

1.1: Copy-editing scientific papers

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Editors of science journals deal with manuscripts at a macroscopic level, making sure the science is right. Copy-editors put the same material under a microscope, making sure the presentation of the science is right. But what exactly does copy-editing consist of? This chapter is for new editors and others who want to know what copy-editors do, how they do it, how their work contributes to the publications they work on, and what qualities and resources they need.

Copy-editing assesses correctness, consistency, precision, and all the minutiae that help to make articles acceptable and readable. Those who do this work are called copy-editors, technical editors, manuscript editors, subeditors, or various other names. Some journals and publishers have in-house copy-editing staff, but the work is often done by freelancers working outside the office. Both in-house and freelance staff need to know what level of editing is required and, if a consistent product is to be published, to be familiar with the house style of the journal or publisher.

Levels of copy-editing

For scientific manuscripts, copy-editors check grammar and spelling, make sure that the promised figures and tables are present and suitable for publication, check references, and modify the language where necessary. They also code or tag contributions in electronic format for typesetting – and much else, depending on the various requirements of the particular journal or publisher. The job may include administration as well as technical editing, substantive editing and – occasionally – creative editing. Editors need to decide which of these “levels of edit” are needed for their publication and instruct their copy-editors accordingly.

Administration is usually done by in-house staff who may or may not be copy-editors. It covers such matters as recording the date of receipt of articles, names and addresses of authors, and titles of articles. It may include assigning a reference number, checking that the contribution is complete, acknowledging its receipt, and checking on its progress through the refereeing and publishing processes. Many of these tasks can now be performed automatically by editorial software.

Technical editing is the core business of copy-editors. This kind of editing concentrates on correcting or standardizing the mechanical style, format, and language of papers, so that they conform with house style as set out in a typographic style sheet or other recommendations. It includes some or all of the checks listed in Boxes 1–4.

Box 1. Checklist for mechanical style and format of text

- Is the manuscript complete? Are all files with tables etc. included?
- Does the title page include all the required information?
- Is the format of authors' names, addresses, etc. correct?
- Is an abstract of the correct kind included, if required?
- Are spelling and punctuation consistent?
- Are headings and subheadings in the text clearly ranked?
- Are extracts and quotations clearly indicated and acknowledged?
- Are capital letters, small capitals, italics, and bold type clearly marked and used correctly and consistently?
- Are abbreviations and symbols used correctly and consistently?
- Are abbreviations other than recognized abbreviations for units explained at first mention and later used consistently? Are special scripts and accents clearly presented and used consistently?
- Are mathematical and chemical terms and equations correctly presented? Are numerals correctly written? Commas in numbers should preferably be replaced by thin spaces, to avoid confusion with decimal commas in other languages (see e.g. Ufnalska 2011).¹
- Are parentheses, brackets, and mathematical braces properly paired off?
- Is spacing between mathematical operators, numerals, and symbols appropriate?
- Are acknowledgements properly positioned and marked? If an appendix is included, is it properly positioned and marked?
- Are footnotes and endnotes, if any, clearly positioned and linked to their indicator symbols in the text?

Substantive editing overlaps with technical editing but may not always be part of a copy-editor's job description. It can include:

- revising article titles, table titles, figure legends, and abstracts to make them concise, accurate, and informative, as these parts of the paper are crucial for readers;
- adding keywords;
- examining and improving the logic, order, and emphasis of the text;
- eliminating jargon, repetition, redundancy, and irrelevancies;
- suggesting ways of shortening words, sentences, or

- paragraphs to make the text easier to read (see Box 4);
- cropping illustrations to emphasize the most important parts.

Some of this work may of course be done by a journal editor rather than a copy-editor, depending on the size of the journal and how much time the editor can spend working on it.

Box 2. Checklist for tables and figures

Are tables and figures referred to in the text in correct numerical order?

Do tables and figures show what the text says they show?
Do numbers and other references to table and figure contents match any details cited in the text?

Tables

Do tables have clear titles, column headings, and footnotes, as needed?

Have abbreviations in tables been explained?

Are all footnote indicators correctly attached to footnotes?

Is the arithmetic in tables correct — do numbers in table columns add up correctly, and are percentages correct?

Is the layout of tables clear to readers? If necessary, are different parts of tables clearly marked for typesetting?

Figures

Are line drawings clearly drawn?

Are photographs of good quality?

If figures have been supplied electronically, are size and resolution acceptable?

Have scale bars been included if needed?

Will lettering, lines, and symbols remain legible if reduction is necessary?

Do figure legends agree with what the figures seem to show?

Have symbols and abbreviations in figures been explained?

Creative editing means making major changes in the content or organization of an article. This is usually done by the journal editor, perhaps with referees' suggestions in mind. However, some copy-editing may include this kind of work too, especially if the copy-editors are authors' editors – who work for authors before papers are submitted rather than for journal editors after those papers have been received.

Copy-editing procedure

Both authors' editors and copy-editors in journal offices or publishing houses work on behalf of the eventual reader, focusing on areas that might make the text unclear or redundant. They try to remove the obstacles that hide the author's message, while avoiding distorting that message. They may start by checking that all the necessary parts of the paper – title page, copyright assignments, acknowledgements, tables, figures, and legends – have been included and are in the correct form (Box 1). What is done next depends on what level of copy-editing is required.

Marking up the format for typesetting, or tagging for electronic production, will be the minimum level, followed by marking the mechanical style in the ways indicated in Boxes 1 and 2.

Box 3. Checklist for citations and bibliographical references

Are all citations in the text included in the reference list?

Are all references in the list cited in the text?

If names and dates are given in the text, do they agree with those in the list?

Does the form of citations in the text match journal style?

Are all the required parts of references included in the reference list? Are those parts in the correct sequence and form?

Is the punctuation correct?

Is the typographical style (roman, italics, bold) correct?

If journal titles are abbreviated, are abbreviations correct?

Does the form of references to books, reports, and other types of publication match the required style?

Are links to internet resources valid?

The third level, correcting the language (Box 4), may be done at this stage, including substantive editing if this is required. A separate stage is usually needed for checking references and reference style in the ways listed in Box 3. Checking references may include verifying that the original source has been correctly cited; however, few if any journals routinely make this time-consuming check and it is usually done only if discrepancies are noticed. URLs should be checked to ensure accuracy and functionality.

One possible method of working is to deal with all the required levels of editing together, during one or two readings of a manuscript, followed by a separate stage for cross-checking and styling references. Another method is to edit the language first, at the same time as substantive editing if this is required, followed by format and mechanical style, again with reference checking and tagging for electronic production as separate stages.

If there are queries for authors, they may need to be answered before the manuscript is sent for typesetting or posted online. Any questions not answered at this stage can be marked on the author's proofs.

Copy-editors may also be responsible for checking proofs and making sure that answers to queries are incorporated in the final version of the article.

House style

Journals and publishers usually prepare style sheets: lists of their preferences on what is to be abbreviated, capitalized, italicized, or hyphenated, and on what spelling or punctuation should be used when acceptable alternatives exist. This is house style, built up from a mixture of experience and editorial idiosyncrasies. As well as encouraging consistency, house style saves time that would otherwise be spent making decisions about the same matters over and over again.² More extensive style sheets

may develop into style books and include information on nomenclature and terminology in the specialties covered by the publication(s). House style also applies to the details of how citations are made in the text and how they are styled in the reference list. Copy-editors should be consistent in applying house style; if there is no house style, they should draw up their own list of instructions.

Box 4. A checklist for language editing

Spelling and punctuation

Is the spelling correct and consistent, according to house style?

Are quotation marks correctly used according to house style or national conventions?

Are parentheses correctly placed?

Are subjects and verbs separated by paired commas or no commas (never by one)?

Are commas in adjectival clauses correctly used?

Are hyphens and en and em dashes correctly used?

Have apostrophes been kept to a minimum and been correctly used?

Are colons and semicolons correctly used?

Have exclamation marks and dashes been kept to a minimum?

Grammar and syntax

Do verbs agree with their subjects?

Have auxiliary verbs been included where necessary?

Are participles and infinitives correctly attached to their subjects?

Has the passive voice been kept to a reasonable minimum?

Are tenses correctly used?

Have abstract nouns been used with restraint?

Have strings of three or more nouns been kept to a minimum?

Do pronouns refer clearly to a preceding noun?

Have relative pronouns been correctly used?

Have definite and indefinite articles been included or omitted, as necessary?

Have prepositions been correctly used?

Are comparatives complete?

Have words been used in the right order?

Usage

Is usage correct according to current recommendations?

Have words been used with precision?

Have the simplest words and the simplest ways of writing been used?

Have sexist, racist, or dehumanizing terms been transformed or removed?

Working principles for copy-editors

In their work, copy-editors should be encouraged to observe certain principles.³ They should:

- leave well enough alone — if authors write correctly, their own wording should be kept;
- find good authority for any changes needed;

- make essential changes only;
- protect readers from authors and authors from themselves, i.e. make the manuscript easy to read and correct;
- be prepared to accept that their version of the author's prose is not necessarily an improvement – argue so far but no further, then give way gracefully;
- be ready to respect authors' feelings – provide praise before criticism;
- comment constructively when comment is needed;
- look for answers from reference sources or previous issues of the journal before putting queries to an author;
- keep queries to the author short and to the point.

Is copy-editing useful?

Editors new to the job may think that papers accepted for publication can be printed as they stand. This may be possible if the authors are skilful writers and exceptional keyboarders. Otherwise editors, readers, and printers or typesetters find that copy-editors make the publishing process much smoother and more economical in time and money. As well as improving the language of many papers,⁴ copy-editors remove the minor errors that annoy readers but may easily go unnoticed by editors and referees – and if readers find mistakes in details, they become suspicious of the rest of what authors have to say. Correctness in apparently minor matters is important in science, because readers may want to repeat experiments or observations. Copy-editors also keep production costs down by removing redundant material, styling manuscripts in an acceptable way, and providing clear instructions for typesetters or accurate tagging for electronic production.

Who are the copy-editors?

In many countries there is no clear path to becoming a copy-editor for a scientific journal or other publisher. A degree in an appropriate branch of science may help, but a degree in the humanities may be useful too. The ability to handle language sensibly and sensitively, a (well-controlled) passion for accuracy, and a good eye for errors and inconsistencies are essential qualities.

Formal qualifications in copy-editing are awarded by the Board of Editors in Life Sciences (BELS; www.bels.org), based in the USA. BELS holds examinations in North America and elsewhere and awards the qualification ELS: Editor in the Life Sciences. In the UK, the Society for Editors and Proofreaders (SfEP; www.sfep.org.uk) offers an accreditation scheme for copy-editors and proofreaders. These organizations and others, including some universities, in the USA, UK, Australia, the Netherlands, and elsewhere, provide short courses on copy-editing or publishing/editing. Other useful courses are those on writing well in science. Many of these courses are listed in EASE's journal, *European Science Editing*, and on EASE's website (www.ease.org.uk). Some publishers also hold in-house courses for new freelance staff and others.

Resources for copy-editors

A good reference library, and experienced co-workers who can be asked for advice, are the main resources for copy-editors, as well as the ability to use the internet. Some books and websites are listed below. Joining an association of editors, such as EASE, is a good idea too (for other examples, see www.ease.org.uk/resources/useful-links). Joining an online forum will also prove useful in finding answers to difficult questions and providing moral and practical support when problems arise.

Dictionaries

Acronym Finder (www.acronymfinder.com)

Dictionary.com (www.dictionary.com)

Dorland's illustrated medical dictionary, 32nd ed. 2011. Philadelphia, PA: Saunders.

Henderson's dictionary of biology, 15th ed. 2011. Harlow, UK: Pearson Education.

McGraw-Hill dictionary of scientific and technical terms, 7th ed. 2010. New York: McGraw-Hill.

Merriam-Webster Dictionaries (www.merriam-webster.com)

OneLook Dictionaries (www.onelook.com)

Oxford Dictionaries (www.oxforddictionaries.com)

Stedman's medical dictionary, 28th ed. illustrated. 2005. Philadelphia, PA: Lippincott Williams & Wilkins.

Wiktionary (http://en.wiktionary.org/wiki/Wiktionary:Main_Page)

yourDictionary.com (www.yourdictionary.com)

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Style manuals

AIP Publication Board. *AIP style manual*, 4th ed. New York, NY:

American Institute of Physics, 1990. (www.aip.org/pubservs/style/4thed/toc.html)

American Psychological Association. *Publication manual of the American Psychological Association*, 6th ed. Washington, DC: American Psychological Association, 2009.

BMJ house style (www.bmj.com/about-bmj/resources-authors/house-style)

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Dodd J.S. *The ACS style guide: a manual for authors and editors*, 2nd ed. Washington, DC: American Chemical Society, 1997.

Iverson C (ed.) *AMA manual of style: a guide for authors and editors*, 10th ed. New York, NY: Oxford University Press, 2007.

University of Chicago Press. 2010. *The Chicago manual of style*, 16th ed. Chicago: University of Chicago Press.

English grammar, usage, and guides to writing

Albert T. (ed.) *The A-Z of medical writing*. London: BMJ Books, 2000.

Collins *COBUILD English Grammar*. London, UK: HarperCollins, 1990.

Fowler H. and Winchester S. (eds) *Fowler's modern English usage*, 3th ed. Oxford: Oxford University Press, 2004.

EASE guidelines for authors and translators of scientific articles to be published in English (www.ease.org.uk/publications/author-guidelines).

Goodman N.W. and Edwards M.E. *Medical writing: a prescription for clarity*, 3rd ed. Cambridge: Cambridge University Press, 2006.

Kirkman J. *Good style: writing for science and technology*, 2nd ed. Oxford, UK: Routledge, 2005.

Ngram Viewer (www.books.google.com/ngrams) [for comparing frequency of synonyms or spelling variants]

O'Connor M. *Writing successfully in science*. London: HarperCollins, 1991. [Now handled by Taylor & Francis.]

Ritter R.M. *New Hart's rules: the handbook of style for writers and editors*. Oxford: Oxford University Press, 2005.

Strunk W. Jr, White E.B. and Angell R. *The elements of style*, 4th ed. Boston, MA: Allyn & Bacon, 2000. (Earlier edition online at www.bartleby.com/141/)

Reference checking

PubMed/Medline (www.ncbi.nlm.nih.gov/pubmed/) [for checking details of publications in the biomedical sciences]

GoogleScholar (www.scholar.google.com) [for general reference searches]

Online forums

EASE-forum: subscribe at majordomo@helsinki.fi [open to non-members as well as EASE members]

Electric editors: www.electriceditors.net [several forums and many useful links]

References

1 Ufnalska S.B. EASE guidelines help editors and scientists save time. *Science Editor* 2011; 34(4): e10.

2 Cooter M. Putting on the style. *BMJ* 1999; 319: 1592. (<http://bmj.com/cgi/content/full/319/7225/1592>)

3 O'Connor M. *How to copyedit scientific books & journals*. Philadelphia, PA: ISI Press, 1986.

4 Cooter M. 2008. Style: what it is and why it matters. In: Hall G.M. (ed.) *How to write a paper*, 4th ed. London: BMJ Publishing Group, 2008.

1.2: Editing texts by non-native speakers of English

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Making the message clear

The editing of NNS (NNS here stands for non-native speaker of English, NS for native speaker of English) texts can be particularly problematic. NSs may find such English quaint, clumsy, or wrong; NNS readers not sharing the author's mother tongue may find the English difficult or impossible to understand. We can expect NNS authors to use English less subtly and skillfully than NS authors, and to find it difficult to know what and how to rectify, if asked to "improve the English". So, if an NNS text is to communicate what the writer intends and contain no distracting linguistic shortcomings, it needs to undergo careful language editing. This chapter discusses generic features of NNS texts, some problems the language editing could and should resolve, and suggests editorial strategies. It also discusses who should do this editing.

Mistakes versus errors

Pre-publication science texts are never perfect for purpose, whatever their author's mother tongue: they may contain incorrect spelling, punctuation and grammar, or have stylistic shortcomings such as redundancy, omissions, poor coherence, verbosity (or its converse: extreme terseness). A useful distinction is between "mistakes" and "errors": we all make mistakes when tired, careless, or rushed, but when alerted to them we are able to correct them ourselves. Errors are ingrained and made consistently and systematically, so they have to be corrected for us, or we must learn not to make them. Through sensitive editing, editors can teach NNS authors to avoid making certain errors.²

Generic NNS errors: learner English

Language-learner errors are an obvious feature of NNS English. They often arise from misapplying rules: for example, to form the past tense of an irregular verb. Grammar- and spell-checking software flags many such errors (such as "singed" instead of "sank"), but will leave examples such as "leaded", instead of "led" and "lied" instead of "lay" because these forms exist in English (as does "grinded" instead of "ground"). Editors of NNS texts must therefore look out for such cases but should also be prepared to find NNS authors of technical texts distrusting the spellchecker because it queries acceptable terminology. When an Austrian author found "detrended" and "outlayer" being queried, she assumed that both were correct and that the spelling checker could not cope with statistics jargon. But "detrended" is correct, and "outlayer" should be "outlier".

Another language-learner shortcoming of NNS scientist-writers is a narrow and skewed vocabulary. Fewer synonyms are known, so words and stock phrases tend to be overused.

Sometimes an imprecise or infelicitous word is used because the apt word is not known. In such cases, editors can help NNS authors expand their vocabulary and enhance their scholarly credibility by inserting or suggesting appropriate replacements (for example, "coextensive" instead of "limited to", when describing the extent of cap rock in a simulation model of an oil reservoir). On the other hand, the NNS scientist's vocabulary contains many specialist scientific terms. The combination of narrow general vocabulary and disproportionately wide specialist vocabulary yields writing in which "difficult" scientific terms are incongruously embedded in simplistic English. Sometimes, NNS scientists try to write very formally by nominalizing (using many words ending in -tion), writing exclusively in the passive voice and favouring multisyllabic words ("utilize" instead of "use", for example). As well as being difficult to read, this style is difficult to sustain in a foreign language, so here too, incongruity creeps in, this time because over-simple or informal words and expressions (such as "a lot of", "don't") appear in a matrix of complex, formal prose. In both cases, the editing should aim to achieve an even tone that is appropriate for the scientific content, is reader-friendly and does the writer justice.

Learners also make lexical errors (errors of word choice). The examples in Example 1, a Chinese-authored sentence, include "strong" (instead of "great") and "abundant nutrition" ("high nutritive value"). "Culture ways" and "long-time planting" are literal translations that preserve Chinese word order, so can be classed as transfers (see below).

Example 1

The tomato is one of important vegetables and has many advantages, such as high yield, strong adaptability, abundant nutrition, many culture ways and long-time planting.

Generic NNS errors: transfers

Many of the errors and much of the strangeness of NNS writing result from transfer ("what works in my language will work in English"). The transfer can also be of an omission: the commonest (a classic marker of NNS English) concerns definite and indefinite articles ("the" and "a/an"), which many Oriental and Slavic languages lack. Authors speaking these languages tend to use English articles arbitrarily, but errors such as "a research" or "an advice" also arise from transfer of usage from languages with articles. Editors vary in how they amend article usage in NNS texts, for two reasons: the difference between American and British usage (in terms of frequency and collocation) and the expectations of specialist readers (for

example, in abstracts and biomedical articles, definite and indefinite articles are used sparingly).

Transfers of symbols

Transferred symbols can also cause problems. Example 2 illustrates a transfer of the symbol which in many European languages means “approximately”.

Example 2

The plates were incubated for 3 weeks in a dark room at ± 23 °C and a relative humidity of $\pm 90\%$.

