Desktop publishing for scientists:
Copy editing, design, and choosing and using software

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Abstract. This article explains how to turn a scientific manuscript into a desktop publication of high quality. Four related tasks serve to present the content in the form most valuable to readers. First, the manuscript has to be copy edited to remove minor errors and ensure consistency throughout. Second, a thoughtful design must be crafted to make the publication useful and attractive. Third, a desktop-publishing program suitable for the targeted product should be chosen. A final step is to master the program and implement the design to produce a publication that is properly laid out and error free.

Copy editing removes faults in language and organization, and standardizes all of the elements according to chosen styles. An efficient procedure consists of developing a copy-editing style sheet, looking for major errors by an initial read, and then, in turn, examining general content, detailed content, citations and their references, and language. Text details are then standardized throughout, before an overall check and a last read.

Design demands attention to many aspects of layout, typography, images, and colour. It will be successful if basic principles are followed to achieve utility and simplicity. In particular, harmonious typography and sufficient space between components avoid a cramped and busy appearance.

The choice of a suitable program for desktop publishing is dictated mainly by the form of the intended product. A complex program is not needed if a simple one would suffice. However, most scientific publications of professional quality rely on software with diverse capabilities. Those options are explained here. The few advanced candidate programs are briefly reviewed. Substantial time must be spent to learn how to use an advanced program. Developing a desktop-publishing style sheet favours consistency. Following a fixed procedure to prepare each document guarantees that nothing will be forgotten and avoids unnecessary respacing. Basic parameters can be set first, and overall formats established. Text should be imported next (and details finalized if necessary), normally followed by design graphics if any. Tables, images, and other content can then be inserted and spaced page by page to give good appearance and flow to each page and to the document as a whole. Another check for errors, as well as verification that file(s) are correctly formatted for export, completes the process.

Diligent attention to copy editing, design, and desktop production ensures that the scientific information in every publication will be presented to full advantage.

How to use this document

→ Jump to key sections from the Table of contents, which links to major subheadings such as features of desktop-publishing programs, how to evaluate a program, how to standardize the manuscript, page layout, typography, and preparing the final document.

→ Consult the Tables, each of which summarizes detailed topics in the same order, and with the same titles, as subsections of the text.

→ Use text searches, through Ctrl + F, to find specific terms related to layout, design, software tools, and other features.

Introduction

Desktop publishing generates finished documents through specific software on a personal computer (originally a desktop computer). Items to post online can be produced efficiently in various formats, and documents can be prepared for printing more cheaply than by a commercial printer.

There are many requirements if desktop publishing is to be effective.

1. *Content.* The process is worthwhile only if it starts with interesting content that is scientifically sound and well written (see Danks 2024). Rubbish made to look attractive is still rubbish.
2. *Scientific editing.* Scientific editing ensures that the content is relevant to readers and scientifically correct, and that the findings are clear (see Danks 2025). Peer review is a key part of this process for formal publications.
3. *Copy editing*. Copy editing prepares the document in detail for publication, by eliminating local errors of content and language, and by making text items such as numbers, abbreviations, and reference formats consistent throughout.
4. *Design.* Competent design gives the work a useful structure and a pleasing appearance. Desktop-publishing programs have many tools for laying out pages, which serve to implement the design, and also to assess and improve it.
5. *Software.* A desktop-publishing program has to be chosen and set up. The sort(s) of products that will be produced, and the design capabilities, ease of use, cost, and other features of the program influence the choice.
6. *Implementation.* Competent use of the software allows the content to be processed into a form that matches all details of the design. Doing justice to those details requires familiarity with the main tools of the program used to lay out the publication.

This article outlines what to do once a manuscript has been competently written and edited: how to copy edit it, design the format, choose a desktop publishing program, and use it to bring the material to its final form.[1]

As noted on the previous page, the many topics dealt with here can be found through links in the table of contents, and in more detail by reviewing summary tables, in which entries match the order of text sections.

Obsessive attention is needed to maintain high quality throughout the process. That requirement is captured by a long-standing saying about printing hard copies: *Publication consists of an infinite number of details, no one of which is important unless it is not done properly*.

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[1] Luckily, I had the opportunity to become familiar with early desktop-publishing software whilst producing a few newsletters of the Biological Survey of Canada. I was also able to evaluate recent software and review recommendations about design in order to produce desktop-published articles (e.g., Danks 2023, 2024). In addition, I was involved in both scientific editing and copy editing (cf. Danks 2025).

Copy editing[2]

Introduction

Copy editing prepares the manuscript for publication. The term is sometimes used loosely to include adjustments in content and expression, fact checking, and even subsequent proofreading. However, manuscripts that have been approved after scientific review are normally modified only to make mechanical or technical changes essential for correctness and consistency.[3]

Copy editing is used here in that narrow sense, to standardize the text and correct minor errors and inconsistencies, rather than to adjust the content. Before desktop publishing begins, each manuscript must be carefully modified in this way to avoid defects in the final publication. Many books and other publications treat the subject (e.g., Butcher et al. 2012), although not all are fully applicable to scientific manuscripts.

Many of the required adjustments will not have been called for during scientific review, because most reviewers focus their evaluations on scientific content. Therefore, they do not take the time to comb through the manuscript searching for general errors.

Some readers who have never done copy editing might feel that this section is attempting to overwhelm them with minutiae. However, the task seems much easier to someone actually doing the work, as they recognize patterns and learn common standards. That is fortunate, because few of the scientists who undertake desktop publishing will work solely with manuscripts that are already spotless.

Ways to correct errors and standardize the text are outlined first. They are followed by suggestions for how to proceed.

Correcting errors

Common kinds of errors and mismatches are shown in Table 1.

Data

Data in a publication are usually considered during scientific review, but some minor checks are worth making during copy editing.

