common default fonts are newspaper fonts, designed to be printed small. Others may look better at 12 pt size. Be careful using historical fonts – they reflect how inks of an era flow onto and soak into paper manufactured in the same era as well as the manner in which ink was applied to paper. The very earliest printing fonts emulated the quill-pen hand-printing of scribes because that was what people were accustomed to reading.
Roman, serifed fonts work better than sans-serif for extended text reading. Avoid sans-serif fonts like this for a long text. (Designers speculate that serifs help our eyes follow the lines.) Sans-serif fonts may reduce visual clutter when used as labels in graphics and are fine for headers and titles.

**Line Length.** Text lines are easiest to read if only 50–60 characters long – less than six inches long. Wider lines should typically be broken into multiple columns, or the eye will swim between lines when trying to scan back and forth. The standard American typescript (and typical university thesis format) allows lines up to 6.5 inches long (8.5 inch wide paper with 1 inch margins), but compensates the eye by large vertical spacing between lines.

**Line Spacing.** Typewriters wrote six lines per inch at single space, and they could double space or one-and-a-half space. Double spacing allows room for editing and marking a manuscript, so it is still the norm for manuscripts being submitted for further editing. Word processing systems can do any amount of leading (vertical spacing between lines) and most documents will look best a little more than single spaced but short of one-and-a-half space.

**Horizontal Spacing.** Intersentence spaces may be different lengths than interword spaces. Fashion trends over the last 100 years have shortened intersentence spaces to where they are either the same as interword spaces or only slightly longer. Good software does not require typists to unlearn their training of putting two spaces after sentence breaks, but the most popular word-processing software does not handle them well. Choose a mode and be consistent.

Unbreakable spaces appear the same as any other interword space, but they will never be used as line breaks (In TeX, \~{}; in Word, Option-Space on Macintosh and Ctrl-Shift-Space on Windows). Put them between numbers and unit symbols of a quantity (10 m), between an honorific and a name (Mr. Jones), in some place names (St. Louis).

**Emphasis.** Within standard text, use *italics for emphasis* extremely rarely and “shock quotes” even more rarely. Bold face is not usually used for emphasis. For textbook style presentations, as in this handout, boldface may introduce unfamiliar words or phrases. Use quotation marks only for quoted text. Use italics for journal titles (not paper titles), book titles in reference lists, and some non-English words and phrases, and in mathematical contexts, below.

**Headings and section titles.** Almost anything can be done for short headers and title lines, and a contrasting font may work better than just using the same roman font larger. Many fonts are designed only for use as short header or display title lines – they are designed for advertising and brochures only. When preparing a paper for a journal, look at the header designs used by the journal and follow their pattern, regardless of whether it follows these suggestions.

- **ALL CAPITAL TEXT IS HARD TO READ.**
- **Bold is useful,** *italics is useful,* **bold-italics should be avoided.**
- **If you distinguish a header based on size,** make sure the difference is big enough to be obvious. This paragraph started with a 14 pt header, changing back to the normal 10 pt text. Increasing a font size by a small amount will just make the reader uncomfortably aware that something is different, as in this section of 11 point text.
- **Underlining** is a typewriter shortcut for italics, and it seldom appears in print.
Punctuation. Computers are more capable than typewriters. Therefore:

• You probably have four different characters that look like a short horizontal line: the hyphen -, the en dash –, the em dash —, and the minus sign. Use the en dash for number ranges (1991–1998).

• Use of dashes for parenthetic breaks follows two style traditions. The American tradition is an em dash surrounded by no space—as shown in this sentence. Europeans more often use an en dash surrounded by a small space – like this. Pick a mode and be consistent.

• Word processors will usually apply curled “quotation marks” and ‘single quotes’ automatically. They will occasionally get them wrong, so notice them and know how to fix them. Feet and inches or minutes and seconds still need the straight quotes ’ and “, and the traditional prime symbol in math is a slanted straight mark.

Beyond Typical Needs. Professional systems allow kerning to change the spacing between letters (‘AV’ should be pulled together slightly and ‘VW’ should be pushed apart); ligatures of some special combinations, more spacing control, and choices among traditional digits (123456789) and uppercase (123456789). Authors seldom need to worry about these.

Science and math

Scientific reports commonly require special symbols, mostly for math. The font chosen for the main text must be compatible with the mathematical symbols, greek font, and whatever math-italics font is available. Many science books look similar because only a few font sets were designed to be compatible among math, greek, and regular text.