Failed transfers of a particular group of symbols – punctuation marks – are widespread (such as decimal commas instead of decimal points). Not all such transfers are immediately obvious: by the phrase “exclusion criteria were (suspected) pre-stroke dementia...” the Dutch author did not mean that the dementia was suspected but that it was either suspected or had been confirmed. Embedded brackets are frequent in Dutch writing and acceptable in certain types of English, but in scientific English, Dutch-authored phrases such as “trace metal(loid)s” and “placenta (histo-)morphology” are unacceptably arcane. Expressions such as “(un)sterile gloves should be worn” are easy to correct (to “gloves should be worn”), but even editors who specialize in Dutch-authored texts and are therefore aware of the phenomenon of “Dutch” brackets still often need to ask authors to explain what the brackets mean, so that the text can be corrected to unambiguous scientific English.

False friends

Extremely important transfers that can result in miscommunication are the so-called false friends: look-alike (or sound-alike) words. These are another diagnostic feature of NNS texts. Editors should look out for the ones common to several European languages. For example, Dutch, French, German, Italian, Spanish and Swedish have a word resembling the English “eventual” but meaning “possible”. Phrases such as “eventual death” or “eventual damage” in an NNS text may therefore need to be queried. Another “European” false friend is “actual” (used because a similar word means “current” or “topical”). Spanish and Russian authors may write “complexion” when they mean “physical constitution”, because of the Spanish *complexión* and Russian *Комплекция*.

If a sentence contains a perplexingly incongruous word, a good editorial strategy is to assume it is a false friend, translate it into the author’s language and then check its meaning in a bilingual English dictionary. There are internet resources that will help. Consider the puzzling “staircases” in Example 3a (written by an Italian author), which Google Translate converts into the Italian text in Example 3b.

Example 3a

The data of the 2 groups diverge in almost all the staircases.

Example 3b

I data del 2 gruppo divergono in quasi tutte le scale

Hovering over *tutte le scale* in Google Translate and

then clicking to reveal alternative translations brings up the suggestion “all scales”, and checking via Google Translate or an online Italian–English dictionary will confirm that *scala* means “scale”. Although this strategy allows editors who do not speak the author’s mother tongue to translate false friends into correct English, it is very time-consuming. An editor who speaks the author’s language, or who is also a translator and therefore applies translation strategies routinely, will identify and rectify such errors more quickly than a monolingual English editor working in an Anglophone setting.

Back-translation will not resolve problematic NNS word choice if the author’s pronunciation has driven the spelling, as when an Iranian author wrote “magnetic steerer” instead of “magnetic stirrer”. Many of the pronunciation-driven errors in Dutch-authored texts are not flagged by spelling checkers (“excess” instead of “access”, “threat-mill” for “treadmill”).

Transfers of syntax

Transfers of syntax (word order) account for the foreignness of much NNS writing. Example 4 is from a Polish author. Grammar-checking software ignores such errors.

Example 4

[The river Vistula] is polluted by located in the up stream course heavy industry in the Upper Silesia region.

Transfers of conventions from the NNS writing culture

Conventions of writing are not universal, so appropriate scientific writing varies among cultures. To an NS, science writing in the German intellectual tradition, for example, appears “pretentious and badly organized” (see ³ p.188) whereas the four-unit pattern of writing traditional in certain Asian cultures (notably Chinese, Japanese, Korean and Thai) may seem incoherent (cf.⁴). And when French scientists transfer the French convention of reporting science in the present tense to their English writing, they seem to be stating general truths, rather than describing their own procedures and findings (see ⁵ p8). NNS scientists are already exposed to the conventions of scientific English passively (through reading) and actively (through writing courses), but didactic editing can help them master these.²

Features attributable to both learner English and transfers: writing that does not “flow”

NNS authors who write fluently in their own language often write English that does not flow, as do novice and unskilled NS writers. Since disjointed, clumsy text can distract the reader from the message, even when the individual sentences have correct grammar, spelling and punctuation, it should be improved.

One or more of the following factors can contribute to awkward flow:

1. the NNS author does not know how to use cohesive devices (conjunctions and words or phrases that signal links with preceding sentences) effectively in English;
2. cohesive devices are not used as often, or as explicitly, in his or her mother tongue;

3. the author has been guided by the sentence length usual in the mother tongue, but this is much longer or shorter than in scientific English;
4. the author has followed mother-tongue ordering of the information in the sentence.

Reason 1 is clearly a learner error, but the others are transfers. Reason 3 helps explain why NSs lose the thread of the long and complex sentences written by French, Germans, Russians and Spanish, but find that Dutch scientists write choppy (very short, simple sentences). Reason 4 results in “frontal overload”, a feature reported in the English writing of Dutch, Finnish and German scientists, but undoubtedly found in other NNS Englishes. It comes about because in English, the rhetorical impact comes at the end of the sentence. Compare Example 5a, a frontally overloaded Dutch-authored sentence, with the corrected version 5b, which contains the same information, but has been “end-focused”.

Example 5a

The carbon balance of terrestrial ecosystems is strongly debated since the discovery that our understanding of the global carbon cycle could not track the pathways of all CO₂ released by human activities.

Example 5b

Since the discovery that our present understanding of the global carbon cycle fails to track the pathways of all the CO₂ released by human activities, there has been heated debate about the carbon balance of terrestrial ecosystems.

Problems of assertiveness

When making claims and presenting conclusions, authors must use words that are neither too strong nor too weak for the given situation. An NNS author may not have mastered the modal verbs (“may”, “might”, “would”, “should”, for example) that signal degrees of confidence about an assertion. If that author uses forceful verbs (“cause”, “produce”, “show”), no modals and no qualifying adjectives or adverbs like “possible” or “apparently”, he or she appears assertive. This is enhanced by overuse of the present tense (which, conventionally in scientific English, is used for stating general truths). Whether this English results from learner ineptitude (not knowing subtler words, being unable to use tense properly) or is cultural (in Dutch, modal verbs are used less frequently; in French, science is reported in the present tense), it should be edited sensitively to modify the bluntness. Sometimes, the tone is over-cautious, over-polite, or vague because the author has used weak verbs (“suggests”), many modals and qualifiers, and imprecise terms. Though learner ineptitude could again be the cause, the root of the problem may be a cultural difference in politeness strategies, especially if the author is Japanese or Chinese and therefore conditioned to write diffidently. In this case, the language can be adjusted towards a more assertive tone.

Author reaction

Whereas NNS authors generally appreciate having their informal, learner’s style adjusted upwards to scientific/academic English, editing to make over-formal, pompous prose more reader-friendly, may upset authors from cultures where science writing is very formal. Germans find it unnatural to say that an inanimate object is performing an action, so may dislike “it is shown in the table...” being changed to the active and shorter “the table shows”. And trying to introduce the personal pronoun “I” in a single-author paper can meet with resistance, for example from Chinese, Japanese and Germans. Often, older scientists resist using the personal pronoun, but even young Dutch scientists avoid using “I”, preferring “we” for its collegiality and unaware that in English this “signifies loftiness or avoidance of responsibility by the author”.⁶

NNS cultural myopia

This problem in NNS texts arises when writers forget that their English writing will be read by a huge international audience who may be unfamiliar with their culture. Included in a Japanese oncologist’s mindset, for example, are the Japanese systems of classifying cancer lesions.⁴ A Japanese-authored English text that assumed that these are part of the mindset of peer readers from other cultures would therefore miscommunicate. Dutch hydrologists may assume the manipulated groundwater depth classes used in the Netherlands are widely known. For such cases, editors should use translation strategies: add explanations, or glossary terms. (Note that such cultural myopia is not restricted to NNS authors, but may also be found in NS writing!)

Who should edit NNS texts, and how?

Language editing is time-consuming, so should preferably not be done by journal editors and reviewers, who are first and foremost scientists, not language professionals. Gosden⁷ reports that the 116 science journal editors he surveyed rarely corrected awkward NNS constructions and idiosyncrasies (“sounds funny, but OK”). Their corrections were superficial, at sentence level (spelling, punctuation, grammar and syntax).

Commercial online editing services recommended by many science journals offer NS science-graduate language editors who correct grammar and spelling errors. Whether they also correct other NNS errors is questionable. However, there are specialist language professionals who work with NNS authors to remove cultural and linguistic problems from texts. These authors’ editors operate at the interface between editing and translation, as mediators between the NS and NNS cultures, to filter out the linguistic and cultural transfers and cultural myopia from NNS writing.⁸

Whether the language editing can preserve the author’s authentic voice depends on the standard of English and the field of science. Author personality is downplayed in the hard sciences. Ideally, after editing, the English of an NNS author writing with a strong foreign accent should be international, rather than unnaturally American or British. And when inept NNS English is being amended,

care must be taken to ensure that the changes do not alter what the author is trying to say, but only how he or she says it. Ideally, the author (who, after all, is responsible for the paper) should know what has been changed, why, and to what effect. Burrough-Boenisch and Matarese discuss how authors' editors do so, and mention the importance of giving language editors due acknowledgement.⁸

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Further reading

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1.3: Increasing your editing efficiency by using macros

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Definition: Macro – a small (or large) computer program that ‘does things’ with the text of Word files.

Automatic editing?

If you asked a professional indexer or translator whether their job could be done by a computer, you would rightly get a ‘robust response’. So what about editing? Could computer programs (that is, macros) ever do our job for us? Clearly not, because only humans can negotiate the delicate art of ensuring that a sentence communicates efficiently and effectively.

But although macros can't replace us, the thesis of this chapter is that they can give us a great deal of assistance. My idea is that computer programs and human editors should each play to their strengths. Let the macros do the boring repetitive jobs, and we'll do the more interesting task of engaging with the meaning and expression of the text.

Unlike me, macros don't miss the occasional occurrence of some word or phrase just because they get bored or tired or distracted. More positively, computers are so quick that we can get them to do jobs such as checking some of the finer details of consistency that we couldn't justify doing, if we had to do them by hand.

So the result of using macros can be that (a) the job gets done more quickly and (b) you produce a more consistent book, paper, or thesis.

‘A good workman never blames his tools’

This phrase, which Google tells me(!) dates back at least to the 13th century, is very important here. Macros are just tools; you, the editor, have to select the appropriate tools for a given job, use them carefully, and interpret the results intelligently. Some macros could even be likened to chainsaws: Sure, they can do a lot of work very quickly, but use them inappropriately and you can make a terrible mess. So macros have a huge potential, but please don't blame me if you use them and they do more harm than good.

Where can I find the macros I want?

That's fairly easy. I have put together a free electronic book with well over 400 macros in it, written specifically for editors by editors (well, mostly by me, actually). So, just download the book, find ‘How do I install a macro?’, and get started. The book, *Macros for Writers and Editors*, is available free of charge from my website at www.archivepub.co.uk.

Which macros would help me most?

Editors can be involved in a huge range of jobs, so how do you know which macros will be most useful for your way

of working? And even if two editors are doing the same job, they may well tackle it in very different ways, so there's no way that I can say, ‘You need to use such and such macros.’ But let me suggest a few scenarios in which macros might be of help...

- You're reading the text and you see coming up a numeral – ‘6’, say – and you need it to be ‘six’, so you click somewhere on the line and press a key that you've set up to run the *NumberToText* macro, and the ‘6’ is instantly changed. Then the text says ‘At A level, I got 3 As, 2 Bs and 1 C’ – so click, click, click (run the macro three times) and it becomes ‘... I got three As, two Bs and one C.’
- How many times a day do you change a comma into a full point and then make the next word start with a capital, or change a full point to a comma and then lowercase the following word, or change to a semicolon, or to a colon, or an en (or em) dash? In each case, all I do is place the cursor somewhere in the first word, and press Ctrl and Alt, together with the desired punctuation mark, and the appropriate macro changes the punctuation mark, sorts out the spacing (for dashes), and sorts out the case of the first letter of the next word.
- You come to something that looks like a degree symbol (°), but you suspect it might not be. You run *WhatChar*, and it tells you that it's actually a masculine ordinal (as used in N°) or a superscripted ‘o’. And in some fonts, the number 1 and the letter l look remarkably similar – as do the O and the 0. *WhatChar* will tell you what each is, even spelling it out as, say, a ‘lowercase el’. And is that an ordinary space, a fixed space, a thin space, or a space that has accidentally been superscripted? *WhatChar* will tell you.
- You have a book made up of some preliminary material plus chapters 1 to 10, and an appendix or three, all in separate files. Even if the client wants you to deliver them in separate files, wouldn't it be helpful to have all the text in one file to make it easy to search for things? There's a macro that combines them for you automatically. (And there's also a macro that can split up one big file into separate chapter files, if you need that.)
- Do you need to take all the pictures and diagrams out into a separate file, leaving behind call-outs: ‘<Figure 1.1 here>’ etc? *FigStrip* does that. And if you have to do the same with tables, there's *TableStrip*.
- You see a word or phrase and you want to look back to the previous time it was used. Select it and, with one keypress, *InstantFindUp* will take you straight back

to the previous occurrence. What's more, the word or phrase is now in Word's Find box, so by clicking Ctrl-PageUp and Ctrl-PageDown, you can jump through each and every occurrence in the text. (And if you do Ctrl-Alt-PageUp and Ctrl-Alt-PageDown, two other macros allow you to jump *case-sensitively*, so you can avoid those occurrences that are not in the same case.)

- You're comparing two files. Perhaps someone has made some edits to one of them, and you want to check, compare, or implement them in the other file. So you make the two files visible on screen, perhaps with Window->Arrange All and then, as you look through the edited file and find something interesting, you run the *FindSamePlace* macro, and it will jump immediately to the same place in the other file.
- You're editing some text with Harvard (name, date) reference citations, and you would like to check that all the references cited are actually in the reference list and that the list doesn't contain any uncited references. There is a commercially available system, *ReferenceChecker*, that will do it for you, but my two macros, *CitationLister* and *CitationListChecker*, while not doing as comprehensive a job as *ReferenceChecker*, will be much quicker than checking them by hand.
- There's even an automatic spell-correction system. But don't panic, you can tell it not to make any corrections to the spelling of any of the words within quotations and/or reference lists.

'Know your enemy'

Before you start to edit a text – especially if it's a whole book – it can be really helpful to know if the author has used certain conventions (and if so, how consistently). True, you may have a brief that tells you what conventions to use, but, if not, find out what the author has (mostly) used and stick with that. Here are just a few suggestions: US or UK spelling, -is-/-iz- spelling, serial (Oxford) comma or not, hyphenation of certain words (for example non-linear and nonlinear)? Do people's initials have full points or spaces: JLB/J L B/J.L.B./J. L. B. Matekone?

Four macros: *TextAlyse*, *DocAlyse*, *PronounAlyse* and then *IZIScount* will analyse your document and list all the different conventions, spellings, and hyphenations, used or highlight them. And it will even alert you to possible misspellings of proper nouns, for example if it sees Beverley and Beverly, it will tell you it has found, say, five of the former and one of the latter, so you now know to check if this is two different people or just a spelling error.

If you're really keen, you can run these macros again at the end of the job to check whether, in your editing, you have been consistent in applying these conventions.

One macro with 1000 applications

I've saved the most powerful macro to last: *FRedit* (short for 'find and replace edit'). It provides an easy way to do a sequence of global find-and-replaces on a document. Simply create a list ('script') of find-and-replaces in a separate Word file, and run the *FRedit* macro; it makes all the changes that you specify in your script, one by one, in

a matter of seconds. You can have as many different scripts as you like, for different jobs and different clients. Also, because the scripts are held in Word files, it's easy to chop and change your scripts at any time.

```
| multiple spaces to a single space
~^32{2,}|^32

| remove rogue spaces in four places
^32^t|^t
^t^32|^t
^32^p|^p
^p^32|^p

| multiple returns to a single return:
~^13{2,}|^p

| space-hyphen-space to space-dash-space
- | ^=^32

| A few standard misspellings (case insensitive)
| and highlighted to show that they have been changed
~superced|supersed
~practicing|practising
~practicedg|practised
~licencing|licensing
~licenced|licensed

| Subscripting chemicals (highlighted in grey)
| first CO2 and SO2
~([SC])[oO0]2|\1O;;2

| NOX
~N[Oo][Xx]>|NO;;X

| water
H2O|H;;2O

| Now change ;;<character> into subscripted character
~;;(?)|1

| th/st/rd/nd not superscript
th|th
st|st
nd|nd
rd|rd
```

Box 1. A short sample *FRedit* list

And we're not just talking about changing text. As with Word's own find-and-replace dialogue, *FRedit* also allows you to change formatting (bold, italic, superscript, subscript, small caps, and underline) as well as styles. For example, you can use it to automatically change, throughout the whole document, CO₂, H₂O, m/s², B.C. and A.D. into CO₂, H₂O, ms⁻², BC and AD, etc.

Like any powerful tool (eg a chainsaw!), global find and replace can be dangerous if not handled carefully. However, *FRedit* helps you there, because it allows you to highlight

any or all of the changes it makes, so that, as you read the text, you can see where changes have been made. What's more, you can use different highlight colours for the various changes, and/or use different colour fonts.

And *FRedit* can selectively use track changes. So, for example, you wouldn't want to have track changes switched on for changing double spaces into single or perhaps for space-hyphen-space into space-dash-space, but your client might want to see more significant changes. With *FRedit*, you can specify which find-and-replaces are tracked and which not; this is especially useful because, as you probably know, Word can get in a real twist if you track change certain ones.

(You could use *FRedit* for is/iz changes, but don't bother, because there are far too many exceptions to the rule – instead, *IStoIZ* does it at a stroke, as it holds a file of all the exception words.)

Another application of *FRedit*'s highlighting is to use a set of global 'changes' that don't change the text but just apply various colours of highlighting to different words or phrases. I find this useful with 'plain English' texts where I have a long list of no-no words or phrases, such as 'implement', 'going forward', 'in conjunction with', etc. These are all highlighted for me (in colours relating to the client's strength of feeling), so that, as I read, I can edit them out.

Although the principle of *FRedit* is simple, you can use it to do some sophisticated editing of Word files, especially if you use wildcard find-and-replaces. But you don't need to be an expert on wildcarding, because *FRedit* comes with a huge library of scripts, so you can cut and paste the various bits of script into your own script file for any given job. For example, hyphens to en dashes within number ranges, (un)eliding numbers (1939–1945 to 1939–45 or vice versa), automatically applying coding (<A>, , etc.) to hierarchically numbered headings, moving footnote markers outside punctuation, etc. The list is endless.

Lots more where these came from

I hope these few suggestions fire your imagination and encourage you to look at the rest of the macros. By picking the ones that best suit your way of working, you can save yourself a lot of time, and they will enable you to produce a more consistent output.

If you can't find a macro that does what you want, do ask me, because other people might want to do the same as you. If I then write a macro for you (no charge!), others can use it – and maybe me too.

Macros for all

I can't guarantee that all my macros will work in all situations, but I do know that people with different language versions of Word are using them, as are Mac users (but not Word 2008, of course, as it doesn't support macros). And if any of the macros don't work when you try them, do let me know and I'll see if I can spot and correct the problem.

Happy macroing!

1.4: Using units and quantities correctly

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In scientific texts, expression of units, measures and quantities follows the 'Système international d'unités' (SI). This system is guarded by the Conférence Générale des Poids et Mesures¹ and is elaborated by the International Standards Organization (ISO). Their standard ISO/IEC 80000, completed in 2009, presents the International System of Quantities (ISQ).² ISO/IEC 80000 replaces ISO 31.

Only a summary of the basic principles and some applications is presented here. Editors (and others) will find more extensive information in chapter 12 of *Scientific Style and Format*.³ This book gives valuable advice on several aspects beyond the scope of this chapter.

Several websites also present more or less comprehensive summaries of the SI; for example www.bipm.org/en/si/, physics.nist.gov/cuu/units/ and lamar.colostate.edu/~hillger/pdf/Practical_Guide_to_the_SI.pdf.