Consistency. Errors of content include slightly different information about the same thing in different places. For example, the size of a country or other area may be specified precisely, but elsewhere is rounded (requiring a qualifier such as *about* or *nearly*) or different. The number of alternative explanations mentioned in the text may differ from the number actually listed in a table or discussed further.

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[2] Copy editing is the form adopted here, although the hyphenated form copy-editing is also used, and copyediting as one word is common and used increasingly. Moreover, some people use more than one form, such as copyediting (one word) for the verb but copy editor (two words) for the noun.

[3] Most popular works use a separate editor to address structure, content, and the style of language before technical copy editing takes place. Language may be changed significantly because scientific and popular styles differ, and because technical terms, intricate analyses, complex sentences, a high degree of detail, and other features of scientific manuscripts are less easily understood, and often frowned upon, by non-scientists.

Table 1. Copy editing for errors. For details, see text.

Component	*Feature to check*	*Examples of potential errors*
Data		
Consistency	Information about the same thing in different places	More than one value for the same thing
Arithmetic	Arithmetic in tables	Entries do not sum to column totals
Language		
Spelling	Misspelled or confused words	Supercede (for supersede)
Grammar and syntax	Structural flaws	Subject-verb disagreement; incorrect use of tenses, pronouns, and prepositions; incomplete comparatives; and many others
Capitalization	Names and other uses	Proper names without required capital initial letter
Punctuation	Commas	Superfluous, missing, or unmatched commas; sentences separated only by a comma
	Apostrophes	Possessive uses confused
	Enclosures	Unpaired parentheses
	Special-use characters	Horizontal strokes confused or misused; letters used instead of the correct characters
Organization		
Headings and numbering	Table of contents, tables, figures, footnotes	Elements missing; numbered components and their sequence incorrect or not matching the text
Necessary information	Definitions, explanations, footnotes	Explanations missing or incorrectly placed, especially for abbreviations and symbols in tables and figures
Internal references	Cross references	Cross references in text do not match targets
External references	References and text citations	References missing or not cited; names and dates do not match exactly between citations and list
	Web references	Links broken; title information incomplete

Arithmetic. Mathematical faults are surprisingly common, especially in complex tables. They arise not only from faulty arithmetic, but also from typographic or transcription errors by the author. Even though nearly all of them are so minor that the scientific conclusions would not be affected, correcting simple errors (e.g., column entries that do not add up to the sum given) improves the manuscript. The author will have to be consulted if the appropriate changes are not obvious.

Language

The majority of corrections made during copy editing are errors in the use of language, including spelling, syntax, capitalization, and punctuation. Language requirements are distinct from the arbitrary standards applied by the copy editor for consistency in a given publication, treated below under *Standardizing*. The most egregious missteps will have been detected during review, but some problems are harder to detect.

Spelling. Surprisingly, some authors spell simple words incorrectly (although sometimes this can be attributed to typographic errors instead). However, a few words are consistently misspelled [as opposed to the faulty *mispelled*!], such as *supercede* (supersede is correct), *indispensible* (indispensable is correct), and *artic* (arctic is correct, although some people pronounce it "artic").

Many such errors can be detected by spellcheckers, but these programs are by no means infallible—particularly if appropriate language or other settings were not enabled. Spellcheckers cannot distinguish homonyms, e.g., *right* (position) versus *right* (entitlement), or *to* (direction) versus *too* (also); they do not take account of sentence structure and context, which may determine whether words are being used correctly, as for *affect* (verb meaning to influence) and *effect* (noun meaning result of an action or verb meaning to bring about); and they have limited ability to verify technical terms because they rely on ordinary dictionaries. Therefore, most spellcheckers cannot be relied upon to do much more than find elementary errors, and their value to copy editors is limited. Moreover, the automatic spellchecking function of the author's word processor is likely to have helped to eliminate simple errors before submission.

Grammar and syntax. Grammatical errors are most common in complex sentences, and take many forms, including subject-verb disagreements, incorrect use of tenses, pronouns, and prepositions, dangling modifiers, and incomplete comparatives. Examples of these and other errors are given by Danks (2024; and see table 3 there).

Capitalization. The initial letter of proper names, countries, and some other words may not have been capitalized as required. These requirements overlap with those for standardizing, and are discussed further below under that heading (and see Table 2).

Punctuation. Commas are often used or positioned incorrectly: sentences are cluttered with misplaced or superfluous commas; single commas are used when paired commas are indicated (e.g., when subject and object are separated by a subordinate clause); commas are missing after an introductory word or between elements in a series; and sentences are separated by a comma although a period or other punctuation is required.

Errors in the possessive use of apostrophes occur regularly, and include confusion between singular and plural meanings (*scientist's experiments* [one scientist] versus *scientists' experiments* [more than one]). Authors most often have problems when words end in s. The possessive form calls for 's even when a word ends in *s* (*the bus's arrival*), except when the noun is plural (*two weeks' work*), or the possessive is not pronounced with the extra s *(Socrates' philosophy*). Of course, pronouns never take an apostrophe (*its* not *it's*, the latter used only for *it is*).

In potentially awkward instances it may be better to reword sentences to eliminate commas (*Individuals do not fly at temperatures below 15°C*, rather than *At temperatures below 15°C, individuals do not fly*), and apostrophes (*publications by Jones*, rather than *Jones's publications)*. Nevertheless, changes to the author's (or authors') correct but awkward text should be made very sparingly.

Paired punctuation marks and hyphens are often used incorrectly. The most common misuse of parentheses, brackets, and dashes is a failure to pair them when they enclose asides, explanations, and so on. When the hyphen is missing between components of a compound adjective, those qualifiers apply separately (*red eyed flies* should read *red-eyed flies*).