Mathematical symbols are usually italic, both in displayed equations and within inline text. Sometimes, the math-italics font will be slightly different from the text-italics font, as math-italics must be compatible with the greek math font and with the operator glyphs. Exceptions:

1) Function names, acronyms, and pieces of words longer than a single letter are roman. Thus, \( \cos t, T_{\text{max}}. \) RMS (root-mean-square). Acronyms often look better in small-caps if available and allowed: RMS, LAI (leaf area index).

2) Chemical symbols are also roman font, not italicized: CO\(_2\), H\(_2\)O.

3) Vectors are bold-faced roman, \( \mathbf{a} \cdot \mathbf{b} = |\mathbf{a}| |\mathbf{b}| \cos \theta \)

4) Tensors and matrices are usually bold sans-serif: \( \mathbf{T} = 2\mu \mathbf{E} \).

5) Digits, parentheses, summation symbols, and other mathematical glyphs are not italicized or artificially slanted to emulate italics. \( (a + b) = 4, \) not \( (a + b) = 4. \)

6) Never add “s” to a mathematical symbol to indicate a plural. One might be referring to “temperatures” but you can never notate them as “\( T_s. \)”

7) Use math symbols. The degree symbol ° is a round circle and does not look like a superscript letter o as \( o. \) The multiplication symbol \( \times \) does not look like x or X.

8) When mixing a minus sign with other math symbols, try to find the special minus sign character. It will be the same vertical centering and weight as related operators – this string of symbols starts with a minus sign and ends with an en dash –+−−−, and the en dash is high and thin compared to the central lines of the other operators.
**SI units** have a large set of rules. [http://physics.nist.gov/cuu/Units](http://physics.nist.gov/cuu/Units) Here are a few.

1) **SI units are symbols, not abbreviations** – do not follow them with a period. Unit symbols are in **roman** font to distinguish them from math symbols, never in **italics**.

2) **Unit symbols are inseparable from a number expressed as digits.** Thus:
   
   a) Use digits with unit symbols, use spelled-out numbers with unit names. A cliff can be 5 m tall or it may be five meters tall, but it is never five m tall and rarely 5 meters tall. Also do not use unit symbols with a nonspecific number. You might estimate several kilograms but not several kg of something.
   
   b) Do not hyphenate digit-symbol combinations, even if the number-unit combination would be hyphenated if spelled out. A fifteen-second delay is hyphenated because ‘fifteen’ and ‘second’ combine to form an adjective that modifies ‘delay.’ However, a 15 s delay is not hyphenated – the digits and units are already a single item. (Some editors disagree with this. They are wrong.)
   
   c) A line break should not happen between the digits and units of a quantity. If 343 W m⁻² had been typed with an unbreakable space, then 343 W m⁻² would have appeared together as appropriate. Reflexively type unbreakable spaces in all such situations, rather than just when you think it will make a difference.

3) **Units used in combination must have space between them.** For example, m s⁻¹ is “meters per second” while ms⁻¹ is “per millisecond” – quite different. W m⁻² is “watts per square meter” and Wm⁻² is undefined because there is no SI unit whose symbol is Wm.

4) If you use power-of-ten multiplier prefixes (M = mega, k = kilo, and so on), then the multiplier becomes part of the symbol and is not spaced from it: PW is petawatts and P W is not defined because there is no standalone SI symbol P. Prefixes have higher precedence than exponents, so 2 km² is 2×(1000 m)² and not 2000 m² nor (2000 m)².

5) **Kelvin is an SI unit whose symbol is K. Degrees Celsius is a related unit whose symbol is °C. (Kelvin does not have a degree symbol.)**

6) All the SI units that are named for people are appropriately capitalized in the symbols, but lowercase when spelled out as a unit. We honor Isaac Newton with a unit of force called the newton whose symbol is N.

**Equations** and mathematical notations value the freedom of handwriting for placing symbols in relation to each other. Mathematics-specialized systems (TeX and LaTex) allow unlimited freedom but are hard to learn. Easy equation editors, as in Word, are adequate but will sometimes smash symbols into each other.

Equations set “inline” should have limited vertical extent relative to the typical text line, as in $\cos h = \cos \theta \cos \delta$. Forcing equations into the text line via constrained summations, $\overline{x} = \frac{1}{n} \sum_{j=1}^{n} x_j$ should be avoided, and instead use a displayed equation

$$\overline{x} = \frac{1}{n} \sum_{j=1}^{n} x_j$$