Quantities, units and symbols

In measurements we distinguish units, quantities and values. A *unit* is a standard *quantity* with which other *quantities* of the same kind are compared to express their *value*. For example, 'length' is a quantity, 'metre' a unit, and '4.6' a numeric value, allowing us to say that "the length is 4.6 metre". The SI has 7 base quantities (dimensions), each with its corresponding unit, as shown in Table 1. Each quantity and each unit has a symbol, which is also shown in Table 1.

Table 1. SI base quantities and units and their symbols

Quantity	Quantity symbol*	Dimension symbol	Unit	Unit symbol
Length	<i>l</i>	L	metre	m
Mass	<i>m</i>	M	kilogram	kg
Time	<i>t</i>	T	second	s
Electric current	<i>I, i</i>	I	ampere	A
Thermodynamic temperature	<i>T</i>	Θ	kelvin	K
Amount of substance	<i>n</i>	N	mole	mol
Luminous intensity	<i>I_v</i>	J	candela	cd

* Symbols for quantities are not mandatory.

Other quantities, with their corresponding units, are derived from the seven mentioned in Table 1. Some of these derived quantities and units have symbols of their own, some are expressed in compound units. Table 2 lists the 22 derived quantities and units with special names and symbols.

Table 2. Derived units with special names and symbols

Quantity	Unit	Unit symbol	In terms of other SI units
Absorbed dose, specific energy, kerma	gray	Gy	J/kg
Activity (radionuclide)	becquerel	Bq	s ⁻¹
Capacitance	farad	F	C/V
Catalytic activity	katal	kat	mol/s
Celsius temperature	degree Celsius	°C	K
Dose equivalent	sievert	Sv	J/kg
Electric charge, amount of electricity	coulomb	C	s·A
Electric conductance	siemens	S	A/V
Electric potential difference, electromotive force	volt	V	W/A
Electric resistance	ohm	Ω	V/A
Energy, work, amount of heat	joule	J	N·m
Force	newton	N	m·kg·s ⁻²
Frequency	hertz	Hz	s ⁻¹
Illuminance	lux	lx	lm/m ²
Inductance	henry	H	Wb/A
Luminous flux	lumen	lm	cd·sr
Magnetic flux	weber	Wb	V·s
Magnetic flux density	tesla	T	Wb/m ²
Plane angle	radian	rad	m/m
Power, radiant flux	watt	W	J/s
Pressure, stress	pascal	Pa	N/m ²
Solid angle	steradian	sr	m ² /m ²

Many non-SI units are allowed to be used in combination with the SI, such as gauss (G), millimetre of mercury (mmHg) and dalton (Da). Table 3 lists these accepted non-SI units. Note that minute, hour and day are accepted non-SI units but year is not. There are also numerous units whose use is discouraged by the Conférence Générale des Poids et Mesures. Conversion factors to the SI for such units are available on the website of the Bureau International des Poids et Mesures: www.bipm.org/en/si/si_brochure/chapter4/conversion_factors.html.

Table 3. Non-SI units that are accepted for use together with SI units

Quantity	Unit*	Unit symbol	In terms of SI units
Acceleration	gal	Gal	10 ⁻² m/s ²
Area	barn**	b	10 ⁻²⁸ m ²
Area	hectare**	ha	10 ⁴ m ²
Dynamic viscosity	poise	P	0.1 Pa·s
Energy	electronvolt	eV	approx. 1.602 176 53·10 ⁻¹⁹ J
Energy	erg	erg	10 ⁻⁷ J
Force	dyne	dyn	10 ⁻⁵ N
Illuminance	phot	ph	10 ⁴ lx
Kinematic viscosity	stokes	St	10 ⁻⁴ m ² /s
Length	ångstrom**	Å	10 ⁻¹⁰ m
Length	astronomical unit	ua	approx. 1.495 978 706 91·10 ¹¹ m
Length	nautical mile**		1852 m
Logarithmic ratio quantity	bel, decibel	B, dB	
Logarithmic ratio quantity	neper	Np	
Luminance	stilb	sb	10 ⁴ cd/m ²
Magnetic field	oersted	Oe	(10 ³ /4π) A/m
Magnetic flux	maxwell	Mx	10 ⁻⁸ Wb
Magnetic flux density	gauss	G	10 ⁻⁴ T
Mass	dalton, unified atomic mass unit	Da, u	approx. 1.660 538 86·10 ⁻²⁷ kg
Mass	tonne	t	10 ³ kg
Plane angle	degree	°	(π/180) rad
Plane angle	minute	'	(π/10 800) rad
Plane angle	second	''	(π/648 000) rad
Pressure	bar**	bar	10 ⁵ Pa
Pressure	millimetre of mercury	mmHg	approx. 133.322 Pa
Speed	knot**	kn	1852/3600 m/s
Time	day	d	86 400 s
Time	hour	h	3600 s
Time	minute	min	60 s
Volume	litre	L or l	1 dm ³

*Note: some reference works list more units as allowed to be used with SI units (notably curie, röntgen, rad and rem), but this is not in accordance with the Conférence Générale des Poids et Mesures¹.

***Scientific style and format*³ discourages the use of these units.

Typography and layout

Symbols of *units* are always in roman (upright) type, regardless of the type used in the surrounding text (as in Tables 1-3). Unit symbols are not abbreviations and should not be followed by dots. Both names and symbols of units are set in lower case, except symbols of units that are named after a person: these symbols have an initial capital (the symbol of the ampere is A, that of the hertz is Hz, etc.). Another exception is the litre symbol, which may be either lower case l or upper case L.

Symbols of *quantities* are to be set in italic (sloping) type, as shown in Table 1. However, if a quantity is represented by an abbreviation that is not a symbol, this abbreviation is set in capital roman type: ADI (acceptable daily intake), CI (confidence interval), CL (clearance), MIC (minimum inhibitory concentration), etc. Symbols for *dimensions* are in sans-serif roman capitals.

If quantities are much larger or smaller than the unit they are expressed in, prefixes are used to indicate multiples of the units (mostly in steps of 10³ or 10⁻³): 1 mN (millinewton) = 10⁻³ N; 4 Ms (megasecond) = 4 10⁶ s; 0.7 TT (teratesla) = 0.7 10¹² T. The SI prefixes are listed in Table 4. Only one prefix is allowed, so 5 hkm should be rewritten as 500 km or 0.5 Mm. Note that in the base unit 'kg', 'k' is the 'kilo' prefix of 'gram'. Prefixes, like units, are always set in roman type.

The use of prefixes k, M, G etc. to indicate 1024, 1024², 1024³ etc. bits, bytes etc. (as in kB, MB, GB) is not in accordance with SI regulations. The names and symbols for the prefixes corresponding to 2¹⁰, 2²⁰, 2³⁰, 2⁴⁰, 2⁵⁰ and 2⁶⁰ are, respectively: kibi (Ki); mebi (Mi); gibi (Gi); tebi (Ti); pebi (Pi); and exbi (Ei). Thus, for example, one kibibyte would be written: 1 KiB = 2¹⁰ B = 1024 B, where B denotes a byte.⁴

According to the SI guidelines spaces should be used:

- between numerical value and unit name or symbol: 6 dm, 1.8 watt, 23 °C; also in adjectival sense: a 25 kg sphere, not a 25-kg sphere; only when the full unit name is used in adjectival sense, a hyphen is used: a 25-kilogram sphere
- on either side of mathematical operators: 4 – 1; 2 < x < 6
- before a percentage symbol: 79 %; 0.15 % (according to the official SI brochure¹, but *Scientific style and format* recommends not to use a space after a non-letter symbol³)
- after currency abbreviations: EUR 723, GBP 59.95.

No spaces should be used:

- after plus, minus or plus-or-minus signs that designate positive or negative values: –2, ±3.5
- after currency symbols: €723, £59.95
- before the °, ' and '' signs when these indicate a plane angle: +38° 34' 24''
- between quantities that are multiplied together: 2c, xy
- on either side of parentheses etc.: 2(a – b)(a + b);
- before or after superscripts or subscripts: xy^{a-2z}, sin²a

Table 4. SI unit prefixes

Multiple	Prefix	Symbol
1 000 000 000 000 000 000 000 000 000	yotta	Y
1 000 000 000 000 000 000 000 000	zetta	Z
1 000 000 000 000 000 000 000	exa	E
1 000 000 000 000 000 000	peta	P
1 000 000 000 000 000	tera	T
1 000 000 000	giga	G
1 000 000	mega	M
1000	kilo	k
100	hecto	h
10	deca or deka	da
1 unit		
0.1	deci	d
0.01	centi	c
0.001	milli	m
0.000 001	micro	μ
0.000 000 001	nano	n
0.000 000 000 001	pico	p
0.000 000 000 000 001	femto	f
0.000 000 000 000 000 001	atto	a
0.000 000 000 000 000 000 001	zepto	z
0.000 000 000 000 000 000 000 001	yocto	y

When numeric values are given, the unit symbols must always be used, with a space between the number and the symbol: 34.5 mW; not 34.5 milliwatt.

For further discussions about presentation see the chapter about editing and presenting numbers, Chapter 1.5.

A value may be represented by a letter indicating that this value is variable or unknown; this letter is then set in italic type. If a letter indicates a constant value, it is set in roman type. Thus, $l = x$ m means that the length l is a (yet) unknown number of x metre, while $l = ax$ m means that l (in metre) can be calculated from the variable x by multiplication with the constant a .

When mathematical expressions are printed in the body of the text, try to eliminate fractions with horizontal lines, exponents with more than one level, square root symbols and everything else that distorts the vertical layout.

Therefore write a/b or $a \cdot b^{-1}$ instead of $\frac{a}{b}$, $(d^2 - 1)^{1/2}$ instead of $\sqrt{d^2 - 1}$ and $\exp(c^2 + 1)$ instead of $e^{c^2 + 1}$.

If more than one set of parentheses is needed in a mathematical expression, use $()$, $[\]$ and $\{ \}$ consecutively from inward to outward: $\{[(())]\}$. If more than three levels of enclosures are necessary, use the same sets in the same order again, but in a bold type.

Avoiding confusion

The correct use of lowercase and uppercase, and of italic and roman type may be essential for the correct interpretation of an expression. For example:

m is both metre (unit) and milli (prefix)
 m is mass (quantity)
 M is mega (prefix)
 M is electrical inductance (quantity) and molar mass (quantity)
 t is tonne (unit)
 t is time (quantity)
 T is both magnetic flux density (quantity), tesla (unit), and tera (prefix)
 T is temperature (quantity)

To prevent confusion, a centered dot or a space is inserted between compound units. Thus, 'm·s' or 'm s' means 'metre second' (also written as 'metre-second') while 'ms' means millisecond.

Avoid the use of more than one slash in an expression, because $a/b/c$ is ambiguous: it may mean $a/(b/c)$ but also $(a/b)/c$. Therefore, kilograms per litre per day should be represented by $\text{kg}/(\text{l} \cdot \text{d})$ or by $\text{kg} \cdot \text{l}^{-1} \cdot \text{d}^{-1}$.

Do not confuse readers with values like $3.7 \pm 0.2 \cdot 10^{-6}$ (implying that ' 10^{-6} ' applies only to '0.2') when actually $3.7 \cdot 10^{-6} \pm 0.2 \cdot 10^{-6}$ is meant; this greatly increases uncertainty (with the quantity, not with the reader).

An important responsibility of editors is to eliminate ambiguity, like that in the preceding sentence. Readers are inclined to attach great value to quantities and values. Editors must take care that readers are not misled, certainly not by inaccurate presentation.

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1.5: Numerals

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The purpose of this chapter is to guide editors on good practice in the use of *numerals*, meaning all indication of numbers as *Arabic numerals*; unless otherwise specified, it is assumed below that Arabic numerals are intended. Roman numerals are occasionally used in some journals and are discussed in a separate section.

When to use numerals in running text

Numerals should be used for all numbers that include a decimal point (or a decimal comma in non-English texts).

Numerals should be used whenever a number is followed by a unit symbol (for example, kg, m, Ω) or a percentage sign (%). Only in exceptional circumstances will a number be spelt out followed by its unit, also spelt out in full. One obvious exception is numbers that form part of a place name (Five Mile Ride, Seven Acre Wood).

Numerals should be used in references to illustrations, plates, tables, etc. (for example, Fig. 5). Some journals may use Roman numerals for some of these (for example, Plate III, Table IV; see the section on Roman numerals). The numeral should not be followed by a full point in the text unless this is otherwise required by the grammar. In a caption, it is normal to use a full point and to start with a capital letter (for example, Fig. 5. Stratified basement ice).

Numerals should be used for dates, expressions of time, numerical designations, and references to numbered material (volumes, pages, sections, etc.) (for example, 2 January 1994 or, as recommended internationally, 1994-01-02; 15:15; type 4; p. 633).

In all cases not covered by the above paragraphs, words may be used for integral numbers up to and including ten (some journals continue to twelve, but only in languages in which eleven and twelve are formed differently from the following numbers, while others continue to one hundred). For larger numbers, numerals should be used (for example, five species, 114 measurements). In series containing numbers for some of which only words would normally be used but including others for which numerals would be used, numerals should be used throughout (for example, of the 127 fossils, 8 were seriously damaged). Ordinal numbers should be similarly treated (for example, third, but 130th, 131st, 132nd, 133rd, etc.).

Where possible, avoid beginning a sentence with a numeral: rearrange the sentence instead. If this is impossible, the word may be used for simple numbers (for example, Fifteen people).

When working on paper manuscripts, prevent possible

confusion between the numeral 1 and the letter l, preferably by indicating “numeral one” or “letter l” in the margin. Similarly, avoid confusion between the numeral 0 and the capital letter O. This can be done by triple underlining the capital. Remember that typesetters cannot be expected to determine which is correct from the context of a scientific manuscript, and proof corrections cost money.

Journal style will dictate whether a space should be used between the number and unit (e.g. 6 ml or 6ml), however if a space is used it is good practice for a non-breaking thin space to be used. Not only does this ensure that there is a clear visual link between number and unit, but it will also prevent them splitting over two lines.

Decimals: very large, very small and very accurate numbers

The decimal sign between digits in a number should be a comma (,) or, but only in English texts, a point (.). This is the international rule agreed by IUPAP, but the SI (CGPM resolution 10, 2003) and ISO 31-0 (amendment 2, 2005) specify that the decimal sign be either a comma or a point whatever the language is.

To facilitate the reading of long numbers, the digits may be placed in groups of three, but it is recommended that no comma or point be used except for the decimal sign (for example, 1 234 567,890 123), but see section on dates below. As with the comment about using non-breaking space above, where a space is used here it should also not allow the long number to break over two (or more) lines.

Numbers ending with many zeros or with many zeros after the decimal sign should either use a word for part of the number (for example, 16 million) or use a power of 10 to reduce the number (for example, 16×10^6). Note that if the number precedes a unit, the problem may be avoided by using unit prefixes (16 MJ instead of 16×10^6 J). Note also that the multiplication sign between numbers, and hence in such places, should be a cross (\times) or (but only in non-English texts) a centred dot (for example, $16 \cdot 10^6$). Remember, if using words, that billion and all larger numbers have different meanings in different countries.

When unit prefixes are used, aim for uniformity within one coherent part of the text (be prepared to have, for example, 5 g, 50 g, 500 g, and 5000 g rather than insisting on 5 kg for the last mass). A similar uniformity is desirable when powers of 10 are used.

When using powers of 10, give preference to the third, sixth, ninth, twelfth, etc., powers.

Always place a zero before the decimal sign in a decimal number <1 (0,3 or 0.3, not ,3 or .3).

Ratios and quotients

Ratios (or proportions) consist of two or more numbers separated by colons (for example, air consists of nitrogen and oxygen in the proportions 4:1). Proportions may also be expressed as percentages of the whole.

Quotients are mathematically the result of division. They may be represented by the appropriate fraction if a special sort is available or by the use of the solidus or slant line (for example, 8/9). A similar treatment may be given to quotients of units (for example, mg/m³) but *never* with more than one solidus. The alternative usage (mg m⁻³) gets over many difficulties but is still unfamiliar in some subjects. Note that in this case a thin space separates the two units if the first is not raised to a power. This is very important in distinguishing m s⁻¹ (metres per second) from ms⁻¹ (per millisecond).

Linear dimensions

The linear dimensions of an object are indicated by length \times width (or breadth) or length \times width \times height. Preferably, each should be correctly given with its numeral and unit (for example, 10 m \times 5 m \times 2 m). If inclusion of the units for the first two is thought objectionable, then 10 \times 5 \times 2 m³ is allowable; 10 \times 5 \times 2 m, although common, particularly in speech, is dimensionally incorrect. It is nevertheless still sometimes used in less precise articles.

Where possible, use of more than one unit of measurement in indications of the size of a single item should be avoided. Do not indicate length in metres, width in decimetres and height in centimetres!

The multiplication sign between measurements consisting of numeral plus unit should always be the cross (\times) or, more precisely, the special multiplication sign (\times). The same applies if, in imprecise work, the units are omitted before each multiplication sign.

Dates

Years in dates should be written as numerals without grouping into threes (for example, A.D. 1996, 3300 B.C.), but time measurements are distinct from dates and should be treated normally (for example, this dates from about 30 000 B.P.).

Dates should be given either in the form recommended by ISO, that is, in descending order (for example, 2003-01-02) or as day-month-year with the month spelt out (for example, 2 January 2003). If the ISO system is used, the date can be followed by the time (for example, 2003-06-08T10:00). Use of the order month-day-year is to be discouraged, as is the use of Roman numerals for months. When a sequence is being expressed, an en rule (that is, a dash the width of the letter n) should be used, for example, 2001–2003. Some journals use a style that omits repeated digits (2001–3) or all but the last two digits of the second number (2001–03). These styles are also used in other cases (p. 633–5 or p. 633–35). A journal should be consistent in adopting one or other of these rules. A solidus should not be

used for such purposes; it may be used for a year that does not begin and end with the calendar year (for example, the UK income tax year 2002/03). If an era must be specified, this should be done in small capitals, for example, A.D. 2003). A.D. always precedes the year; B.C. and B.P. follow the years (for example, 185–122 B.C.).

Superior and inferior numerals

Superior numerals are used:

1. in mathematical expressions (for example, 10⁶);
2. to indicate units in terms of powers of other units (for example, those of area, m², volume, m³, or acceleration, m s⁻²);
3. in symbols for chemical elements, nuclides and particles, where the mass number is put to the left of the element symbol (for example, ¹⁴C, ²⁶⁸Pb) and a number and a symbol sign indicating a state of ionization is put to the right (for example, F⁻, Ca²⁺). A similar indication is used for the charge of particles (for example, e⁺, e⁻, p⁺, p⁻, p⁰). Coordination numbers are also put to the right as superiors in parentheses;
4. for oxidation numbers expressed as Roman numerals (for example, K₆M^{IV}Mo₉O₃₂);
5. in spectroscopy, on the left to indicate the spin multiplicity 2S+1 (for example, ³P) or the equivalent molecular spin multiplicity (for example, ³P), on the right to indicate the number of electrons in an atomic configuration (for example, (1s)²(2s)²(2p)³);
6. by analogy with (1) and (2) above, to indicate the inverse of a function (for example, tan⁻¹q instead of arctan q, sinh⁻¹x instead of arsinhx, log⁻¹x);
7. in some journals to refer to footnotes. Such a reference should usually be placed after any punctuation or quotation marks and should not follow a numeral or unit symbol, for danger of confusion with other uses. An alternative method of referring to footnotes is to use the sequence asterisk (*), obelisk (†), double obelisk (‡), followed if necessary by §, ¶, ¶, and then the same signs duplicated. This avoids the problem of footnotes being mistaken for cases (1), (2), and (3) above, but the asterisk and obelisk, which are used in mathematics for complex conjugate and Hermitian conjugate (for example, z*, A[†]), have their own risks;
8. in some journals for references, whether these are footnotes or grouped at the end of each paper. This carries the same dangers as (7) above, and is one of several arguments against this system of giving references. This particular difficulty can be overcome by putting numerals in parentheses ⁽³⁾ or in full-sized brackets [3].