Many authors use incorrect characters for certain specific punctuation. The horizontal strokes - — – −_ differ in length and in distance above the baseline and are used for different purposes. These characters are - hyphen (used for word division, compound words, and others), — em-dash (separator), – en-dash (number ranges), − minus sign (subtraction or negative value), and _ underline (used for links, and for emphasis except in printing, where they signify italics—see *Font emphasis* under Typography below). Most such characters are readily available in word processors. In Microsoft Word, for example, Alt-8722 gives a minus sign. Alt-0215 is a multiplication sign (×), and the lower-case letter x should not be used instead. These and other characters can be accessed too through Insert/Symbol. In desktop-publishing programs they are available as "glyphs".

Organization

Another set of errors arises from elements that are incorrectly sequenced or matched. They are distinct from the sorts of errors of content noted above, because they concern the completeness and organization of the manuscript, rather than the factual information it contains.

Headings and numbering. In particular, the existence, rank, and sequence of headings, subheadings, and their position in the list of contents, the numbering and order of tables, figures, and their captions, mentions of tables and figures in the text, and other features of a logical structure (which serve to orientate readers to the content of the work) do not always correspond exactly.

Necessary information. Likewise, abbreviations and symbols may not have been explained as they should, in the text or—most commonly—as footnotes to tables and figures.

Internal references. Cross references to other sections of the text do not always match their targets. For example, the author may have modified a subheading during revision. (Internal references to specific data—such as text reference to content that is actually slightly different in tables or figures—was noted under data errors above.)

External references. It is especially important that entries in the reference list are complete and fully matched. All cited references must be included in the list of references. No reference should be listed unless it is cited. The author(s) and dates given in the text must match their reference-list entries exactly, except for the abbreviation *et al.* used in the text for three or more authors. Care is needed to ensure that reference to more than one publication in the same year by the same author is

accurate, and in the correct sequence (in the order of the text citations, or chronologically within the year, as called for by the chosen standard).
Web links are now common, but a copy editor is wise to confirm them because broken links annoy readers. A website may have changed, or a URL might have been mistranscribed. Even so, authors tend to check the links themselves more diligently than the information shown there, so that the citations of web references are more likely to have incomplete titles or missing components than those of hard-copy or pdf publications, which most authors check more carefully.

Standardizing

Copy editing also ensures that every use of the same characters, words, and formats meets arbitrary standards chosen for the publication, in order to keep every aspect as consistent as possible. Most standards would accord with the chosen style guide.

A copy editor standardizes the manuscript by careful examination of the front matter (introductory details like title and author), the text, the tables and figures, and the list of references. These elements are outlined in Table 2.

Similar adherence to the design of the publication is not treated in this section, but under *Design of publications*, and under *Using desktop-publishing software*. Design standards include layout and organization, such as spacing, the arrangement and size of headings, the style of tables, and the placement of captions, along with typography and the use of colour.

Front matter

The content of introductory pages should be checked with care. Complete bibliographic information assists documentation and tracking by librarians and others. However, many components in addition to the basic facts of title, author, and date are required, and all of the details have to be decided. A series identification number or other unique reference may have to be given.

Title. The full title should be accompanied by any subtitle.

Author. The full name may be used, or just initials for some or all of the given names. In scientific works, the name of an author usually lacks any honorific such as Dr, or qualification such as PhD. The audience and location of the publication may determine if authors' names from languages in which the family name is written first (such as Chinese and Japanese) are shown in reverse order for publication in English, or with the family name identified by putting it in capitals, for example.

Author affiliation and address. The author's institution, and an address for the author or institution if relevant, would be given with the appropriate degree of detail.

Date. The year of publication is essential (and see Copyright below), but a more specific date is sometimes added. For example, the dates of printing, distribution, or posting online might be specified.

Publisher. The publisher's official name is given. Contact information is sometimes included.

Publication series. The setting of the publication in any current (or newly established) publication series should be specified, e.g., *University Science Monographs no. 5*.

Copyright. Ownership of copyright is signified by the © sign and the year.

Table 2. Copy editing to standardize front matter, text, and references. For details, see text.

Feature	*Formats to standardize*
Front matter	
Title and information pages	Title, author, author affiliation and address, date, publisher, publication series, copyright, reference numbers
Text	
General	All required components included, and in the correct order
Abbreviations	Non-standard abbreviations defined on first use; abbreviations with correct punctuation, italicized or not
Contractions	Contractions avoided
Numbers	Numbers spelled out or expressed as numerals according to fixed rules based on nature, size, and use
Dates	Format of individual dates (day, month, year) [practice differs among countries]; format for periods such as centuries
Spacing	Spacing between a value and its unit
Capitalization	Capital initial letters where required; see also *References* below
Accents, foreign characters	Structure of foreign letters, diacritic marks, etc.
Spelling variants	All individual words in the same manuscript with either British English or American English spelling; words with more than one accepted regional spelling consistent throughout
Quotations	Format of verbatim quotations; position of terminal commas and periods [practice differs among countries]
Emphasis	Consistent use of font emphasis
Punctuation	Text formats, in addition to correct language use (see Table 1); terminal punctuation of ancillary elements (such as headings, tables, captions, and footnotes); for punctuation of abbreviations, see above
Reference list	
Required entries and their basic format	Components that are always required; additional components; sequence, font style(s), spacing, capitalization
Authors	Multiple authors; Author names; Author initials; Author details
Dates	Year of publication; other details
Titles	Titles of papers; Titles of journals and books
Edited publications	Editor properly identified, in addition to other details
Page references	Pages specified exactly
Publisher	Publisher name and relevant detail
Other elements	Edition, and other details; date of access for online items

Reference numbers. If the publication bears any reference numbers, such as ISBN (International Standard Book Number, used chiefly for print publications) and DOI (Digital Object Identifier, used for digital documents), they are essential for identification or tracking.

Text pages

With respect to the text itself, the copy editor first makes some general checks. For example, publications with multiple chapters often require all authors to include *Discussion*, *Conclusions*, both of those sections (or a single section entitled *Discussion and conclusions*). Also called for might be *Suggestions for future research* or other subsections. Ensuring that all of them have been included in the correct order, and with consistent headings, verifies the work of the scientific editor.

Most of the copy editor's work, however, involves attention to every fine detail of the text. The features included were summarized in Table 2, and a few specific examples are noted below.

Abbreviations. Some well-known abbreviations can be used without explanation (but in a consistent manner) according to most style guides. However, depending on the guide, the publisher, and editorial choice, abbreviations are either not allowed, all allowed provided they are defined on first use, or some are allowed but others—deemed non-standard, more obscure, or vernacular—not allowed. Style guides also show required formats, such as capitalization (e.g., typical acronyms are in capitals) and italicization (e.g., some abbreviations are in italics and others are not).

Italics were once called for if an abbreviation stemmed from a language other than English, notably for terms derived from Latin, but many guides discourage some of those terms (such as ibid. and loc. cit.), and the remainder (such as e.g. and i.e.) are commonly used and no longer italicized.

The punctuation of abbreviations is also standardized. For example, abbreviations can include periods (cf.), some periods (et al.), or no periods (Dr).[4] When used in the text, some abbreviations are followed by a comma (e.g., and i.e.,) but others are not (cf.).

Contractions. The text should not include contractions such as *shouldn't include contractions*.

Numbers. In the text, numbers are spelled out or put as numerals according to fixed rules based on their value and use. Typically, cardinal and ordinal numbers below 10 are spelled out (five, fifth), but numerals are used for higher numbers (57, 57th). Large rounded numbers (e.g., hundreds, thousands) are customarily spelled out. Numbers that exceed 999 have either commas (2,100) or spaces (2 100). However, years (2025), decimals (6.3), most direct comparisons—including ratios (6:1)—and the day in dates (5 or 5th depending on the specific standard) are expressed in numerals for all values. Data are shown as numerals, but the word zero may be used even for data if there might be confusion between the numeral 0 and the letter O. Ordinal indicators (st, nd, rd, th) are often shown as superscripts (as in the examples above), but seldom italicized. Superscript numbers in the text that refer to footnotes usually come after punctuation such as terminal periods.

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[4] The basis for this common standard is whether the last letter of the abbreviated word is included, when it takes no period (et [*et*], Dr [*Doctor*]), or excluded (cf. [*confer*, imperative of *conferre*], al. [for masculine, feminine and neuter forms *alii*, *aliae*, and *alia*]). However, many style guides provide for exceptions to this pattern, such as MSc rather than M.Sc.

Dates. The format of individual dates depends on the country. In Canada and many other places, the order is day-month-year. In the United States it is month-day-year. Because most readers are familiar with one or the other of these systems, it is best to avoid ambiguity by spelling out the month, and giving every digit of the year. The date 06-08-2013 [specified in the USA as 08-06-2013, and written carelessly as 08-06-13] is ambiguous; 6 August 2013 is not.[5] The International Standards Organization recommends the format YYYY/MM/DD (e.g., 2013/08/06) for general purposes such as filing, and it is is widely used, although it might be ambiguous to those unfamiliar with it. Therefore, it is little used in North American publications. Periods such as centuries are spelled out or not depending on the guide (fifteenth century or 15th century).

Spacing. Spacing standards vary somewhat between guides, countries, and scientific and popular texts. Moreover, reducing spaces in the desktop-publishing program may be necessary for good appearance. Typically, a single space is inserted between a value and its unit, not no space (12 mm not 12mm), except for temperature (21°C not 21 °C), percent (15%), and angular units such as degrees of latitude and longitude (45°N). A space is normally placed between numerals and arithmetic operators (3 + 4), but not between numerals and relation symbols (<5) or around hyphens and dashes. Double spaces between words are avoided (see *Character and letter spacing* under *Typography*).

Capitalization. Capitals are used for proper names, initials of proper names, titles before a personal name, names of countries and languages, trade names, and so on. However, professions are not capitalized (Professor Gray, but John Gray, professor of entomology). Abbreviations may be capitalized excerpt when spelled out (MSc, but master's degree). Trade names that have become generic are not now capitalized (dry ice, escalator), at least when used as verbs (googling); see also *References* below.

Accents and foreign characters. Care is needed to use the correct form for accents, foreign letters, transliterations, and so on. For example, learning about a distinctive character makes it possible to discover how to find or generate it. Simply trying to mimic it may lead to erroneous substitutions, such as δ [Greek delta] instead of ð [Icelandic eth], or d' [d apostrophe] instead of ɗ [d-hook]. In particular, accents and diacritic marks in an author's name are part of their language, even though some journals delete them.[6]

Spelling variants. All words should use spellings from either British English or American English (colour-color, behaviour-behavior). In Canada, British spellings are more common, but both spellings are accepted there for some words (judgment-judgement, fulfill-fulfil). Therefore, the requirement for consistency can be met by mixing less common and more common regional alternatives, but only one of each pair must be used throughout the manuscript (e.g., chiefly British English forms, but *categorize* not *categorise*, even though the latter is dominant in British English).

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[5] A similar convention is recommended for specimen data labels, although space can be conserved if necessary by abbreviating the month or using lower-case Roman numerals (6 Jun 2013 or 6-vi-2013).

[6] Many letters with accents or diacritic marks were once simplified because they caused problems during typesetting, but universal digital processing removes that difficulty. Nevertheless, the distinctness of some common diacritic marks and other characters had already been eliminated (e.g., diaresis and umlaut).