Inferior numerals are used:

1. primarily in chemical formulae to indicate the number of atoms in a molecule (for example, H₂O, where they are to the right of the chemical element symbol);
2. if desired, to indicate the atomic number of a nuclide; this should be to the left of the symbol (for example, ¹²₆C, ²⁶⁸₈₂Pb);
3. in spectroscopy to indicate the total angular

momentum quantum number J or j (for example, ${}^2P_{3/2}$ where $J = 3/2$ multiplicity 2; $p_{3/2}$: electron for which $j = 3/2$);

4. in various mathematical symbols (for example, \log_{10}) and symbols for physical quantities (for example, L_{12} for mutual inductance between circuits 1 and 2, $t_{1/2}$ for half life);
5. in algebraic working to specify particular values of an algebraic symbol (for example, x_0, y_1);
6. to indicate different states of a system, for which inferior roman numerals should be used.

When working on paper manuscripts, indicate superior or inferior characters in the margin of the manuscript by (for example) “sup.” or “inf.” Instructions of this kind should always be circled. In the text, the appropriate mark should be placed above or below the character according to the standard adopted in the country or according to a system agreed with the typesetter.

Occasionally, in algebraic working, superiors and inferiors to superiors and inferiors occur (for example, e^{x^2}). These should be avoided if at all possible, for example, by using instead $\exp(x^2)$.

Typeface problems with numerals

While there are many typefaces of numerals, the important division is between non-ranging numerals and ranging numerals. Non-ranging numerals range differently, that is, like lowercase letters, they are not all the same height; 6 and 8 go higher and 3, 4, 5, 7 and 9 lower than the letter m in the same point size, whereas ranging numerals are all the same height. The two should not be mixed in the same journal, though some difficulty may be experienced with special sort fractions, which are usually ranging.

If ranging numerals are being used, these will be of capital letter height. Problems then arise if numerals occur in a line that is to be set in small capitals (for example, a running headline or the title of a table). This can be overcome by using a smaller typeface (for example, 8-point numerals among 10-point small capitals).

If non-ranging numerals are being used, superiors of numerals that descend below the line may be misread, particularly if they follow a capital letter (for example, P^3).

Roman numerals

Roman numerals are usually expressed in Roman capital letters (for example, I, IV, XI).

In general italic working, use italic capital letters for Roman numerals.

Sections are sometimes numbered with lower-case Roman numerals, either Roman or italic, sometimes in parentheses.

Do not use four repeated symbols (that is, use IV not IIII, XL not XXXX, CD not CCCC).

The sequence of letters is I = 1, V = 5, X = 10, L = 50, C = 100, D = 500, M = 1000.

Avoidance of dimensionally meaningless statements

When inserting numerical data into algebraic working, especially where functions are involved, remember that a numeral followed by a unit normally has dimensions and cannot therefore be inserted into a function that has expression as a power series. Thus, $\log x$ is sensible only if x is dimensionless: $\log 3$ has meaning, but $\log(3 \text{ m})$ does not.

If numerical data are to be printed in an algebraic formula with dimensions, both number and unit must be inserted (for example, if we substitute 5 g for the mass $F = ma$, we would write $F = (5 \text{ g})a$, not $F = 5a$. See also the section on dates above).

Other problems concerning numerals

Numerals are also used for numbering volumes, issues, pages, illustrations, tables, etc., within a journal and in references to other works. Other questions of style arise here; however, these are best dealt with as aspects of other general editorial decisions and are therefore not covered here.

1.6: Layout and principles of lists

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Series of related items are frequently presented in scientific literature. The number of items may range from a few to several dozen. Depending on the amount of data to be presented for each item, one can choose to present the related items as separate chapters, sections or paragraphs, or as lists. Lists are particularly useful if relatively little information is provided per item. As a rule of thumb, one should use sections or paragraphs if the description or explanation of individual items requires more than one sentence.

If lists are preferred, one can choose – depending on the number of items (and occasionally on other aspects) – between run-on lists and displayed lists. Run-on lists consist of sentences in which a number of items are summed up; in displayed lists each item starts on a new line.

It is remarkable that, although lists are important because they make it possible to overview a wealth of related data or remarks quickly, they have so far received hardly any attention in handbooks for authors or editors. Yet, a well-balanced presentation may contribute significantly to the effectiveness of the transfer of information. Suggestions for how to handle lists are presented here. The text may seem fairly complex, but once the underlying principles are understood, the reasons for the various suggestions will become clear. The list at the end of this chapter is just a way of checking whether the various recommendations (not prescriptions) have been well understood.

Run-on lists

A restricted number of items (up to five or six) can best be summed up in the form of a *normal* sentence. An example is: *The commonly preferred main sections of a scientific article are abstract, introduction, methods, results, discussion, and reference list.* In such a simple sentence, the various items are best separated from each other by commas.

Sometimes, some or all of the individual items in this kind of list consist of more than one element, and some items may include some additional information. To avoid confusion, one should then use semicolons between the various items rather than commas: *The various departments in this faculty deal with astronomy, which is performed at a top level; biology and biochemistry; physics, with two Nobel prize winners among the professors; and geology and environmental sciences.* Even more unambiguous and reader-friendly is the use of numbers for the various items: *The various departments in this faculty deal with: (1) astronomy, which is performed at a top level, (2) biology and biochemistry, (3) physics, with two Nobel prize winners among the professors, and (4) geology and environmental sciences.* In this case, commas are to be preferred, as semicolons make a sentence less fluent and less easily readable.

Run-on lists should be restricted to items that do not require a specific order. If such an order is important, as it often is in methodology sections, the items should be presented as a displayed list.

Displayed lists

Displayed lists consist of either a relatively large number of items, each of which may be explained in only a few words, or a small series of items that for one reason or another need to be numbered.

Good displayed lists provide the reader quickly with an idea of what items are included, and whether all or some of the items are subdivided into sub-items. This can be done only by using a proper layout and proper marker symbols. In addition, it should be clear where the list stops. These requirements imply that attention should be paid to the type of marker symbols used and to the indentation, punctuation, capitals versus lower case, line spacing, and fonts. In addition, one should take care that the text of an individual item is not so long that the configuration of the list becomes obscure. If possible, the text of each individual item or sub-item should be restricted to one sentence or part of it.

Justified, not justified

It is, as a rule, not the author who decides whether a text is published with justified lines or not. Justification is not a major point of discussion if a text is printed in a single column over the width of a page. If the text is printed in two or more columns, however, lists usually become difficult to read if the lines are justified, because either frequent hyphenation will be required or wide spaces will appear between the commonly long scientific words.

Authors, editors, and publishers should all consider the desirability of justification of texts printed in columns, but they should also consider the option of not justifying lists, even if the remainder of the text is justified.

Marker symbols

Each item of a displayed list starts on a new line, and each item may be preceded by a marker symbol. Such marker symbols may be dashes, bullets, asterisks, or any other symbol that the author thinks appropriate. One should bear in mind, however, that symbols that are too fancy tend to distract the attention of the reader from the text. Numbers should only be used as marker symbols if there is a good reason for this (*the ten commandants are: [new line] (1) . . .*).

If a list includes sub-lists – that is, if one or more items are subdivided into sub-items – the marker symbols should help in expressing the ranking of the item or sub-item.

This should be done on the basis of their positions (see the subsection on Indentation), as well as on the basis of their importance: the larger or blacker, the stronger the impression made. A good choice of a first-level marker symbol is a medium-sized square bullet (■), whereas a second-order marker symbol may be a medium-sized round bullet (●). Third-order marker symbols should be used sparingly only, because the list becomes complicated (and the layout will allow little text on a line with text of a third-order level), but if such a third level cannot be avoided, one might mark the beginning of such items with a circle (○) or with a dash (-). Fourth-order levels in a list should be avoided: if this level seems necessary, the item must be so complex that it deserves in principle a section in the text rather than being part of a list.

All major word-processing programs supply sufficient symbols to allow a choice of suitable marker symbols.

Indentation

The marker symbol of first-level items should be positioned at the left margin of the column or page. The text should follow after an em space, so that the entire text is indented (so-called *hanging indentation*). The marker symbol for each second-level item should be positioned underneath the left-hand part of the first-level text. An em space should again follow, so that all the text of the second-level item is indented more than the text of the first-level item. The marker symbol of a third-level item (if present) should be positioned underneath the left-hand part of the second-level text, followed again by an em space. The text thus becomes even further indented.

Three levels of indentation are commonly still manageable in scientific journals that have, like this Handbook, two columns. The space available for the text of fourth-level sub-items will commonly be so restricted, however, that a subdivision to this degree should also be avoided for this reason unless the text is printed in a single page-wide column. One might consider solving the space problem raised by fourth- (and possibly third-) level items by not indenting, but this not only destroys the structure of the list but also affects its readability considerably.

Punctuation and the use of capitals

A list is always preceded by an introductory sentence (The following conclusions result.) or a sentence followed by a colon (The following conclusions:). A colon makes the sentence more fluent but implies that the sentence is not yet finished, so the various items (preceded by their marker symbols) should start with a lower-case letter. If a full stop is used after the introductory sentence, the various items should start with a capital. If the first first-order item starts with a capital, it is only logical from the viewpoint of reader-friendliness that the second first-order item should also have a capital. This capital should follow a full stop, so the text of the first item should form a sentence. Since this is commonly not the case, it is (as a rule) preferable not to use capitals for first-order items, and consequently not to use an introductory sentence that ends with a full stop. If individual items need several sentences, full stops

are unavoidable; in this case, the first-order items should start with capitals, and the introductory sentence should consequently end with a full stop.

The same is, obviously, true for second- and lower-order items. Clearly there is hardly any reason to include words with initial capitals (apart of course from any proper nouns).

As stated above, some lists need full stops after the text of first-order items, for example, if the text consists of more than one sentence. If no full stops are required, a semicolon is the most appropriate punctuation mark after the text of first-order items. Commas are the most appropriate after the text of second- and lower-order items.

Line spacing

A displayed list is an entity that often consists of one complex sentence, but sometimes consists of more sentences. Because a list is an entity, there should be no extra line space (half or whole) between the various items. The list is also directly connected with its introductory sentence. Therefore, there should be no extra line space between the introductory sentence and the list either.

The end of a list may also be the end of a section. In this case, the spacing below the list should conform to the rules of the journal or publisher with respect to line spacing at the end of sections. The list may also represent the end of a paragraph. In this case the list should be followed by a line space (even if *normal* paragraphs are not separated from each other by such an extra line space) to show clearly that both list and paragraph have ended.

In rare cases, a list forms part of a paragraph that is continued after the list. There should be no extra line space within a paragraph, so in this case the running text should immediately follow the list and the continued text should not be indented; indenting would not only be against the principle that new sentences within a single paragraph should not be indented, but the indentation might also raise confusion as to what belongs to the last (indented) item, and what is part of the *continued text*.

A problem regarding line spacing is raised by the most commonly used word-processing programs. These usually work with built-in so-called *styles*, some characteristics of which cannot (or only with great difficulty) be changed. Some programs introduce half-line spaces between the introductory sentence and the beginning of a list, between the various first-order items (sometimes also between those of second- or third-order items), and between the list and the text following it. Line spacing of this kind does not belong in a list. It has been suggested that the word-processing programs insert line spacing or even blank lines because numerous office people want to increase the physical length of their texts to impress the reader. Obviously, such considerations should not apply in the world of scientific information transfer. In addition, half-line spaces should be avoided anyway, because they make lines in adjoining columns unequal in position, which is tiring for readers.

Fonts

Lists form part of the running text and should be printed in the same font (type and size) as the rest of the text. If the list has to be printed in narrow columns (three or more), and if the text of the various items or sub-items is long, the option of using a smaller type may be considered. This is the same practice as applied in tables where the normal type size may provide difficulties in layout, thus affecting readability.

Example of a list

The readability of a list (which should preferably be preceded by an introductory sentence ending with a colon) should be optimized by adapting the following layout and typography:

- whole or half-line spaces should be avoided, both between the introductory sentence and the list, and between the various items or sub-items;
- each first-order item should start (after its marker symbol and an em space) with a lower-case letter and it should end with:
 - a colon, to indicate that second-order items follow, or
 - a semicolon, to indicate that another first-order item follows, or
 - a full stop, to indicate that the list has ended and that the running text will be continued;
- a second-order item should start (after an em space, a marker symbol and again an em space) with a lower-case letter and it should end with:
 - a colon, to indicate that several third-order items will follow, or
 - a full stop if it is the end of the entire list, or
 - a semicolon if it is not only the last item of the second-order list but simultaneously the end of a first-order list (followed by the next first-order item), or
 - in all other cases, a comma;
- a third-order item should start (after two em spaces, a marker symbol, and another em space, unless the typography prevents this latter hanging indent) with a lower-case letter and end with:
 - a comma, if the item that follows is:
 - another third-order item,
 - the next second-order item,
 - a semicolon, if a first-order item follows,
 - a full stop if it is the end of the list.

In certain cases fourth-order items may be present, but their use is not advisable in general.

Acknowledgements

Although much of the above is an updated version of suggestions I have made about the presentation of lists,^{1,2} this contribution is based largely on the ideas of Yateendra Joshi, who has done pioneering work in this field that is still largely neglected in editorial handbooks.³ Several of his ideas have been used without modification; other ideas have, however, been modified to increase consistency.

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1.7: Symbols for physical quantities

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Introduction

The purpose of this section is to guide editors in good practice in the use of expressions and symbols for physical quantities. By symbols, we mean single letters or groups of letters and numerals used to designate unknown quantities, constants, and variables. When put together, symbols form expressions. It may also be helpful to read other relevant chapters in this handbook, such as the Chapter on numerals, and on using units and quantities correctly.

Symbols

Types

The basic rule is that Latin letters used in symbols are set in italic to distinguish them from ordinary text. Letters from other alphabets are set in Roman. Vectors and tensors are set in boldface. Numbers and other symbols, e.g. brackets, are set in Roman. When it is essential to distinguish between vectors and tensors, sans serif may be used for tensors.

Latin letters considered to be abbreviations of words are properly Roman instead of italic, e.g. chemical symbols (m_{Ne}). Multi-letter abbreviations for standard mathematical functions (e.g. cos, sin, exp, det, max, . . .) are also set in Roman type.

Subscripts and superscripts

Subscripts and superscripts are normally set flush against the symbol to which they are attached. To simplify setting, brackets can sometimes be used, e.g. X_{ay}^{mn} can be replaced by $(X_{ay})^{mn}$.

Variables

Symbols should be one-letter symbols with subscripts or superscripts to improve readability and avoid ambiguity, e.g. does xr designate a single symbol or the product of x and r ? Words that appear as part of a variable, e.g. 'out' in x_{out} , are set in Roman. When, exceptionally, two letters are used for a symbol, the symbol should be separated from other symbols by a dot, a bracket, or a space, e.g. the Reynolds number (Re).

Displayed equations

What to display

The choice between displaying equations and running them into the text depends on the size of the equation, the emphasis, and its logical connection to other equations. Running simpler equations into the text can improve a paper by increasing emphasis on more significant material.

The term 'equation' is used in this section as a generic term for a variety of mathematical expressions.

Equation numbers

1. Only displayed equations are numbered.
2. For equations in the body of a paper, use Arabic numerals in brackets: (1), (2), (3), etc. Number consecutively throughout the text. In appendices, use the numbering sequence (A1), (A2), (A3), etc.
3. Place equation numbers flush with the right margin. Leave a space at least two characters wide between an equation and its number.
4. An equation number should be centred beside a group of equations identified by one number. It should be aligned with the last line of a multilinear equation.
5. Equations should be cited as Eq. (2) or Eqs (4)–(10) inside sentences, but the whole word 'Equation(s)' is written out at the beginning of a sentence.

Multilinear equations

Equations are broken at the 'weakest' links in the expression, according to the following model:

$$\begin{aligned} \langle k+q | V_0 | k \rangle &= \langle k+q | V(r_0, r_0) \sigma(r_0, r) d\tau_0 | k_0 \rangle_0 \\ &+ \langle k+q | v(r-r_0) \sigma(r_0, r) d\tau_0 | k_0+q \rangle \\ &\times \langle k+q | 2N_1 | k_0 \rangle + \langle k+q | 2N_2 | k_0 \rangle \\ (\hbar\Gamma_{nk} - \hbar\omega_c) \langle nk | f | n+1, k \rangle \\ &= 2n\ell e^n E_0 (1-e^{-n}) (n+1)^{1/2} (n-1)^{1/2} f_{nk} \end{aligned}$$

Operators and signs of relations begin continued lines. Operators can also be repeated at the end of the broken line. When a product is continued from line to line, start the continuation with a multiplication sign.

$$\begin{aligned} \text{Align signs of relation in} \\ f(x) &= x^2, & x &\geq 0 \\ &= 0, & x &< 0. \end{aligned}$$

When multilinear equations are very long or equations contain large matrices or long fraction lines, it is sometimes better to print across the page in a single column on pages normally printed in two columns per page. Authors should try to avoid this, however, as it makes the paper harder to read. If possible, define the component parts of such long equations in terms of appropriate symbols.

Built-up fractions, slashed fractions, and negative exponents

A fraction can be represented in three ways:

built-up with a fraction line,

$$\frac{x+y}{z}$$

slashed with a solidus,

$$(x+y)/z,$$

or with negative exponents

$$(x+y)z^{-1}.$$

In running text, one of the two last forms must invariably be chosen, as built-up fractions will not fit. In displayed fractions, use the slashed form or the negative exponential for short, simple fractions but the built-up form for long, complicated fractions. That is, write:

$$pq^2/r + (n/y)^2 = 0$$

or, better

$$(pq^2/r) + (n/y)^2 = 0$$

or, better still

$$pq^2r^{-1} + n^2y^{-2} = 0;$$

but

$$\alpha = \frac{B(E_0)+c}{f_1+f_2} f(\omega)$$

is easier to read than

$$\alpha = \{[B(E_0)+c]/(f_1+f_2)\}f(\omega)$$

or

$$\alpha = [B(E_0)+c](f_1+f_2)^{-1}f(\omega).$$

Do not mix built-up and slashed forms unnecessarily within one equation. Slashed fractions or negative exponentials should be used in the numerator or denominator of a built-up fraction. Write:

$$\frac{a}{b} = \frac{[3J/(J+1)]\omega}{En - Bn^2}$$

As a rule, use built-up fractions in displayed equations containing integral, summation, or product signs. In displayed equations, these signs are usually large, and no particular economy results from using the solidus. Write:

$$\frac{r}{r_0} = \int_0^t f(x)dx \quad \text{and} \quad \frac{r}{r_0} = \sum_{i=0}^{\infty} x_i.$$

Always use slashed fractions in subscripts and superscripts:

$$\left(\frac{C}{C_0}\right)^{(1-\epsilon_0)/\epsilon_0} \approx a + b\frac{N}{C}$$

Derivatives can be written on one line as follows (note Roman character for ∂):

$$\frac{\partial}{\partial\theta} F(r, \theta, \varphi)$$

can be replaced by

$$\partial F(r, \theta, \varphi) / \partial\theta$$

or

$$(\partial / \partial\theta)F(r, \theta, \varphi).$$

Any rational fraction can be put on one line in the special upright form. This form is awkward in subscripts and superscripts (see above); elsewhere, use the upright form instead of the solidus when this special type is available.

Write:

$$\sin\left(\frac{1}{3}x\right) \text{ and } \frac{1}{3}\sin x$$

instead of

$$\sin(x/3) \text{ and } (\sin x)/3.$$

Never write $\sin x/3$.