Quotations. Verbatim quotations can be indicated by italics or by quotation marks, but their form should be consistent. When quotation marks are used, terminal punctuation such as commas and periods are placed inside or outside the marks, a practice that differs among countries. In Canada, placing punctuation marks inside is the normal practice,[7] whether or not the original ends that way ("this original quotation does not reach the end of a sentence."). However, an ellipsis is sometimes used there instead ("this original quotation does not reach the end of a sentence...")

Emphasis. Potential font emphasis, such as bold for headings (shown in instructions to printers by a wavy underline), and italics for quotations (indicated to printers by an underline), can be made consistent by the copy editor. See *Font emphasis* under *Typography* for more details.

Punctuation. Apart from the correct punctuation in the language itself (cf. Table 1), standards are needed for several other manuscript components, such as the punctuation of abbreviations and quotations (see above). The final item in a list may or may not be preceded by a comma (*tables, figures, and footnotes* [known as the "Oxford comma", from the style guide for Oxford University Press] rather than *tables, figures and footnotes*).

Not all text components have the same terminal punctuation. Section and subsection headings are not followed by a period (except for subsidiary headings with text that starts on the same line). Table captions, figure captions, and footnotes take a period, but image credits do not.

Table entries have no terminal punctuation, but some long entries consisting of words seem to require a period, especially in those rare instances where an entry has more than one sentence, and the lack of a period at the end of the second sentence looks discordant. However, it is best to avoid adding periods if nearly all other entries in the publication lack them. One alternative is to combine the two sentences into a single sentence by replacing the intervening period with a semicolon.

That example illustrates another aspect of the copy editor's role: to identify the best approach to maintain consistency, aesthetics, and other desirable traits in the publication—not simply to make robotic changes.

Reference list

The reference list must be strictly standardized too. Like all other sections of the manuscript, consistency is the key. For each kind of reference, copy editing systematizes what must be included and in what order, as well as typography. In practice, choosing among the many options detailed below can normally be simplified by following the style of an existing journal or published guide.

Required entries and their format. Typical scientific papers cite author(s), date, title, journal name, volume number, and page number(s). Typical books might have author, date, title, publisher, ancillary information like series or edition, and number of pages. However, there are many choices as to what items are included, and their order, spacing, capitalization, emphasis (e.g., italic or not), and abbreviation, as illustrated below.

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[7] That convention is not followed for legal documents.

Multiple authors. Multiple authors might be separated by a comma, and the final author by a comma, the word *and*, or both. When the list of authors is very long, a few journals truncate it with *et al.*

Author names. Given names shown in the original publication are usually, but not always, reduced to initials.

Author initials. Initials (or given names) of the first author normally follow the family name (which is alphabetized in the list of references), but when there are multiple authors, initials or given names might precede or follow the subsequent names.

Author details. Author address and other details may be given.

Dates. Dates can be enclosed in parentheses or not, and followed by a period, or a comma, or neither.

Titles of papers. The titles of journal papers are nearly always spelled out in full and not italicized. Only the first word of the title may be capitalized, or—less often—every word, or every word except articles, prepositions, and conjunctions. However, a few journals that greatly condense citations even omit titles altogether. Presumably, the space (and hence cost) saved is deemed worth the inconvenience to readers.

Titles of journals and books. The title of a journal may be abbreviated in set ways or spelled out in full. Abbreviations were common years ago (when there were fewer journals, and a World List of abbreviations for periodicals was maintained). Some journals still use them (*Entomol.* not *Entomology*; *ent.* not *Entomological*). The title of a book is seldom abbreviated, but some 18th century titles that occupy many lines are sometimes truncated with an ellipsis. Journal titles are usually italicized, book titles less often. Every word of the title of a journal (except articles, prepositions, and conjunctions) is normally capitalized, but this is done less often for book titles, which most often echo the format used for the titles of papers.

Edited publications. There are several formats for edited publications: *Edited by*, *Editor*, and *Ed*, which are capitalized or not, italicized or not, and followed by a comma or a period, or enclosed in parentheses and followed by a period, a comma, or neither. Whenever applicable, reference should be to an individual chapter within the book, which would be cited under its author(s).

Page references. Volume number and page range are required for serial publications. Volume number may be in bold face or not. Issue number may or may not be required: it is often useful to readers for locating references in libraries or online, and is essential if a citation would otherwise be ambiguous because more than one issue in a volume has the same pagination. References to stand-alone publications should show the number of pages, all as a range (1–*n*) or as a number (*n* pages or *n* pp.).

Publisher. References to books should include the publisher, and the place of publication if one is given in the original. However, nowadays a place of publication is shown less often. Some multinational publishers have multiple locations, and a location is less meaningful for publications produced online or exclusively online.

Other elements. Including rather than excluding other potential entries helps readers. For example, the edition of a book should be shown if more than one edition has been published, as *n*th or n^{th} edition or edn, capitalized or not and italicized or not.

Digital (web) citations such as journal sites and DOIs should be appended if they exist, whether or not they will be actively linked. However, a workable hyperlink should be added whenever possible. It is best to use the entire hyperlink (https://...), because some sites do not connect without it. Nevertheless, a few sites accept only the shortened form (or only http://)—which is another reason to verify cited links. It is best to omit a terminal period, in case readers invalidate the URL by including it. The date of access for such online items should also be specified.

Copy-editing style sheets

A *Style sheet* lists all of the specific standards to be adhered to, such as those just discussed, to ensure that they are not forgotten. Most practical for desktop publishing are separate style sheets for the text with references, for the use of the copy editor (treated in this section), and the layout and other design features of the publication, for use during desktop publishing (see *Desktop-publishing style sheets*).

Authors will have been informed about the most commonly used text conventions, through a document prepared by a journal or scientific editor, for example. The copy-editor's style sheet is more extensive, but should be as short as possible too, because listing all conventions is not feasible. Rather, a style sheet should be relatively simple and carefully organized. Thus, it is better to list the adopted style guide and highlight key items or differences than to show every rule. It is better to identify a consistent global rule than to show every possible example of it.