When using the solidus, make sure that the meaning is unambiguous:

$$a/b+c \text{ means } (a/b)+c,$$

but use brackets, or write $ab^{-1}+c$, to allay any doubts. Never write

$$a/b/c;$$

write instead

$$ab^{-1}c^{-1}.$$

Make sure that the fraction line clearly delimits the numerator and denominator of a built-up fraction.

Integral, summation, and product signs

In running text, integral, summation, and product signs cannot be fully sized, and symbols attached to them must always be subscripts and superscripts:

$$\int_C, \sum_{i=n+m}, \prod_a$$

In displayed equations, integral, summation, and product signs can be full-sized, and symbols can be placed above and below the signs. For multiple integrals, the subscripts and superscripts are centred unless each integral has its own subscript and superscript, in which case they are treated as single integrals:

$$\begin{aligned} \int_a^b f(x)dx & \quad \iiint_c f(x, y, z)dx dy dz \\ \int_{-\infty}^{\infty} \int_0^1 f(x, y)dx dy & \quad \sum_1^m \frac{1}{n!} \prod_{i=n}^m (a-i) \end{aligned}$$

Recommended notation

Brackets

By convention, one works outwards with brackets, according to the scheme

$$\{[()]\}$$

Once the above scheme is exhausted, repeat the sequence in boldface. Also use boldface brackets to enclose a functional argument where the argument itself contains brackets.

Functions set in Roman type

Use the following conventions for functions set in Roman type:

1. A function is closed up with its argument:
 $\ln x, \tan^{-1}(w/z)$.
2. The function of a product may be written without brackets:
 $\sin xa$ means $\sin(xa)$,
but brackets should be used whenever confusion is possible. E.g. $\sin x/a$ should be written $\sin(x/a)$ or $(\sin x)/a$, depending on the meaning.
3. An argument stops at a plus or minus sign:
 $\sin x+a$ means $(\sin x)+a$.
4. A plus or minus sign should never directly follow a

function. Write $\sin(-(x+a))$ instead of $\sin-(x+a)$.

5. The use of \exp or the Roman e depends upon the nature of the argument. Use e if the argument is simple enough to make a readable superscript.

Radicals and bars over groups of symbols

The ‘roof’ of a radical or a bar can be used over a simple expression as in $\sqrt{b^2 - 4ac}$ or \overline{AB} , but may be awkward over complicated ones. A bare ‘unroofed’ radical may also be used, but always with liberal use of brackets to avoid ambiguity. An exponent $^{1/2}$, $(b^2-4ac)^{1/2}$, as a substitute for roofed radicals is usually less troublesome and more readable. Special brackets may be used instead of bars,

$$\langle AB \rangle_{av}$$

Avoid multiple embellishments over letters.

Multiplication signs

As a rule, do not use multiplication signs for simple products. Write:

$$2ab \text{ instead of } 2 \times ab \text{ or } 2a \times b.$$

Use the multiplication sign for the vector product of three-vectors $\mathbf{A} \times \mathbf{B}$, for the continuation of a product from line to line, and the following special cases:

$$1.5 \times 10^6 \text{ mm}, 3 \text{ mm} \times 2 \text{ mm} \times 1 \text{ mm},$$

$$1 \times 3 \times 5 \times \dots \times (2n-1).$$

Centred dots may be used in compound units: $9.82 \text{ kg} \cdot \text{m} \cdot \text{s}^{-2}$. Their principal use is in inner products of vectors, dyadics, and the like, where they are set in the type of the surrounding symbols: $\mathbf{k} \cdot \mathbf{p}$. They may also be necessary to show multiplications of symbols made up of several letters: $W_{\text{root}} \cdot W_{\text{shoot}}$; but the latter is much better written $W_{\text{root}} W_{\text{shoot}}$ or $W(\text{root}) \cdot W(\text{shoot})$.

Spacing

A thin space should be inserted before and after the signs $+$, $-$, \times , \div and also before and after \sin , \cos , etc. unless preceded or followed by a bracket.

Mathematical terms

The use of the following symbols are recommended:

\approx	approximately equal to
\cong	asymptotically equal to; of the order of magnitude of
\propto	proportional to
\rightarrow	tends to
A^*	complex conjugate of A
A^\dagger	Hermitian conjugate of matrix A
\tilde{A}, A^T	transpose of matrix A
$\hat{\mathbf{k}}$	unit vector \mathbf{k}/k

1.8: References

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References are essential in scientific publications, to give credibility to statements made, to give credit to other scientists whose findings are being cited, and for use by readers to find further information. To fulfil these functions, they must be complete and accurate.

Accuracy of references

The instructions to authors of almost all journals state that it is the responsibility of the author to ensure the accuracy of references. Very few journals have staff with time to check references for all the possible types of errors.

The first type of error is simple citation error, in which some element of the reference is incorrect. These errors can vary from minor annoyances, such as a typographical error in the title, with the only consequence of reducing the confidence of the reviewer or reader in the accuracy of the whole paper, to more severe lapses, such as misspelling the first author's name or giving an incorrect date. In the past, such severe errors made the reference difficult if not impossible to trace. Now, Google will usually magnanimously overlook such foibles and offer the correct reference.

Another type of error cannot be corrected so easily. This is attribution error, in which the author attributes certain information to the wrong paper. This type of error often arises when authors copy references from a secondary source. Specht noted that the number of such errors is higher if the reference was originally incorrectly cited by an eminent author or in a highly cited paper.¹

A further error is placing a reference in the wrong place in a sentence, so that the reader is unsure which information was derived from that reference. For example, in the sentence 'Smith et al. reported that mice in England prefer Stilton to Emmenthal, indicating a cultural bias [x]'. Did Smith et al. accuse the mice of cultural bias, or was it the authors of the paper? If the latter part of the sentence is a comment on the study of Smith et al., the reference should be placed either immediately after Smith et al. [x] or after '... Emmenthal [x]'.²

Many authors now use various systems to store, organize, and retrieve references that they have downloaded from the Internet. These systems include EndNote, the best known, and also ProCite and Reference Manager. Such systems are often bought by a university or research laboratory for use by their scientists. There are now also systems that can be downloaded free of cost. One of these, Mendeley, allows references to be exported to different styles (currently, they can export to almost 3000 different journal styles). Nevertheless, these reference organisers will probably not produce references in the exact format

required by a journal. Another problem is that at least some of the systems introduce errors into references, such as abbreviating 'World Health Organization' to 'Organization WH', or 'AJ Van Loon' to 'Van LA'. Authors cannot therefore rely on these systems to produce error-free reference lists.

Inappropriate references

The dependence of authors and journals on the tyrannical system of number of citations to advance themselves has led to a number of dubious practices. From the author's side, these include gratuitous self-citation, failing to cite competitors' work,² and citing their peers' work even if it is not directly relevant to the study being reported.³ From the journals' side, some now overtly ask authors to cite their journal a specified number of times in the reference list. Although these practices have been condemned, they are still found widely in the scientific literature.

Other inappropriate references encountered by journals are those that cannot be traced, such as posters and talks given at conferences. Authors should give the name or, preferably, the website of the institution that organized the conference. Theses are often mines of information, as the students who prepare them usually include detailed information on their methods and results and are obliged to undertake extensive bibliographic searches. Consulting theses cited in the scientific literature has until recently been a difficult, frustrating experience. More and more universities are, however, putting all Master's and PhD theses online, where they can be freely consulted.

How does a journal identify inappropriate references? This should be one of the jobs of peer reviewers, who are assumed to be familiar with the relevant literature in a specific area. This is, however, an additional burden of work that many reviewers will not undertake. A great deal of faith is therefore placed on the integrity of the author.

Referencing systems

Now to the issue that has given rise to so much ink: standardization of reference styles in journals. Roderick Hunt, the author of the previous Handbook chapter on references, noted that, as 'each book or journal is free to set its own stylistic requirements and the hapless contributor ignores these at his or her peril', each of the approximately 5300 scientific serials analysed each year by the *Science Citation Index*, 'could adopt a unique style of referencing and change it to a new one every year for 64 000 years without exhausting all of the available styles ... This would result in more than one-third of a billion permutations of style.'⁴

There are three main referencing systems in use today.

The most widespread is the sequential numerical style, in which references are numbered in the order in which they appear in the text, tables, and figures. The placement and style of the number vary widely, appearing in brackets or square brackets, in roman or italic type, online or as superscripts. The reference list is therefore in numerical order. The second is the alphabetical–numerical system, in which the references are listed in alphabetical order, and the corresponding reference numbers in the text, tables, and figures are therefore not in numerical order. The third is the name and date system, formerly known as the Harvard system. This is the style preferred by most researchers, as the name of the scientist and date immediately evoke the article. Journals, however, prefer the numerical systems, which save space, allowing them to print more articles per issue.

Use of the three systems appears to depend to a certain extent on discipline. The quantitative sciences tend to prefer the numerical systems, while the social sciences retain the name–date system. In the name–date system, commonly only the first three authors are included in the text. Some journals, however (for example, in psychology), list *all* the authors of a paper in the text reference. The main argument against this type of referencing is that it distracts the reader's attention and disrupts the flow of the text.

Debate on the style in which references are listed (order of elements, typography, punctuation) has been roiling since the 1970s.^{5–10} In 1979, the International Steering Committee of Medical Editors, the predecessor of the International Committee of Medical Journal Editors (ICMJE), first issued the basis of what became known as 'Vancouver style'.¹¹ This system, most recently issued by ICMJE,¹² is now used by most medical and biomedical journals. In this style, a journal article is cited as follows:

Eichorn P, Yankauer A. Do authors check their references? A survey of accuracy of references in three public health journals. *Am J Public Health*. 1987;77:1011–2.

The National Library of Medicine in the United States also recommends the Vancouver style¹³ but with the addition of the full date of publication and the issue number, thus:

Veronesi U, Maisonneuve P, Decensi A. Tamoxifen: an enduring star. *J Natl Cancer Inst*. 2007 Feb 21;99(4):258–60.

That reference also describes the styles to be used for all other possible forms of publication. Apart from the fact that the recommended presentation includes unnecessary information, such as the full date and issue number, the style does not follow international standards, for instance with respect to dates (recommending year-month-day rather than day-month-year) and requiring only the state or province for publishers' locations in the United States or Canada but the name of the country for locations in other parts of the world (for example, Oxford (England): Oxford University Press).

Maeve O'Connor, Secretary-Treasurer of EASE from

1987 to 1997, published a hybrid standard¹⁴ based on the Vancouver style but with elements approved by the European Life Science Editors (ELSE, the predecessor of EASE) or borrowed from the Council of Biology Editors (CBE) in the United States.¹⁵ In the 'CBE–ELSE–Vancouver style', a journal article was cited as follows:

Eichorn P, Yankauer A. 1987. Do authors check their references? A survey of accuracy of references in three public health journals. *Am J Public Health* 77:1011–1012.

This system placed the date close to the name, meeting readers' preference for immediate recognition, but retained the sparseness of the Vancouver style.⁴

At the Fifth General Assembly in Budapest in 1994, members accepted five proposals concerning reference style.¹⁶ It was recommended that, whatever referencing system was used, the same information elements should be set out, as far as possible, in the same order; that punctuation be kept to the minimum; that authors should not be required to underline, bold or italicize elements in a reference, that serial titles should be either abbreviated in accordance with the internationally recognized *List of Serial Title Word Abbreviations* or written in full; and that for a document with more than four authors, the names of the first three should be cited, followed by 'et al.' or by 'and *n* others'.

The current guidelines for the EASE *Handbook*, however, introduce punctuation and italicizing:

Kang Y., Jones E.G. and Kim S.S. Evaluation of the psychometric properties of the Korean language version of the Incontinence Quiz. *Urologic Nursing* 2012; 32: 313–318.

In contrast, the reference style now used in *European Science Editing* is very close to the Vancouver style, the only deviations being the spelling out of the journal name and giving the full number range:

Marx W. Tracking historical papers and their citations. *European Science Editing* 2012;38(2):35–37.

The references in the EASE *guidelines for authors and translators of scientific papers to be published in English* are cited in Harvard style.¹⁷ In the reference list, up to six authors are named before et al. and the title of the journal is abbreviated and sometimes in italics, as follows:

Gasparyan AY, Ayvazyan L, Blackmore H, Kitas GD. 2011. Writing a narrative biomedical review: considerations for authors, peer reviewers, and editors. *Rheumatol Int* 31(11):1409–1417.

EASE itself is therefore somewhat schizophrenic with regard to reference style! Standardization is still an elusive goal.

In a lengthy exchange of views on the topic on the EASE Forum, Lorna O'Brien said that, in modern journal production, input references (author's file) are converted to structured XML, and the output (proof) can then be whatever is required for a particular journal.¹⁸ The

structured XML is exactly the same regardless of the input or output style. This means that authors can prepare their references in a generic style that could be the same for every paper they produce, and journals will output in their own style from the XML.

Regardless of what technology can do, most journals still require authors to cite their references in the journal style. Whatever one's views on reference style and on the futility of abiding by apparently petty deviations from recommended styles, authors must follow the journal's instructions in this regard – particularly because some journals will reject manuscripts without review if they do not comply with their instructions.

References or parts of references in languages other than English

A few words on references in languages other than English:

- Authors' names with non-English features such as accents and letters (for example, ø) should, if possible, be reproduced correctly. Otherwise, they should be transliterated. The American Library Association and the Library of Congress (ALA-LC) have published 'romanization tables', which cover the transliteration of many languages.¹⁹
- As so many Chinese authors have the same family name (129 names shared by 1.1 billion people), it is essential that both initials of their forename be given.²⁰
- The titles of references in languages other than English should be given in the original (or transliterated) language, with an English translation and mention of whether the paper has an abstract in English.²¹

Essential elements of a reference citation

What does today's reader really need to find a reference? The information required by the instructions to authors of journals include the authors' names, date of publication, title, name of journal or publishing house, volume number if in a journal, and inclusive page numbers. These are all essential for readers who do not have access to the internet but rely on physical (not virtual) libraries, although it would probably be useful to also include the ISBN for books, which is not currently required. For readers with access to online search engines, however, some of this information is more important than other items.

- As long as authors' careers depend on their names appearing in a reference (preferably first), despite continuing debate about 'authorship' and 'contributorship' (see article on authorship in this Handbook, Chapter 3.6), the name and initials of at least the first author should appear. Furthermore, a name may have immediate connotations for someone working in the same field.
- The date of publication clearly provides important information.
- The title of the article should, if properly complete and informative, indicate to the reader whether he or she should go to the trouble of trying to obtain a full text version.
- The name of the journal is clearly useful and also

indicates to the knowledgeable reader the 'quality' of the journal.

- For citations of books or book chapters, the name of the publisher can be useful, although this, like certain other aspects of references, has become largely superfluous with the advent of online searching. Likewise, the location of the publisher is sometimes difficult to pinpoint in these days of global companies (for a discussion, see ²²).
- The volume and issue numbers of a journal may also have become superfluous with online searching.
- Inclusive page numbers give readers an idea of the length of the article but no longer have any search function.

For an online search, therefore, the reader requires either the first author's name or the title of the article or book, the journal title, and the date, although even partial information may be sufficient.

The requirements for referencing a website retain some of these elements. Thus, the 'author', or institution, should be given, the title of the item on the website, the full URL (uniform resource locator), and, importantly, the date the site was last accessed and found to contain the item. Websites change rapidly; therefore, if readers at least have the name of the 'author', they can usually make contact to obtain a copy of the item. An international standard (ISO 690–2) for references to electronic documents exists, as do recommendations from the National Library of Medicine in the USA.¹³

The near future

All of the debate described here may possibly be made moot by the introduction of the DOI, the digital object identifier, and CrossRef, an official DOI registration agency to ensure linking of online academic journals published by different publishers. The DOI consists of a string of characters, a 'digital identifier' that uniquely identifies an object such as an electronic document (that is, a journal article or online book chapter). For more information on the DOI, see Chapter 6.5 in this handbook.

Another change may be the introduction of unique author identifiers. ORCID (Open Researcher and Contributor ID) is a unique alphanumeric code that is being adopted to identify authors. It is quite possible that in the future this may also become an element to be incorporated in reference lists.

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1.9: Editing and design of tables

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As a science editor, you will be confronted with tables that your authors have prepared and incorporated into their documents; very rarely will you be required to prepare a table from scratch. Given a table as a *fait accompli*, two categories of editors will look at it differently: the immediate concerns of science editors, the editors responsible for the science, will be different from those of scientific copy-editors, who are responsible for preparing scientific texts for publication. This chapter touches on the concerns of science editors but focuses mainly on what scientific copy-editors do with data tables.

Science editors, once they have established what a given table is all about, will focus on the numbers, asking a series of questions: Is the sample size adequate? Have the data been analysed statistically? Does the magnitude seem reasonable? Are the differences between the treatments and the control, and those within the treatments, marked, significantly different, or possibly due to sheer chance? Lastly, do the numbers support what the authors claim when they mention that table in the text?

Scientific copy-editors may also consider these questions but will ask many more, and will scrutinize every bit in the table to make sure that it is consistent with all other tables in the document, and in line with the publisher's style. The discussion from now on follows the path from the sentence in the text that mentions or refers to a table through all the parts of a table – its number and title, headnotes if any, row heads and column heads, footnotes, and so on – up to the last part, namely, source notes.

Mention of the table in text

Typically, such items as tables, figures and references are adjuncts to text. Data books and similar reference works are, of course, exceptions. Every table in a research paper or report needs to be mentioned in the text by its number. Ideally, the text should go beyond a mere mention by saying something about the table, for example, a key observation, as in 'Minimum temperatures in Moscow are much lower than those in Madrid (Table 3)'. Such statements prime the readers when they choose to look at the table; they already know what the table is about. The copy-editor will also double-check that the table in the above example is indeed numbered Table 3 (and not Table 2 or Table 4): mismatches are not uncommon because in revising a paper, the author may have added or removed a table but forgotten to amend the mention suitably. Incidentally, some publishers capitalize the word 'table' (as in the above examples) but some do not.

Table numbers

Tables are numbered sequentially. In multi-authored volumes, a table number usually includes the chapter number, Table 1.3 being the third table in Chapter 1. This system has the advantage that adding or removing tables affects only individual chapters: all the tables in the volume do not have to be re-numbered. In some documents, tables given in annexes or appendixes are numbered separately, Table A3 being the third table in Annex A or Appendix A, and so on. The word 'Table' can be rendered in different ways – Table or TABLE or TABLE, in normal or italic or bold type – but needs to be set consistently. Similarly, the number may be followed by a colon, a full stop or a space (variable or fixed), and the title of the table may follow immediately or may begin on the next line.

Table title

The title of the table should indicate the scope of the table and ideally include the unit of measurement (if it is common to all the entries in the table). If the data are a time series or apply to a particular year, that information should also be included in the title, as in 'Monthly average maximum and minimum temperatures (°C) in Europe's capital cities: 1900–2009'. A common tag usually appended to the end of the title to show how the table is organized consists of the preposition 'by' followed by the variable, as in 'Coal production (million tonnes) in Europe in 2010, by country'.

Capitalization

The table title usually follows normal capitalization (sentence case) but some publishers choose to capitalize all significant words (title case).

Terminal punctuation

A table title is not usually a complete sentence with a subject and its complement; therefore, it does not require a full stop at the end. However, this again is a matter of style, and the copy-editor should ensure consistency across all table titles in a document.

Turn-over lines and indents

Sometimes, table titles run to two lines or more. The line length, or measure, is the same as that used for text (although the table itself may not be as wide). Turn-over lines are either flush left: that is, the second and subsequent lines also begin from the left margin of the text block, or indented. In this way, the space underneath the table identifier (Table 1, Table 2, etc.) is left clear, and the turn-over lines begin some distance away from the left margin.

Head note(s)

Additional information other than the units of measurement and the date that applies to the data, if relevant, can be given in notes placed between the title of the table and the body of that table. Whereas footnotes (see below) apply to particular cells within a table, a headnote applies to the entire table, as in ‘The data have not been adjusted to account for political reorganization in the form of new countries and changes in national boundaries.’

Body of the table

The body of the table comprises the matrix of rows and columns, including column headings and row headings.

Order of rows and columns

Order the columns and rows logically to show the data to their best advantage, by which I mean the arrangement that best serves the argument that the data support. Tables in a data book or other works of reference form a different case, and are organized to facilitate looking up specific bits of information, which usually means alphabetical or chronological organization. Tables in a research paper often arrange entries in ascending or descending order by magnitude. Sometimes, the categories have a natural order, for example, calendar months or seasons, age groups, and stages of crop growth.

Rows or columns?

Tables can be turned (‘pivoted’) on their axis: columns can become rows and rows can become columns. The choice is more often a matter of what fits in a given space than of logic: printed pages are typically rectangular, and tall rather than broad. This makes it easier to accommodate more rows on a page than columns. When fitting a table to a given space is not an issue, what data go into columns or rows is often a matter of choice. If I were to hazard an opinion, I would say that smaller differences are noticed more easily if the different values appear side by side, that is, as columns; whereas larger differences – of an order of a magnitude or more – are easily apparent when scanned vertically down a column of numbers.

Headings and subheadings

A column heading or a row heading typically consists of a category (a city, a month, a crop, etc.) or a variable and its unit (mass and kilograms, length and metres, duration and hours, etc.). If, in the case of the variables, the two are separated by a comma or the units are enclosed in brackets, as in ‘Weight, kg’ or ‘Weight (kg)’, the units are typically represented by their symbols rather than by their names, space being at a premium. A separate column for units or unit symbols is not recommended when different rows have different units.

If entries in a column are multi-digit figures, it is better to choose a larger unit (tonnes instead of kilograms or gigawatts instead of kilowatts, for example) and reduce the number of digits. In these situations, write out thousands, millions or billions, or use exponents, rather than giving a

string of zeros: for example, ‘No. of births, in thousands’ is preferable to ‘No. of births, 000’.

Singular or plural: The heading must agree with the entries in terms of number: if each row presents data on a different city, the column of row headings will be ‘City’, and not ‘Cities’, whereas if the rows have such headings as ‘London, Manchester, and Birmingham’, ‘Frankfurt and Munich’, and ‘Paris, Lyons, and Tours’, the column heading will be ‘Cities’.

Levels of headings: The row or column headings may have subheadings or even several levels of subheadings. If so, the design should clearly indicate the levels. If a column heading has one level of subheadings (sales figures for a financial year broken down by quarters; temperature split into average, average minimum, and average maximum; power generation given by source – coal, oil, and natural gas – and so on), a table typically uses ‘straddle’ or ‘spanner’ rules between the main heading and the subheadings.

If a row heading has subheadings, the subheadings are indented (although this takes up more space). If space cannot be spared, the levels can be distinguished typographically: for example, the main heading can be in bold type and the subheadings in normal type, both set flush against the left-hand margin, with a blank line above the main heading.

Vertical alignment between a row heading and the rest of the row: At times, a long row heading will run to two lines or more. In such cases, should the rest of the row align with the top line of the row heading or the last line of the row heading? The convention is to align the data row with the last line of the row heading (presumably, because readers will read the heading first and then read on); however, if the row contains text instead of numerical data, the text aligns with the first line of the row heading.

Vertical alignment in column headings: A similar choice needs to be made when column headings are of uneven length: within a table, some column headings will fill only one line, some may fill two lines, and some may run to three lines. Should these headings be aligned from the top, like a clothesline (and therefore referred to as ‘hung’ headings); should they be aligned from the bottom, or ‘stacked’, or should they be centred? This is a matter of style, although stacked headings have the advantage of maintaining a consistent spacing between the heading and the body of a column.

Horizontal alignment between the heading and the body of a column: Sometimes, a column heading will be as wide or wider than the body of the column. The copy-editor should check if a long column heading can be divided into two lines or more, to narrow it.

Vertical alignment between the head and the body of a column: A commonly seen choice is centred column heads, which are centred on the widest entry within the body of the respective columns. If spanner or straddle rules are used, the main heading is usually centred on the rule. If column headings are left-aligned, the left edge aligns with the left edge of the widest entry within that column; if right-aligned, the heading and all the entries within that column share a common right edge.

If each column is numbered, the number (an Arabic numeral within brackets) is centred on the column. However, columns should be numbered only when they are referred to by their numbers in the accompanying text or when the numbers in one or more columns are derived from other columns (for example, when entries in column 5 are products of multiplication of the corresponding entries in columns 3 and 4).

Vertical alignment within a column of numbers: Avoid centred alignment because it masks the differences in magnitude: the difference in length between a 5-digit figure, for example, and a 3-digit figure will be less prominent if the numbers are centred within a column, but easily noticed when the numbers are right-aligned. The result is even worse when some numbers contain the decimal point and some are integers: 1234 and 1.234, for example, will appear nearly equal.

As long as all the entries share a common unit, right-align them if all are whole numbers and align them by the decimal point if one or more entries are in decimal numbers. If the numbers do not share a common unit, left-align them since the numbers have no arithmetical relationship. In a column of figures that refer to consumption of fossil fuels, for example, you cannot add up tonnes of coal, litres of diesel, and cubic metres of natural gas unless all are given in TOE (tonnes of oil equivalent), in which case they share a common unit.

If in a column of decimal numbers, the number of digits to the right of the decimal point varies, do not add zeros to make the numbers consistent, since the differences may reflect differences in the accuracy of measurement. It is best to query the author, but the difference may be acceptable.

Footnotes

Whereas headnotes apply to the entire table, footnotes apply to specific cells, rows, or columns. Footnotes to a table are placed at the foot of the table and not at the foot of the page on which the table appears.

Footnote markers

In tables containing numerical data, it is better to use letters of the alphabet as footnote markers; in tables containing text, numerals will be the better choice. The traditional footnote markers – the asterisk, the obelisk, the section mark, and so on – are seldom seen in the 21st century. The asterisk is also associated with probability levels and therefore best avoided.

Formatting footnote markers: Footnote markers are usually set as superscripts. In addition, setting them in bold type makes them stand out, and setting them in italics separates them slightly from the number they refer to. Footnote markers may interfere with proper alignment. A ‘quick and dirty’ approach is to insert the marker *before* the number, that is to the *left* of the number (assuming that the numbers are either right-aligned or decimal-aligned).

Explaining the footnotes

Footnotes are usually short, and several footnotes may be run together in a single line below the table, perhaps

separated by an em-space. Although footnote markers are typically superscripts, many publishers print them ‘in line’ when the markers are repeated at the foot of the table. Leave a slight gap (a hair space is one possibility) between the marker and the explanation that follows, and avoid starting it with a capital letter so that the marker will not be obscured, at least in some cases. As with table titles, footnote text seldom consists of complete sentences, and hence does not require a full point.

Source note(s)

The convention is that if no source is given, the table is credited to the author. If the data in the table are not the author’s own, cite their source in keeping with the citation format adopted for the document: author–date (Harvard) or numbered citations (Vancouver). Alternatively, give the full reference, including the table number and page number on which the table appears in the source document.

The heading for the source note may be ‘Source’ or ‘Sources’, depending on whether the data are from one source or more. The word may be in italics, small caps, or whatever, depending on the publisher’s house style: the copy-editor should ensure compliance and consistency.

If the table has been modified in some way, by updating the statistics or by adding or removing one or more columns or rows, and by pooling data from several sources, indicate this with a tag ‘Adapted from’ or ‘Modified from’ before the citation.

Large or unwieldy tables

Some tables may be too large to fit on a page or within a page spread. If fitting such tables into the available space is part of the copy-editor’s responsibilities, several choices are possible and may be used in combination by:

- using a smaller font (although anything smaller than 7 points should be generally ruled out);
- reducing line spacing;
- doubling up (if rows are many and columns are few, two or more sets of identical columns may be printed side by side);
- printing the table in ‘landscape’ format (sideways on a page);
- ‘pivoting’ (making rows into columns and columns into rows);
- splitting a table across pages, and so on.

Alternatively, the table can be made into a supplementary table and put only on the publisher’s website or supplied on a disk. In printed documents, fold-outs are another possibility: the table is printed on a larger sheet, which is folded to fit the size of the document. This is easy enough if only a few copies are to be printed, but seldom used when print runs are large, because of the additional costs.

If a table is split across pages, the usual form is to put ‘continued’, typically in italics and right-aligned on the page, at the point where the first part ends. The next page begins with ‘Table # continued’ at the top, and the rest of the table below this line. The column headings are repeated.

Some reminders

The minutiae should not prevent copy-editors from examining a table as a whole: being unable to see the wood for the trees is an occupational hazard, which the following points may help you avoid.

Does the table duplicate information?

Some authors present the same data twice in one document, once as a chart and once as a table. Robbins addresses the explicitly posed question, “When should I use a table, and when should I use a graph?” and provides a brief and clear answer, which begins with the elegant one-liner: “Graphs are for the forest and tables are for the trees.”¹

Does the table contain any redundant information?

Any text that occurs repeatedly in many columns or rows should alert the copy-editor to look for ways to eliminate the repetition. Most often, this happens with units of measurements (which can be moved into the row head or column head as appropriate and removed from all other rows or columns); however, these units can take other forms. For instance, in a table giving data on a number of rivers, instead of repeating the word ‘River’ in each row, as in River Danube, River Tiber, and River Seine, give the column the heading ‘River’, and reduce the row headings only to the name of the river in question. The only redundancy you may consider allowing is to repeat the percentage sign as appropriate: as Koomey puts it, ‘label the column heading “% of total” AND put a percent symbol in every cell . . . people make mistakes in their calculations.’²

Does the table contain enough data?

Sometimes tables are used without enough thought; information that can be given in a single sentence is parceled into rows and columns and dignified with a table number and title. If this happens, the copy-editor should suggest that the table be deleted and the information given in running text.

Does the table yield meaningful ‘test sentences’?

A test sentence is a useful device in checking whether everything is shipshape as it were. Construct a sentence by reading across the columns and see if it is meaningful, as in ‘The River Danube is 2857 km long; the mean altitude of the river basin is 475 m, and the mean flow of the river is about 6550 m³/sec.’ If a unit of measurement is missing, the test sentence will not be meaningful.

Conclusion

Think of tables not as repositories of boring data but as gemstones that you can polish. Finney says it all: ‘good tables and diagrams are not born without pain. They require at least as much effort as the sentences of the text. An author may revise the text repeatedly in order to improve the presentation, yet may never think to change the first drafts of tables and diagrams.’³

References

- 1 Robbins N.B. *Creating more effective graphs*. Hoboken, NJ: John Wiley, 2005.
- 2 Koomey J.G. *Turning Numbers Into Knowledge*. Oakland, CA: Analytics Press, 2008.
- 3 Finney D.J. On presenting tables and diagrams. *Journal of Scholarly Publishing* 1986; 17: 327–342.

1.10: Editing graphs

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This chapter covers editing and designing graphs to ensure that they communicate the intended information in a clear, concise and accurate manner. Elsewhere in this Handbook (Chapter 1.9) there is discussion of when to use a table and when to use a graph to present quantitative information. Consideration of when to use each type of graph as well as some graph types that should never be used can also be found in Robbins.¹ The emphasis here is on editing a graph, given that it is an appropriate display.

A number of the questions an editor must ask before editing a table apply to graphs as well. However, due to space considerations, these questions are not repeated here. We divide key issues for editors of graphs into three sections – *clear vision*, *clear understanding*, and *scales* – following Cleveland.² ‘Clear vision’ questions ask whether the reader can clearly see the graphical elements; ‘clear understanding’ questions ask whether the reader understands the information that the graph is designed to communicate, and ‘scales’ questions ask if the scales are appropriate to the data. Space permits only a sampling of useful questions; Appendix A in Robbins includes others.¹

Clear vision: can the reader clearly see the graphical elements?

Do the data stand out?

When editing a graph, the first thing to do is to look at the graph and ask yourself what you notice first. The answer should be the data. If the first things you notice are the gridlines, the strings of zeros in the labels, or anything other than the data, the figure needs revising.

Gridlines are useful for interpreting the data but should always be in the background, so draw them a light gray colour. Lines and plotting symbols should be visually prominent; make sure that the symbols are not hidden by labels, tick marks, gridlines, other data points, axes, or other data elements.

Are there unnecessary elements?

Pseudo-third dimensions added to pie charts, bar graphs, or line charts are unnecessary. They distort the data. Figure 1 shows a bar chart with a pseudo-third dimension. Readers do not know whether to read the bar from the front or from the back.

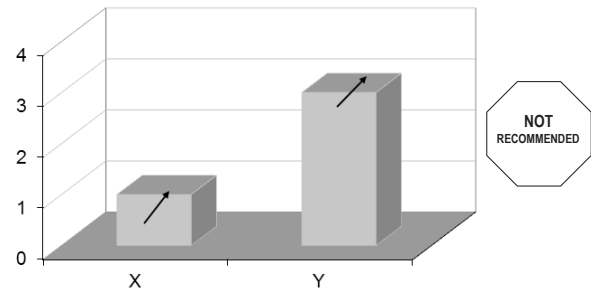


Figure 1. Readers do not know how to read bars with pseudo-third dimensions.

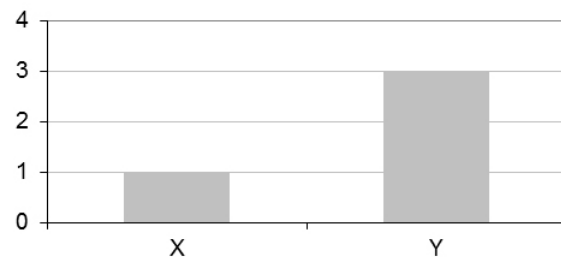


Figure 2. A two-dimensional bar chart is unambiguous.

In Figure 2, a two-dimensional bar chart shows the same data as Figure 1; because the interpretation is unambiguous, we see that neither the front nor the back of the bar in Figure 1 is correct. These figures were drawn using Microsoft Excel. Other software packages use different algorithms to create the pseudo-three-dimensional effect. In some cases we do read from the back or the front. It is unacceptable to have the interpretation of the figure depend on the software used to create it, so figures with a pseudo-three-dimensional effect should never be used.

Extra dimensions represent just one form of unnecessary elements. A percent sign on every tick mark label can be eliminated by adding the word ‘percent’ to the axis label. Similarly, a long string of zeros can be eliminated by stating the units (thousands, millions, etc.) in the axis label. Too many tick marks and tick mark labels clutter the graph or confuse the reader. Not every tick mark needs a label, especially when providing one for each causes the labels to merge.

Clear understanding: can the reader clearly understand the graph?

Are error bars clearly explained?

Error bars are often used for three distinct purposes: 1) to indicate the standard deviation of the data, 2) to indicate the standard deviation of a statistic such as the mean (also called the 'standard error'), or 3) to show a confidence interval. Too often, the reader is not told the meaning of the error bars in a specific graph. All error bars should be clearly explained (see Figure 3).

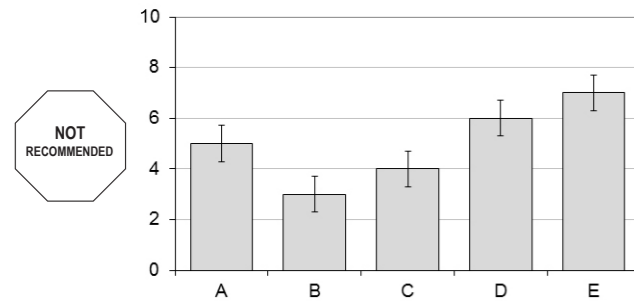


Figure 3. Error bars appear without an explanation.

Standard errors are useful in tables; they allow the reader to compute different confidence intervals. They are less useful in graphs. Error bars that show standard errors are equivalent to 68% confidence intervals for some distributions. Since it is common to use confidence intervals of 90% or 95%, intervals of 68% are not particularly interesting. For other distributions, confidence intervals are not based on standard errors. See Cleveland for a more complete discussion of error bars in graphs.²

Is the message of the graph clearly communicated?

Too many graphs do not give the reader any clues as to why they are shown. Neither the title nor the labels reveal the point the designer wants to make. For example, a paper or presentation might argue that more funds are needed to fight lung cancer in Kentucky and include a graph showing the rate of lung cancer for the 50 American states. The title 'Kentucky has the highest rate of lung cancer' would be more effective than the usual 'Lung cancer death rate by state'.

Is area or volume used for changes in one dimension?

In figure 4 the population is incorrectly encoded in the diameter of the circle even though we visualize the area. Therefore, the population in 1999 appears to be around 16 times greater than that of 1900 although it is only around 4 times as large. Another problem in Figure 4 is that two lines point to the same circle. Proofreading is therefore required in graphs as well as texts.

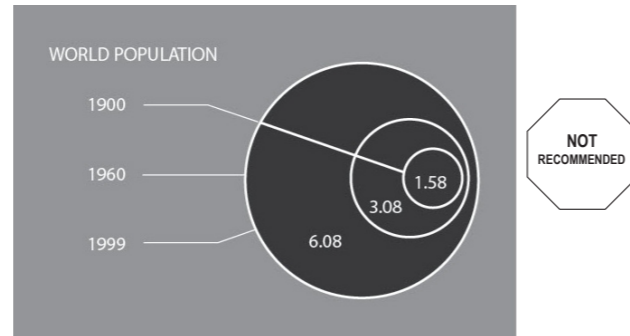


Figure 4. Readers do not know whether the diameter or the area of the circle represents the population so circles should not be used (Wurmann, 1999³).

Are all graphical elements explained?

Shaded areas, use of different symbols or colours, and other features of a graph require clear explanations.

Is the graph consistent with the text of the document?

Too often, we see text and figures that contradict one another. The text and figures must be edited together. For example, an editor might not have any problems with Figure 2, where x is smaller than y, until reading the accompanying text, which says that x is larger than y.

Are data sets labelled directly without cluttering the graph?

It is preferable to identify data sets without resorting to a separate legend. However, some graphs contain too much other information for this to be done without causing clutter.

Are calculations required?

Many graphs show data before and after some intervention occurs. The reader must subtract the values from the two curves to determine the change or improvement. The computer can calculate this more quickly and more accurately than the reader. Plot the change or improvement directly if this is the variable of interest. For example, if you have data on weight before and after a diet, you should calculate the difference between the two first, and then plot the change rather than leaving the calculation to the reader.

Do groups of graphs have consistent scales, colours, symbols, and other elements?

Graphs often appear in groups for comparisons. For example, we might compare the body mass index of men and women at different ages with one chart for men and another for women. This comparison is not valid if the scales on the two charts differ. Another common problem is that the meaning of colours or symbols change from one graph to another in the same article or book. This confuses the reader.

It is also important to ensure that the meanings of multipliers of axis labels are consistent throughout a journal and in different journals. (Multipliers are used to avoid long strings of zeros in labels. An example of a multiplier is $\times 10^6$.)

Is a graph prepared in colour likely to be reproduced in black and white? If so, will it be understood?

Very often presentations and courses are presented in colour. The slides used are then copied on black and white copiers for handouts. Groups of data that are clearly distinguishable in colour are not so in black and white. Yet, the handouts are all that the audience has after the presentation ends.

Scales

Is zero included if it is needed?

Whether or not zero is required on all graphs is a controversial topic. Cleveland claims that zero is not required on graphs such as scatterplots and line graphs where we judge the position of the point or line along a common scale such as the x or y axis.² On the other hand, zero is required on bar graphs, for example, where lengths are judged.

Are the two sides of a scale break connected?