Table 3 shows the content and organization of a typical copy-editing style sheet.

Content of the style sheet

Basic reference materials. The overall style guide and other basic references that have been decided upon should be listed. Standards can be adopted or customized from several kinds of references:

- Style guides provide sets of specific rules (e.g., The Canadian style 2026, MLA Handbook 2021, CSE Manual 2024), and may include spelling.
- Dictionaries serve to check spelling (e.g., Barber 2005 for Canadian English).
- Some of the guidelines are already established for publications in a series (e.g., journals, monographs, updated editions of books).
- Other sources include printed or online guides and booklets (e.g., Termium Plus 2026 for Canadian terminology and translation).

Alternative rules. It is useful to note any standards adopted for the current publication that differ from those in the basic references. For example, rules for when to spell out numbers may not follow the common practices mentioned above.

Exceptions. An exception to one of the style rules may be appropriate, such as allowing certain well-known acronyms without spelling them out.

Additions. Other items can be added as editing proceeds to keep track of any new standards that were applied. For example: unusual words; subject-specific technical terms not given in the references; choices made to deal with unusual problems; the format of a few specific repeated elements; and additional alternatives, such as further abbreviations that have been allowed because they are used so often.

Table 3. Content and organization of a style sheet for copy editing.

Item	*Components*
Content	
Basic reference materials	Adopted style guide, dictionary, and other chosen items
Alternative rules	Rules that differ from the those in the adopted reference guides
Exceptions	Exceptions to the guides that are applied in certain instances only
Additions	Standards for items that do not appear in the guides
Tables and figures	Relevant layout
Key specifics	Frequently consulted, hard to remember, and other selected rules, such as table guidelines
Reference list	Detailed formats [see Table 2, and the example in Table 4]
Organization	
Categories	Categories listed in the order the user deems most convenient, e.g., Reference documents, Text conventions, Tables and figures, List of references
Subcategories	Useful subcategories (e.g., Text conventions/Headings, Abbreviations, Punctuation, Dates & numbers, Spacing, Words, Other)
Details	Key details and reminders only

Tables and Figures. Table layouts (e.g., horizontal rules only) and image details are treated in later sections, but copy editing ensures that the emphasis and punctuation of tables and captions are consistent.

Key specifics. Some items should be highlighted because they are especially helpful. Included here might be standards that are consulted frequently, ones that the copy editor finds difficult to remember, some that are particularly difficult to find in reference materials, and spacing patterns or other requirements that are specific to the project.

Reference list. The style sheet should also summarize all of the standards for entries in the list of references (cf. Table 2). That is best done by including in the style sheet correctly formatted examples of the various kinds of publications (journal papers, books, chapters in books, online references, websites, etc.).
Experienced copy editors can ascertain all of these standards simply by looking at the examples, perhaps with a few notes to take account of rarely seen features.
Table 4 shows a style-sheet entry of that sort: a sample reference to a journal paper, which reflects the order, spacing, punctuation, and other standards used in this article. Table 4 also explains those standards. However, explanations would not be included in a typical style sheet: the copy editor would understand them from the example.

Organization of the style sheet

In practice, each note about key specifics, alternative rules, exceptions, and additions would be organized into logical sections of the style sheet. Additional notes would be added as the work proceeds.

Table 4. Potential entry in a copy-editing style sheet, showing the standards used in this article for journal papers in the list of references. Copy editors would normally include only an example or two and a few notes, because they could quickly digest the patterns. However, the full format information has been added here.

Sample citation format (journal papers)

Danks, H.V. 2007. The elements of seasonal adaptations in insects. *The Canadian Entomologist* 139(1): 1–44. https://doi.org/10.4039/n06-048

Detailed formatting

Item	*Standard [no font emphasis unless noted]*
Required components and sequence	Author, Initials, Date, Title, Journal, Volume, Issue, Pages
Additional components	Other relevant components [period and space between] [final period] If a link is included it should be the last component: DOI or other online references should have active hyperlinks whenever possible [no period after links, including DOI]
Author	Family name [comma] [space] Initials [period between but no space] [period] [space]
	{*Multiple authors:* Subsequent authors with initials first [comma after each author]; add "and" before Final author, e.g., Danks, H.V., and D.R. Oliver. 1972.}
Date	Year of publication [period] [space]
Title of paper	In full, only first letter capitalized except for language requirements [period] [space]
Title of journal	In full {*including definite article if part of the official name*}, italicized [space]
Citation	Volume number {*and, only if nominal year of volume differs from year of publication, add:* [open bracket] Nominal year of volume [close bracket]} [no space] [open parenthesis] Issue number [close parenthesis] [colon] [space] First page number [en dash] Last page number [period]
Ancillary information	DOI: Full link, not abbreviated {*includes https://doi.org/*} [no terminal period]

Categories. A well-organized list helps the copy editor to find items quickly, and it is most efficient to put entries in the order that the copy editor prefers. For example, a style sheet might have four main sections: Reference documents; Text conventions; Tables and Figures; and List of references.

Subcategories. The notes can be further organized into subsections to make them easier to consult. Text conventions might be subdivided into Abbreviations, Dates and numbers, Headings, Punctuation, Spacing, and other sets. Alphabetizing the entries within each subcategory makes them easier to consult, and reduces the time needed to find a given entry.

Details. As noted above, the style sheet should be streamlined as much as possible by including only entries that the individual copy editor deems essential. Thus, a copy editor used to the conventions of a particular publication series would have no need to include the most familiar ones.

Recommended procedure for copy editing

All of the work that was discussed under *Correcting errors* and *Standardizing* should be incorporated into a set procedure to guarantee that copy editing will be done thoroughly. Of course, authors should take these steps before they submit the manuscript (Danks 2024), but not all of them do so, and in any event a second pair of eyes is likely to find something that was overlooked.