Some graph designers use a scale break in cases where the data have very different values. If a scale break is included, it should be prominent, and its two sides should never be connected. Often, the use of logarithmic scales avoids the need for a scale break, which can be misleading if not done properly.

Are evenly spaced tick marks used to represent uneven intervals?

This is a very common problem that leads to distorted figures. Quite often, a researcher has data for uneven intervals. For example, an experiment might be conducted on day 1, 2, 4, 8, 16, and 32. Some software programs assume that the data are categorical and space the days evenly, as in Figure 5. This gives the impression that the response increases in an approximately linear fashion. Figure 6 shows that when spaced correctly the increase is not at all linear.

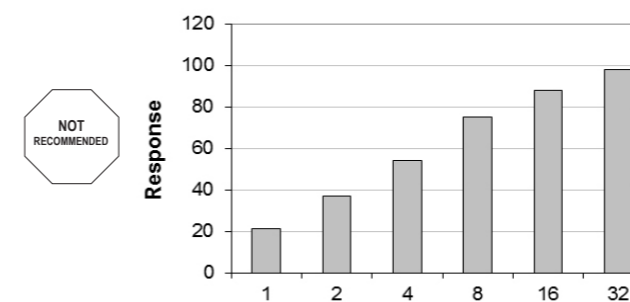


Figure 5. Some software programs inappropriately treat data as categorical when that is not the case.

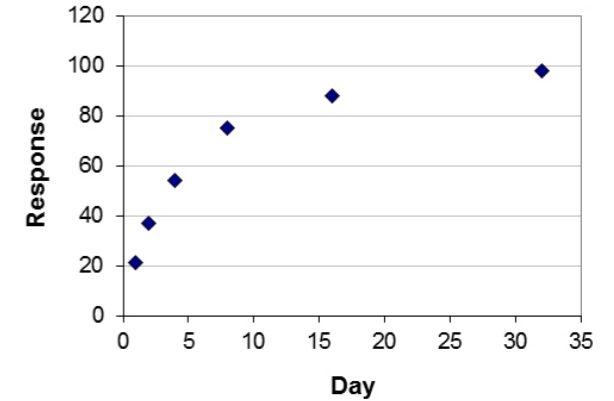


Figure 6. The data of Figure 5 are spaced correctly in this figure.

Do the axes increase in the conventional direction?

Readers expect the horizontal axis to increase from left to right and the vertical axis from bottom to top. Deviations from this pattern may be missed, misleading the reader.

Conclusion

Well-designed graphs help to make complex data clear; poorly designed graphs confuse or mislead. Although many of the questions the editor must ask just require common sense, too often they go unchecked. The editor plays an important role in ensuring that graphs communicate clearly.

References

- Robbins, N.B. 2005, reissued June 2013. *Creating More Effective Graphs*. Chart House [originally Wiley-Interscience]
- Cleveland W.S. *The elements of graphing data*. Revised edition. Summit, NJ: Hobart Press, 1994.
- Wurman, S. *Understanding USA*. Newport, RI: TED Conferences, 1999.

1.11: Last but not least – the index

Ann Kingdom

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Why you need an index

A good book or journal deserves a well-crafted index produced by a skilled professional with the appropriate level of subject expertise. A poorly constructed index will impair the publication's usefulness and frustrate its readers, while the absence of an index will leave them trying to search for specific pieces of information from the contents list.

Indexes versus full-text searching

Although many journals have chosen to discontinue indexing, relying instead on full-text searching, this is a poor substitute for a good analytical index in terms of retrieval. Full-text searching picks out far too much information to be usable, but at the same time far too little to be reliable. There are no quick fixes for the kind of intellectual analysis required to extract meaning and significance from the text, to identify complex concepts, or to recognize different ways of expressing similar ideas. An indexer knows, for example, that tigers aren't always tigers – they may also be referred to as “big cats”, “endangered species”, “man-eaters”, “top predators”, “*Panthera tigris*” and “poaching targets”. And a good indexer, unlike keyword-based systems, will ignore such phrases as “unlike tigers” and distinguish between Sumatran and Siberian species.

Why you need an indexer

Although the author, editor or proof reader may sometimes be asked to create the index for all but the simplest name index, it is generally preferable to engage a professional indexer (although authors and editors have occasionally produced award-winning indexes). Indexing is far from a clerical or mechanical task, and requires a high level of intellectual input. A professional indexer will be able to do the job more efficiently, not only through having the relevant training, skills and experience but also through using specialized software. A professionally trained indexer will:

- analyse the meaning and significance of the entire text, identifying significant terms and concepts, and representing them with appropriate index terms;
- identify with the proposed readership, considering the terms readers are likely to use and relating them to the language chosen by the author with a web of cross-references; this is so nothing is missed, no matter where the reader begins to search;
- organize multiple references into helpful subheading sequences, making retrieval faster and more specific, and preventing readers from having to wade through long strings of page numbers;
- distinguish between material in footnotes, illustrations and tables;

- make sure the index is clear, comprehensive and internally consistent;
- tailor the index to fit the available space and conform to the publisher's house style; and
- recognize non-significant references to a subject that lead the reader nowhere.

Finding an indexer

Engaging an indexer early in the production schedule (and certainly before the page proofs come back from the typesetter) will allow time:

- to find a good indexer, particularly one with an appropriate level of specialist subject knowledge;
- for the indexer to schedule the work adequately.

It is important to keep the indexer informed of any subsequent changes to the schedule.

There are professional indexing bodies in several countries, notably English-speaking ones, which produce registers of freelance indexers, with information about their qualifications, skills, experience, and subject specialisms. Many indexers have held senior posts in their particular field, or in publishing, or library/information work, before choosing to go freelance, and have a high level of specialist knowledge.

Scheduling the work and negotiating the fee

How long does it take to compile an index?

For particularly complex texts it may be difficult to index more than 2–3 pages per hour. More straightforward material can be indexed more quickly, but the indexer will still need to set aside time to edit the draft index into an efficient finding tool. Since freelance indexers may be working on several projects at a time, ideally, two or three weeks should be allowed for the average book of, say, 200–300 pages. Factors that may increase the time (and therefore the cost) include:

- reference and research texts requiring indexes equal in importance to the textual content;
- detailed indexing of figures, tables and footnotes;
- poorly written or edited texts where the indexer has to raise queries about apparent inaccuracies and inconsistencies, or where it is difficult to follow the author's argument;
- proofs received out of sequential order;
- late amendments to proofs (see below);
- non-standard index style or presentation;
- embedding of index entries into the Word or XML file (see below).

It is also worth noting that if there is only space for a

shorter-than-ideal index, it is not necessarily quicker for the indexer to prepare this, since decisions have to be made about what to leave out.

Index length

There is no ideal length for an index; length depends on the type of book and the intended readership, but in general, you should allow around 3–5 per cent of the book's length (that is 7–12 pages for a 250-page book). Some reference or scholarly texts may need much longer and more detailed indexes. If there are space constraints, these should be discussed with the indexer so that the index can be prepared to fit the space available. Liaison with the designer or typesetter over type sizes may be necessary.

Indexing fees

Guidance on fees (hourly, page and word rates) is provided by some indexing societies, such as the Society of Indexers in the UK, and these should form the starting point for negotiation. Higher rates should apply to:

- more experienced indexers,
- complex texts requiring a high level of specialist knowledge, and the ability to disentangle convoluted arguments,
- urgent jobs with tight deadlines that mean the indexer has to work unsocial hours,
- embedding of index entries in the document,

In the case of ongoing journal indexes, a monthly fee may be agreed to cover the indexing of each issue, together with an end-of-volume sum to cover the final editing and index submission stages. However, for a large cumulative journal index (or indeed any large project lasting several months), interim payments may be negotiated.

Most indexers prefer to negotiate a fee after seeing the proofs, or at least a sample chapter or several issues of a journal. At the very least, the indexer needs to know:

- production schedule and deadlines,
- book length and format,
- readership level,
- any length/space constraints,
- whether certain sections of the text do not need indexing. Although this should normally be a matter for the indexer's professional judgement, in the case of journal indexes, certain sections of the journal may be excluded (e.g., letters, news, entertainment items or fillers),
- format in which the index is required.

The fee may have to be re-negotiated if unexpected complications arise once the job is in progress.

Queries

It is important that the indexer knows who to contact with queries that arise when indexing: for example, about different spellings of names, inaccurate information in text.

Proofs

The indexer will need a complete set of final page proofs, if possible, via an email attachment or an FTP site. If the pagination changes *after* the index has been completed

(due, perhaps, to extensive proof corrections), the indexer will also have to update the index and will need revised proofs (see below). If the indexer is supplied with printed proofs, A4 sheets are much easier to work with than A3 or larger.

Journal indexes

Journal indexers expect to receive each issue as it is published in order to update the ongoing volume index with the entries for each new issue, ensuring that the wording is compatible with entries from previous issues (or adjusting the phrasing of previous entries) and including appropriate cross-references. Indexers should be notified well in advance of the date when page proofs of the final issue of the volume are scheduled. If the index is to be incorporated into this final issue, scheduling is inevitably tight. At this stage, the indexer not only has to index this issue, but also edit and check the whole index for accuracy, consistency and style. Weekly publications present unique problems of scheduling, and this final stage can be particularly time-consuming.

Contracts

The indexer may be required to sign a contract. A letter that clearly stipulates all conditions, obligations and duties may be sufficient. It is important to agree the fee and any expenses – not only how much, but also when they are paid (that is, when the index is supplied, normally within four weeks), and by what means (cheque, electronic transfer, etc.).

New production techniques: XML and beyond

The development of new production techniques and the increasing importance of e-books pose both challenges and opportunities for indexing. As explained above, relying on full-text searching is no substitute for a proper index in which the index entries must be hyperlinked to the relevant section of text. This requires the index entries to be *embedded* into the XML file from which the publication is produced. Although it is beyond the scope of this chapter to explain how this is achieved (especially in a fast-moving area like publishing technology), there are implications for scheduling, since the indexing may sometimes be undertaken at an earlier stage in the process, before the document is typeset. At the time of writing, a variety of techniques are in use, the precise role of the indexer varying from one publisher to another.

Briefing the indexer

Authors' and editors' involvement

Authors and (academic) editors should tactfully be dissuaded from interfering in the indexing process and reminded that the indexer *is* a professional. However, if they have views on what is required, these should be respected and discussed with the indexer. Authors sometimes provide (or offer to provide) lists of terms they think should be included in the index. These are rarely very helpful; the final choice of entries and the structure of the index should be a matter for the indexer's professional

judgement. Depending on the personalities involved, it may be useful for the indexer to contact the author or editor directly to resolve queries more speedily and avoid possible misunderstandings about the purpose of the index.

Style and layout

Skilled indexers will use their professional judgement or follow the guidelines in the international standard (BS ISO 999, 1996) to deliver an index with the most appropriate content and stylistic features, for both the document in question and its intended users. However, if a house or series style *must* be followed, the indexer should be supplied with a style sheet (or another index in the required style). Journal indexers will refer to the previous year's index and a few issues of the journal to establish the level of indexing required and the stylistic conventions, though it may be necessary to update these from time to time.

Style guides might cover:

- capitalization of first letter of entry (lower-case initial letters except for proper names is normally preferred);
- alphabetization (word by word, or letter by letter – see examples below);
- subheading arrangement (alphabetical or chronological order);
- typeface style differences for references to illustrations, tables, appendices, etc. (e.g. bold or italic);
- punctuation (if required) after headings, before page numbers, etc.;
- form of location references (e.g. page numbers, volume/page numbers, or paragraph/clause/section numbers, and annotation for different sections of a journal such as (C) for correspondence);
- page range style – full (e.g. 123–124), maximum elided (e.g. 123–4), or something in between;
- whether illustrations should be indexed even if they appear on the same page as the associated text;
- position of *see also* cross-references (after the last subheading in a sequence, or after the main heading);
- subheading style (set-out or run-on) and number of subheading levels. Set-out subheadings are easier to follow than run-on, but the run-on style will occupy less space (see examples below).

If last-minute stylistic changes are required once the index has been completed, it is usually a simple matter for a professional indexer to make these and they should not be attempted in-house.

Cumulative indexes to a sequence of journals may or may not follow the style currently in use for the annual or regular index. For a particularly long sequence, the style is likely to have changed over the years, with changes of editor and indexer. Discussion with the indexer is needed to determine a suitable and consistent style for the cumulative index.

Format

The indexer will also need to know:

- preferred file format for the index (e.g., RTF, Word doc);
- how indents (for subheadings) should be formatted (e.g., tabs or Word styles);
- how the index should be delivered, for example, as an

email attachment or uploaded to an FTP site.

To avoid problems, it is well worth checking file formats and compatibility with the typesetter.

If index entries are to be embedded into the Word document or the XML file to enable the publication to be produced in both printed and electronic formats, the indexer will need full and clear instructions on the method to be used.

One index or many?

It is generally preferable to have one single index of authors/names and subjects, the practice adopted in most books. Some journals have separate sequences for authors (sometimes including article titles) and subjects, and sometimes also for particular features such as book reviews. Whether or not there is more than one index, consistency in the presentation of subjects and authors' names is vital.

Author/name indexes

However names appear in the text, it is important that they are presented consistently in the index (e.g., full forenames or just initials), and that ambiguities are resolved (for example, are Bob Smith, B Smith, R Smith, RE Smith or REM Smith one and the same person?). This may be more of a problem in journal indexes and the indexer may need to raise queries with the editor.

Decisions must also be made on the style of names for different nationalities:

- whether or not to use accents such as Spanish ñ;
- whether Far Eastern names should be inverted, as when academics move to the West, with consequent consistency problems (e.g. Wong H-L and Hu-Ling Wong);
- order of sorting for Mac/Mc and Saint/St;
- sorting of prefixes such as *van*, *von*, *de* and *di*.

Subject indexes (journals)

All indexers should be aware of ongoing developments in their specialist subjects, but this applies particularly to journal indexers in the fast-moving sciences.

A straightforward, relatively simple index can be constructed using terms from the article title, abstract, and author's keywords for guidance. However, author-supplied keywords (unless based on a thesaurus of subject headings) are generally an unreliable basis for a subject index. Most indexers develop a list of subject headings for a particular journal, ensuring they are used consistently, and that they are reviewed and updated as terminology evolves. They will also consult relevant thesauri. A more detailed index can be constructed using major terms relating to each section or paragraph of the articles, more in the style of a book index. This tends to be used for review or seminar-style journals.

Cumulative journal indexes cannot be compiled by simply amalgamating the separate volume indexes, however good each one is individually. Not only is the depth of indexing likely to have varied, but inconsistent terminology is also a particular problem where usage may have changed over time. It is often preferable to start afresh, using consistent terms, omitting irrelevant information, and ensuring that all issues are indexed in the same level of detail.

Receiving the index: what to look for

A professional indexer should deliver an index tailored to the needs of the reader, conforming to any agreed stylistic conventions; it should also have an appropriate length and follow the agreed format. There should be no need for any editorial intervention, since even minor alterations can affect the structure of a carefully prepared index. Using specialized software, the indexer will have automatically checked that the index is accurate in terms of

- alphabetization;
- capitalization;
- subheading style (consistent use of set-out or run-on),
- cross-referencing (there should be no *see* references that lead the reader round in circles);
- matching double entries;
- consistent elision of page ranges.

If the index has been produced by the author, however, or by an editor lacking both indexing skills and specialized software, the above points will need to be checked more carefully. It is also worth spot-checking the accuracy of locators (page numbers) by checking both from index to text and text to index, while also remembering that passing mentions of a subject in the text should not be indexed.

In addition, looking at the index from the perspective of the potential reader, the editor should check the points listed below.

- Are all the major topics covered adequately? (The main index headings should be checked against the contents list or author's summary.)
- Is there an introductory note to the index? Is it helpful?
- Are the subheadings logical and not so brief as to be confusing? Are they grammatically consistent? Are they redundant?
- Have any foreign names been correctly indexed? (The typesetter will also need a list of any special sorts.)
- Has the indexer avoided long "strings" of page references? These are annoying to readers and should generally be avoided; more subheadings may be needed.

Author's involvement

If the index has been prepared by a professional indexer, the author should be discouraged from making changes. The index is a tool for the reader, prepared by an expert; even minor changes can destroy its carefully designed structure. Sometimes it is necessary to explain to authors that the index is not a list of word occurrences, and that it is not usually necessary to index every name mentioned in the text. An index is a key to significant treatments of subjects, requiring harmonization of vocabulary and collocation of topics described differently, especially in multi-author works. It also has to supplement the author's terminology to accommodate the language in which the reader may formulate questions.

Design and typesetting

Everyone involved in the preparation of indexes should be familiar with the purpose and accepted standard layouts of indexes:

- Indents (for subheadings) are usually in multiples of 1 or 2 ems.

- Turnovers should be indented further than the deepest subheading.
- "Continued" statements (replication of main heading) are useful when a series of subheadings is split between two pages, especially over recto/verso breaks.

Dealing with proof corrections and last-minute changes

Whatever changes are needed, indexers with their specialized software and familiarity with the text will be in the best position to do the job efficiently and avoid introducing errors.

Shortening the index

Decisions on size should normally have been made at the outset and the index tailored to fit the space available. If an index is slightly too long, the simplest option is to

- change from a set-out style to a run-on style (especially if there is only one level of subheading) and/or
- reduce the type size and/or increase the number of columns per page. (But narrow columns with many turnover lines may confuse the index user.)

If shortening the index is unavoidable, it may be necessary to amalgamate subentries, subsume specific entries under more general headings and replace multiple postings with more cross-references – all of which reduce index usability. It is essential that such changes are done by the indexer, whose moral right not to have their work subject to "derogatory treatment" should be respected. An index is a complex structure, and any changes to one section are likely to have repercussions in others.

Accommodating proof corrections

If the indexer has not been working from final proofs, author's and proof reader's corrections may mean adding or deleting index entries and adjusting page numbers. Again, these changes *must* be done by the indexer, who will be alert to their implications for the structure of the whole index. The indexer will need revised proofs, preferably with changes highlighted. Some pagination changes (e.g. chapters in a different order, whole pages added/removed) can easily be dealt with using indexing software.

Making stylistic changes

The temptation to adjust the index layout, capitalisation, punctuation, alphabetisation and page-range elision should be avoided. Using specialised indexing software (see below), the indexer can usually make such stylistic changes (and more) quickly and accurately and then output the index in the required format.

Indexing software

Indexing programs such as CINDEK, MACREX and SKY Index help indexers to produce, sort and manipulate entries, establish subheading sequences, re-style and amend entries, check for consistency in cross-referencing, record what has been indexed where, etc. They also enable them to index book chapters or journal articles before the final order is known using dummy numbers, which can

save time at the final stage of production.

However, the intellectual and analytical work of indexing is the task of the human brain; it is not yet possible to feed a text into a computer program and expect a usable index to be produced. Similarly, the indexing add-ons provided by word processors are of little use in making a serious index, though specialized software designed to work with indexing software has been developed (WordEmbed and DexEmbed) to embed index entries into Word documents.

Proofs

Like anything else, when the index has been typeset, it should be proof read, preferably by the indexer. Electronic delivery of PDF proofs should ensure that there is little delay to the schedule. At this stage it is important to check that:

- the complete index has been typeset;
- any missing location references or personal name initials or forenames are supplied;
- the first page number of the index matches that in the contents list;
- “continuation” lines are included if subheadings straddle a page or column;
- subheadings have the correct indentation;
- indentation of all turnover lines is greater than that of the deepest level of subheading;
- bold and italic text are clearly indicated.

Some indexers like to be identified as the author of the index, while others prefer anonymity. An indexer’s name may be credited in the index or in the prelims. The indexer may appreciate a complimentary copy of the book, or the opportunity to purchase it at a discount. A journal indexer will need a copy of the printed index of a journal for use as reference for the following volume (usually automatic if a subscription has been set up for the indexer).

Moral rights

An indexer is entitled to assert moral and/or economic rights in accordance with copyright legislation. Legislation varies from country to country, but indexers should not have their work subjected to derogatory treatment.

References and further reading

Books

British Standards Institution. *BS ISO 999 — Information and documentation — guidelines for the content, organization and presentation of indexes*. Geneva: ISO, 1996.

British Standards Institution. *BS 1749 — Alphabetical arrangement and the filing order of numerals and symbols*. London: BSI, 1985.

Although now somewhat dated, these two standards still provide useful guidance.

Browne G. and Jermey, J. *The indexing companion*. Cambridge: Cambridge University Press, 2007.

In addition to covering the basic principles, this examines controversial areas and new challenges, speculating on future directions for indexing.

Butcher J., Drake C. and Leach M. *Butcher’s copy-editing*, 4th edition. Cambridge: Cambridge University Press, 2006.

The whole of Chapter 8 (pp. 185–206), devoted to indexes, is an

invaluable resource for anyone involved with commissioning indexes. (It also includes an excellent and comprehensive index.)

Chicago manual of style, 16th edition, Chicago: University of Chicago Press, 2010.

Although focusing on American style and conventions, this manual includes an excellent chapter on indexing (available as a separate offprint).

Horn B. *Editorial project management*. London: Horn Editorial Books, 2006.

Taking the reader through the whole process of managing a project, this includes plenty of useful advice on indexing, with practical exercises on briefing the indexer and assessing the completed index.

Mulvany N. *Indexing books*, 2nd edition. Chicago: University of Chicago Press, 2005.

Besides presenting a comprehensive guide to indexing principles and practice, this book also considers the nature and purpose of indexes in the twenty-first century.

New Hart’s rules. Oxford: Oxford University Press, 2005.

In addition to discussing matters of style and presentation, Chapter 19 (pp. 354–70) also throws light on the indexing process and the intricacies of alphabetization.

Websites

The websites of the indexing societies also provide useful information on commissioning and evaluating indexes.

American Society for Indexing (ASI): www.asindexing.org

Association of Southern African Indexers and Bibliographers (ASAIB): www.asaib.org.za/

Australian and New Zealand Society of Indexers (ANZSI): www.anzsi.org/

Indexing Society of Canada / Société canadienne d’indexation (ISC / SCI): www.indexers.ca/

Society of Indexers (SI): www.indexers.org.uk/

There are also networks of indexers in Germany and the Netherlands:

Deutsches Netzwerk der Indexer (DNI)/German Network of Indexers: <http://www.d-indexer.org> and www.d-indexer.org/welcome.html (site in English)

Nederlands Indexers Netwerk (NIN)/Netherlands Indexing Network: www.indexers.nl and www.indexers.nl/index_uk.html (site in English)

Glossary and examples

Alphabetization: there are two alternative systems:

<i>word-by-word</i>	<i>letter-by-letter</i>
amino acids	amino acids
amino esters	aminoacyl-RNA
amino ketones	amino esters
amino nitriles	aminoglycosides
aminoacyl-RNA	amino ketones
aminoglycosides	amino nitriles

cross-references: *see* references do not contain information themselves, but direct the reader to an entry that does; *see also* references direct the reader to additional entries containing related information.

double entries: two (or three or more) entries for the same topic (as opposed to a cross-reference), providing alternative access points for readers. May be used for synonyms, for example:

inert gases 2, 10, 230
noble gases 2, 10, 230

and for inverted terms, for example:

endangered species, conservation 23, 39, 51–5
conservation, endangered species 23, 39, 51–5

location references: numbers that identify the location of text. They may or may not include volume numbers, and may refer to paragraphs, clauses or sections other than pages.

page ranges: indicate full extent of pages over which a topic is covered. Full page ranges use the complete numbers. *Hart’s rules* specify the least number of figures possible. *Chicago manual of style* uses a combination of full and elided page numbers.

full: bacteria 223–225
maximum elided: bacteria 223–5

run-on style: subheading style where entries continue on the same line, with punctuation to indicate subordination, for example:

primates: conservation research grants 77; great ape reclassification 243; habitat fragmentation 93; mixed-species groups 247–8

set-out style: subheading style where each entry starts on a new line, indented to show subordination, for example;

primates
conservation research grants 77
great ape reclassification 243
habitat fragmentation 93
mixed-species groups 247–8

subheadings: secondary entries appearing under the main entry (see above).

1.12: Career and personal development for editors

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“Traditionally many medical journals have been edited by academics who have no training in editing. One day they are professors of cardiology, the next editors of major journals. Nobody would launch into being a cardiologist ... without training. Yet it is routine the other way round.”

Richard Smith: *The Trouble with Medical Journals*, 2006

Being an editor may be a full-time or a part-time role, but anybody undertaking this work needs to consider what skills and knowledge they bring to the job, and where they need to develop. The editorial world has changed substantially over the past couple of decades, and editors increasingly need technical skills and a wider understanding of the world of publishing to do their work well. For an editor-in-chief it is no longer sufficient to be knowledgeable about your discipline – now you need to be aware of reporting and publishing ethics and of the changing dynamics of scholarly communication. For technical editors being “good with words” needs to be supported by being “good with technology” so that you can make the best use of online editing and file management systems.

There are no clear career pathways for editors and little in the way of continuous professional development. Initially editors are shown what is expected and then required to rely on colleagues (where available) and published resources (books on editing style, etc.) for guidance. For technical editors there are some practical training courses, plus a wealth of literature about how to edit articles. However for editors-in-chief and managing editors there are few available resources and hardly any training courses.

Initial training often includes examples and practical exercises – but after this editors are often left on their own to ensure they do not pick up bad habits and that they keep up-to-date with changes in publishing and editing. To ensure they do not stagnate but continue to develop requires editors to be proactive. This is where “personal development plans” come into their own. This phrase might be a fashionable piece of sociospeak, but it is nonetheless a useful concept. The idea, simply, is that we can and should take control of what we learn and how we develop. This is a sensible notion that involves four steps. Each step comes from a simple question:

- Where are you now?
- Where do you want to be?
- How will you get there?
- How will you record your journey?
- What does “being an editor” mean?

Firstly, it is important to understand what type of editor you are, and what opportunities there are in other editorial roles. It is generally understood that an editor has responsibility for the content – but there is no general agreement regarding what responsibility over which content they have. Therefore the skills and knowledge that different editors require is very dependent on the particular role they undertake.

It is also important to understand that being proficient as one type of editor does not make you suitable for a different role. For example, there are many editors-in-chief who make superb decisions regarding what articles to publish, and have hugely impressive knowledge of their discipline – but who could never be a copy-editor as they simply cannot spell! Table 1 outlines some of the different editorial roles.

Table 1. Varieties of journal editors

- *Copy-editors* (sometimes called sub-editors), undertake the reading and editing of manuscripts, including correcting grammatical errors and checking references, and prepare manuscripts for typesetting. They also sometimes proofread the typeset pages.
- *Technical editors* (and language editors), often overlap with copy-editors, but often undertake more substantial editing of manuscripts including re-writing for clarity and language.
- *Editorial assistants*, work in the editorial office, managing the administration of the editorial system (submissions, reviewing and acceptance or rejection processes).
- *Managing Editors*, take responsibility for the movement of articles from submission to acceptance or rejection: they may be quite senior and make some decisions on rejection or acceptance.
- *Editorial board members*, usually honorary figures who represent the journal in their own communities and sometimes review articles.
- *Advisory or associate editors*, usually work closely with the editor-in-chief to help make decisions, sometimes with overall responsibility for specific sections of the journal.
- *Deputy editors*, work closely with the editor-in-chief, to support decisions and help with strategy.
- *Editors-in-chief*, the most senior editor with overall responsibility for the content of the journal and its editorial strategy.

What skills and knowledge do you need

When it comes to learning and development, we tend to stay deep in our comfort zone, happily spending time and money adding to what we already know and can do well. What we often neglect is the much harder task of addressing major gaps in our knowledge, attitudes, behaviour and skills – and nothing really changes. So the first step should be an audit: what kind of editor are you anyway?

A useful starting point, much loved by those who teach time management skills, is to divide your business life into different components. About seven is usually considered to be a manageable number. Remember to include the whole range of activities, and not just the ones you like; if in doubt ask others for their opinion. Two examples, one for an editor and one for a technical editor, are shown in Table 2.

Table 2. Examples of job components

Editor	Technical editor
1. Strategy	1. Strategy
2. Business	2. Business
3. Marketing	3. Marketing
4. Subject matter	4. Language/writing skills
5. Writing/editing	5. Critical appraisal skills
6. Dealing with people	6. Communication skills
7. Personal development	7. Personal development

Use this list as the framework for applying that useful tool – the SWOT analysis. Take a little time (half an hour will probably do) to sit down and look at yourself. Ask the following questions, in turn:

- *Strengths*: what are the things you do well?
- *Weaknesses*: what are the things you don't do well?
- *Opportunities*: what forces, internal and external, could lead you to be doing nicer things in the future?
- *Threats*: what forces, internal and external, could be detrimental to you and your work?

A very brief example of SWOT tests is shown in Table 3. Beware of confusing what you *want* with what you *need*. A technical editor once asked for help to develop her language and editing skills, particularly her knowledge of English grammar. Her request was triggered by a number of criticisms of her editing decisions by her (part-time) editor-in-chief. These had made her job difficult and her self-esteem low. When we talked it became clear that most of these so-called “grammatical corrections” were nothing of the kind: they were individual style preferences. Her most pressing training need, we decided, was not a course on grammar, but on negotiation skills.

Table 3. Example of two SWOTs

Editor	Technical editor
Strengths Thorough knowledge of subject Wide clinical experience Critical subject appraisal skills Good network in Europe	Strengths Clear idea of future direction Good English language skills Comfortable with critical appraisal Wide range of contacts in UK
Weaknesses No formal training in editing skills Little knowledge of publishing ethics Uncomfortable with social networking Poor network in USA	Weaknesses No book-keeping experience No formal marketing training Not confident on electronic submission systems Small number of contacts in Spain
Opportunities Increased research funding (leading to more articles) Improved journal support from publishers	Opportunities Greater need for technical editors in Spain Increasing need for technical editing services due to influx of articles from China
Threats Cancelled subscriptions No funding	Threats Lack of (new) customers Journals closing down Ill health

Where do you want to be?

There are certainly benefits in remaining in the same job for a long time – learning from experiences and feeling comfortable within the role and with your colleagues. However there is also the chance of stagnation and the development of bad habits. This is why it is useful to think of the future and to plan.

This is the time to dream. If all goes well in the next three years, what will you be doing differently? Imagine you are sending a postcard to your nearest and dearest: what triumphant message would you put out? For instance: “Our journal has just become the market leader”, “I have just been promoted to managing editor”, or (unlikely though this may seem!) “I have just been thanked by a grateful author”.

Next, go through your list of seven or so components to identify the skills, knowledge, attitudes and behaviour you will need to acquire if you want to achieve these goals. For example, you are editor of a middle-ranking journal, and your vision is to provide a better author service than all your rivals.

Your training and development needs will start to become clear: computer skills, personal relationship skills, marketing skills, and some mainstream journalism skills. To take another example, you are a technical editor, and your vision is to leave your current paid position and move to the south of Spain and run an editing business from there. Your training and development needs would probably include strategic thinking (you will need a good plan), business skills, computer skills, networking skills and the ability to speak passable Spanish.

Now start to firm these up. Write specific things you can

measure rather than pious hopes and vague ambitions. And (most important) put a deadline on them. Thus, instead of “I need to learn Spanish” write, “By January 8 I will be able to sustain a three-minute conversation in Spanish” or “By January 8 I will have completed the Learning Spanish package”. The vague “I need to start using an electronic reference system” becomes “I will decide on a suitable electronic referencing program (January 8), install it (February 14), complete the tutorial (February 24) and start using it to store and use references (April 1)”.

How will you get there?

Now you need to decide on how you are going to meet the goals you have defined. Your problem will be too many possible solutions, so take your time to choose. First work out what resources you will make available. How much time should you put aside for development activities (though you should bear in mind that much learning can be done in combination with “real” tasks)? How much money should you spend — 5% of your income perhaps?

Also important is an understanding of how you learn best. One of the most widely quoted models of adult learning is that by Kolb, who suggests four different stages: action (or experience), reflection, generalizing, and applying. On this cycle has been built one of the most popular models of learning styles, devised by Honey and Mumford (see the resources at the end of this chapter). They have proposed four learning styles for four different types of individual:

- *Activists*: like doing things, and enjoy role playing and practical exercises,
- *Reflectors*: like to reflect on experiences, and thrive on observation and reflection,
- *Theorists*: like to get a thorough understanding, and thrive on models and theories, and
- *Pragmatists*: like to plan the next steps, and do well with practical planning sessions.

Knowing how you best learn will help you to make wise decisions as to which learning methods you will invest in.

Most people will start by looking at courses. Whilst there are often many courses on how to write, there is a surprising lack of courses for editors. Frequently these are available at conferences and other meetings, and some associations also provide training, for example the European Medical Writers Association, EMWA (see www.emwa.org/training.html). EASE also provides workshops around its biannual conference.

If you decide that a course is the appropriate way of meeting your needs, you should ask the following questions:

What are the course objectives? Avoid courses that make vague promises. Look instead for concrete and measurable goals.

Is the course “good value”? Courses vary considerably in cost, so you should think in terms of value for money. If a course is within your budget, and meets one or more of your goals, then you are receiving value. If it fails to meet any of your objectives, then it is not good value, even though it might have been “free” in monetary terms (though not in time spent).

How many people will be on the course? The kind of

learning you will have will vary according to the number of people on the course. A group of 100, for instance, will be fine if you want to acquire new facts. But if you want to acquire a skill or have your attitudes challenged then you will be better off in a group of 12.

What will be the teaching style? Some courses employ a succession of experts to give short presentations (which is more akin to a conference); others use one or two tutors who will run the whole thing themselves. Again, the best format depends on what you wish to acquire: the former will be good for acquiring knowledge; the latter for acquiring skills and learning new attitudes and behaviour. Read the biographies of the trainers and see if they have (or mention) any training or teaching skills.

Will the course be residential? Since one of the greatest benefits of courses is interaction with other participants, this is often a great advantage.

Do you need further information? If you still have any concerns, ring up or Email for further information. Any good trainer or training company will be happy to talk: part of this is self-interest, as all good trainers know that the secret of good courses is having the right people attend them.

The one thing that unites all course providers is that those who survive are good at marketing themselves, so they can be hard to resist. One great advantage of a personal development plan is that it gives you a clear framework for choosing learning solutions wisely, so that you can spend your money on those that are going to meet your defined needs and not just those that look attractive.

But courses are only one option. There are many other training solutions that can be more appropriate to your needs. Some of the most common include:

Conferences: these are always good for foreign travel and networking, but they are expensive, and content and delivery can be mixed. Their main focus will usually be advances of knowledge rather than changes in attitudes and behaviour and the acquisition of skills.

Reading: books, journals, magazines, blogs, ListSers and websites are an available and cheap way of acquiring knowledge, or at least some exposure to knowledge, which is not always the same thing. You need to work out a way of storing that knowledge so that it can be recalled and used. One technique is a reading log, in which you list why you read something, what you learnt, and how it will help.

Electronic learning: these opportunities are becoming more widely available (though not necessarily cheap) and have the advantage that you can use them in your own time. The disadvantage is that it is too easy to become demotivated, so look for “blended learning” schemes that combine distance learning with more traditional techniques, such as tutorials and seminars.

Visits and exchanges: an excellent way of learning is to go and talk to (or perhaps shadow) someone who can already do what you wish to learn to do. This is cheap and effective, particularly for those who prefer listening and observing to reading.

Writing an article: this is an important way of acquiring knowledge, as it means not just collecting facts but ordering them in a meaningful way. It will force you to criticize what

you have done — and once the article is published you may receive feedback from those who have read it. This is a cheap option (and you may even get paid for it), but rarely a quick option.

Writing and delivering a training course: this is a time-expensive activity, similar to writing an article. The main difference, however, is that the feedback you get will be more reliable and more detailed.

Working with a partner: there are all kinds of different relationships, such as coach, mentor, or “support and challenge” partner. The important thing is that you will be able to develop alongside someone else. If you choose the right people for the right role, it could even be fun.

Making mistakes: if something goes wrong, particularly if it goes spectacularly wrong, spend time to work out why. This will give you some immediate lessons, and also inform your next personal development plan.

Choose from these (and many other learning opportunities) so that you have a list of what you plan to do in the coming year.

How will you record your journey?

Much of this activity could be wasted, however, if you don’t work out a way of recording the gains you have made. Too many people, sadly, leave a training event with a pile of neatly written notes, which they will put into a drawer or file and never look at again. You should take a more proactive approach. One useful technique is to write down an action list after each learning event.

In addition you should keep an overall record of your journey — a development log. Many professional organizations now make this a requirement: practitioners need to be able to demonstrate that they are keeping up with developments. But they are useful even if you are not forced to keep such a record: the most important benefit is that it will force you to reflect on what you have learnt. This is now seen as a vital part of learning.

The log itself may take many forms but broadly speaking you should record three things. These are:

- *The activity*: what exactly did you do, and when?
- *The lessons*: what did you learn from it?
- *The benefits*: how will it help you (as an editor)?

These are self-explanatory, and an example is shown in Table 4. One of the big issues is when to do this. Most people will leave the log to the end of the year, but whenever possible you should try to update it regularly.

Table 4. Learning logs example extract

Editor

Learning event: I have read a book on publication ethics (specify) which was recommended to me by three editors.
Lessons: I learnt that there is a widespread feeling that there are many ethical problems, such as ghost authorship, gift authorship, fraud, etc. Editors should play an important role in raising ethical standards, and clearly editors should have explicit policies on key issues.
Benefits: I now have a greater understanding of the major ethical issues involved in scientific publishing, and will be able to introduce practical ethical policies to my journal.

Technical editor

Learning event: I attended a one-day course on marketing. The course was organized by AB Training and covered targeting and positioning, the buying process, promotional tools, marketing collateral and writing a marketing plan.
Lessons: I came away with a 14-point action list which will help me to improve my marketing. The most important points were to rewrite my promotional material, add additional products and develop public speaking skills.
Benefits: This will help me to achieve my goal of setting up a viable technical editing business by December 31.

All this begins to raise the final, important question: why bother? The simple answer is this: in a fast-changing world we risk being left behind if we don’t keep developing what we know, how we feel and act, and what we can do. If this is worth doing, then it is worth doing systematically because this will increase our chances of meeting our real needs. It will be an efficient use of scarce resources such as time and money. And it will give us enormous satisfaction when, looking back, we can see how far we have travelled.

Resources

- ALPSP (Association of Learned, Professional and Society Publishers): www.alpsp.org
- Committee on Publication Ethics (COPE): <http://publicationethics.org/>
- Council of Science Editors (CSE): www.councilscienceeditors.org/
- Eastern Mediterranean Association of Medical Editors (EMAME): www.emro.who.int/EMAME/
- Editorial and publishing courses: www.pspconsulting.org/medical-short.shtml
- Editors’ Association Canada: www.editors.ca/resources/eac_publications/pes/index.html
- European Association of Science Editors (EASE): www.ease.org.uk/
- European Medical Writers Association (EMWA): www.emwa.org/aboutemwa.html
- Honey and Mumford learning styles questionnaire: www.peterhoney.com/content/LearningStylesQuestionnaire.html
- International Society of Managing and Technical Editors (ISMTE): www.ismte.org/
- Mediterranean Editors and Translators (MET): www.metmeetings.org/
- World Association of Medical Editors (WAME): www.wame.org/