The most effective procedure, in my experience, is to draft a detailed style sheet (as explained in the previous section), and then examine the manuscript step by step, with a focus on content, then language, and then minutiae. These steps are summarized in Table 5. Experienced copy editors combine some of them, especially steps 6 and 7.

1. *Establish standards and prepare style sheet.* A style sheet with all of the specific standards for the project is an essential aid for consistency. It can be augmented as the project proceeds. As noted above, established publications such as journals already have basic style sheets.
2. *Read completely*. An initial read of the whole manuscript finds conspicuous errors of content, consistency, and syntax. Major potential errors can be noted (in writing), and minor ones that are detected in passing can also be marked (e.g., by circling, underlining, or highlighting). The first read-through looks for general problems, but does not risk distraction by making any checks or corrections at this stage.
3. *Check general content.* Notes made during the initial read can be used to review any substantive items just identified, and remedy them where required, if necessary by consulting the author.
4. *Check detailed content.* It is worth reviewing tables and figures for lack of matches in data (e.g., disagreement between column totals and the sum of the individual entries), faulty captions (e.g., titles or column headings that do not accurately reflect the content of a table), information that diverges slightly from that given in the text, and other imprecisions.
5. *Review the references.* Citation errors can be found most easily by marking each citation in the text (temporarily check-marking, highlighting, underlining, or circling it), and at the same time marking the corresponding entry, or its absence, in the list of references. Once the whole manuscript has been screened, missing references will be marked in the text but not in the list, and missing citations will be marked in the list but not in the text. The author will have to be asked to remedy any omissions.
6. *Analyse the language.* The manuscript should be examined sentence by sentence for syntax and other language errors, such as plural subjects with singular verbs, and misplaced clauses (cf. Table 1; Danks 2024 tables 3, 4).

Table 5. Recommended procedure for copy editing.

Item	*Components*
Establish standards and prepare style sheet	Customize and organize a style sheet that includes the standardizations likely to be needed for reference by the individual copy editor for the project, and augment it as the work proceeds
Complete an initial read	Identify potential substantive errors for later assessment, and quickly mark minor items noticed in passing, but make no detailed corrections yet
Check general content	Evaluate the main items just identified, and correct if necessary
Check detailed content	Look for mismatched data in tables, figures, and associated text
Review the references	Check that citations and references match exactly
Analyse the language	Read sentence by sentence to find and correct grammatical errors
Standardize	Check that each word, punctuation mark, and other element accords with the style sheet
Use software tools	Use computer searches to verify that punctuation, abbreviations, and other elements are now consistent
Read again	Read through carefully and correct any remaining problems

7. *Standardize.* Another slow pass through the manuscript is aimed at checking each word and punctuation mark, capitalization, and every other component for correctness and consistency (cf. Tables 2 and 3).
8. *Use software tools.* Search or Search-Replace functions (included in all modern word processors, for example) can find errors such as double instead of single spaces, and items that might not have been standardized everywhere, at least for selected minutiae that are most commonly inconsistent. For some extensive jobs, macros might be considered. Searching for the minimum unique format is most efficient (for example “cf” rather than the correct “cf.”).Otherwise, the search might miss items, including those with missing, incorrect, or superfluous terminal punctuation. Thus, a search for “e.g.” will find the correct “e.g.,” and the incorrect “e.g.” (missing the comma), but a search for “e.g” without the second period will also find the two incorrect forms “e.g,” (no period) and “e.g” (no period or comma). The same purpose is served by truncations such as “behavio” (which finds the American spelling “behavior” as well as the British spelling “behaviour”), and endings such as “ise”, “ising”, and “isation” (which detect unwanted spelling such as “standardisation” when “standardization” is the chosen form).
9. *Read again.* A last slow read of the whole manuscript, preferably more than once, ensures that all changes have been made correctly and that nothing has been missed.

As already noted, other systematic checks of minutiae that reflect the design of the publication, such as some of the typographic details, are part of the process of desktop publishing. For commercially produced publications, however, copy editors may make some of these adjustments in the digital files, or mark specific instructions on the manuscript to inform the printer about them.

Design of publications

Introduction

Professional design is expensive because it depends on substantial knowledge and skill. However, non-professionals can produce excellent scientific publications, such as special-interest works (books, symposium proceedings, memoirs, bibliographies, etc.), newsletters, information documents, and booklets, using basic principles and modern software.

Some ancillary documents, like leaflets and questionnaires, are aimed at scientists who are not seeking them. Marketing techniques may help to motivate users to look at those sorts of items—for example, attention-grabbing titles and cover art, images that engender enjoyment, an appeal to social values, trying to impart a sense of self-worth, and offering an incentive. These aspects are less relevant to most scientists, who want to impart knowledge, not sell it.

In the same way, self-produced scientific publications for popular audiences are unlikely to be successful. Most of those products demand informal or artistic designs. Moreover, the volumes must reach, attract, and engage non-scientists who are not necessarily familiar with the subject.

Therefore, design, production, and marketing (along with placement in bookstores) ordinarily depend on both professional expertise and an established infrastructure. Stand-alone scientific publications (as opposed to journal issues or professional society vehicles that are more visible) may need aggressive marketing too, but their better-defined audiences are easier to reach.

Many books and articles are relevant to publication design. Some outline the principles of design, although they focus on products other than publications. Some detail how graphic artists can harness their creativity in designing books, among which are several that deal only with the design of covers. Many other documents, including instructions (chiefly online) prepared by software providers, show how to use desktop-publishing programs to aid in the design of documents. Many short articles, which differ widely in coverage and quality, are posted on the web.

Most of these treatments are not useful to scientific authors because they emphasize consumer products not documents, artistic creativity of a sort that is out of place in scientific publications, the design of books that are published commercially, and detailed explanations of typography or other facets of printing. In place of numerous citations, therefore, I have simply tried to address subjects likely to be helpful to scientists who may be planning, designing, or producing a book, newsletter, or other finished document through desktop publishing.

Recommendations for how to proceed are shown in Table 6.

General considerations

Scientists who design specialized publications should focus on how to make them most useful to their colleagues, rather than on how to make them attractive to wider audiences.

Table 6. Recommendations for the design of publications.

Element	*Recommendations*
General considerations	Focus on making the content of scientific publications accessible, rather than on attracting readers
Design principles	Make publications useful, understandable, and aesthetic—as unobtrusively as possible
Content	Restrict content to what is relevant; organize sections clearly
Target audience	Tailor approach, length, complexity, and illustrations to the intended audience
Type of publication	Adjust the strictness of layouts according to the degree of formality
Form of output	Use the format best suited for the intended output (e.g., print, digital publication, web integration, multiple platforms)
Clarity	Make design easy to follow
Hierarchy	Organize the content in an obvious hierarchy
Consistency	Make layout, size of components, and typographic elements as consistent as possible throughout
Page layout	Arrange content of each page to make it easy to grasp and pleasing to the eye
Page size	Choose page size according to how the publication will be produced and used
Orientation	Use portrait orientation for most scientific publications
Spacing	Put space between elements to avoid crowding
Text blocks	Limit dense text blocks by breaking them up (e.g., as multiple paragraphs)
Position of elements	Place non-text elements at margins and at top of page whenever possible
Typography	Harmonize all elements for readability
Margins	Use relatively wide margins, especially for printed works
Columns	Limit number of columns for scientific publications
Font style	Choose clear and aesthetically pleasing fonts; normally black on white
Font size	Make text large enough to be legible to normal readers, e.g., 11 pt
Font emphasis	Limit use of bold, italic, underline, capitals, and other forms of emphasis
Special characters	Check special characters for accuracy
Interline spacing	Leave adequate interline space, e.g., 120–145% of font size
Line length	Choose appropriate line length, normally 40–90 characters per line (including spaces), but 70–90 generally preferred for formal scientific publications

(Continued)

Table 6 *(continued)*. Recommendations for the design of publications.

Element	*Recommendations*
Paragraph recognition	Use modest first-line indents (100–400% of font size), without space between paragraphs
Alignment and hyphenation	Align left for general items; justify text for most books; harmonize word spacing by minimal hyphenation when necessary
Letter and character spacing	Use proportional (variable-width) not monospaced fonts for nearly all content, and normal (not reduced or expanded) space between letters for most text (except titles when necessary); eliminate unnecessary spaces
Diversity	Include relatively few styles, sizes, and colours of type in a single publication
Images	Ensure that images are organized, integrated with the text, and of good quality
Colour	Use colour judiciously, and tailor it to the type of publication
Titles and covers	Make titles concise and clearly legible, and cover designs and illustrations aesthetically pleasing and relevant

Design principles

The role of design, for both publications and consumer products, is to serve the needs of the user. Effectiveness comes from familiarity with design requirements and techniques, and from creativity and artistic sensibility.

Good design makes a publication useful, understandable, and aesthetic. In particular, design should be unobtrusive, even though every last aspect has been considered. Indeed, readers readily accept the best-designed publications without noticing that anything has been "designed".

In contrast, modern capabilities may tempt users to overdesign. For example, a newsletter might promote notable articles by displaying illustrated highlights in coloured boxes on the front page—but doing so for more than a few reduces the impact of every one and clutters the publication, detracting from its overall appearance. There should be no attempt to mislead potential readers, for example by spectacular claims on the cover.

In other words, useful and visually appealing scientific publications combine carefully chosen elements to convey information in a clear and cohesive manner. Layout, typography, and other specifications of the design can be further evaluated—and some might be slightly modified—during the desktop-publishing process. Captions and other objects will also be aligned exactly at that time.

Content

The content and approach (such as the degree of detail) depend on the subject, but should be confined to what is relevant. Superfluous material distracts readers.

This constraint does not limit the amount of content, nor the provision of illustrative examples or asides, for example. Nevertheless, information overload can be minimized

by using tables and images instead of or in addition to text (the responsibility of the author), by sections and subtitles that are clearly distinct (partly checked by the copy editor), and by adequately spaced layouts that encourage the reader to pause at intervals (the responsibility of the designer).

Target audience

Every publication should be tailored to its intended audience. Understanding the needs of that audience suggests the best approach, length, and complexity of the work—for both the content and how it is delivered.

For example, the best design for an in-depth and fully referenced review for specialists differs in almost every respect from the layout of a profusely illustrated book for children. Readers of the review anticipate—and indeed welcome—dense content, whereas children relate best to a product that is attractive, colourful, easy to understand, and relatively short.

Specialists seek detailed information. Children want to be engaged and entertained. Even most scientific readers have preferences that fall between these extremes for both content and design.

Type of publication

Formal publications, newsletters, and ancillary items have different demands and production values.

Most journals, monographs, proceedings, articles, and other specialized vehicles follow constrained layouts based on a grid or other restrictive framework. These formats increase the degree to which content elements, or certain kinds of elements, are aligned with the margins or centre of the page or with other vertical guides, with horizontal guides, and with one another.

Scientific newsletters can adopt less strict layouts if preferred, and can also be enhanced with ancillary design elements such as colour and thematic images. Moreover, many readers browse newsletters for information and interest rather than specialized information. Therefore, typical newsletters are well served by including diverse content of different lengths (see Danks 2025, pp. 24–32), permitting more variable layouts. Even so, designers must exercise restraint, as emphasized in this article.

Ancillary documents, such as leaflets intended to advertise scientific publications, have few restrictions, but the same caution applies: function before flashiness.

Form of output

Design requirements also depend strongly on what form the publication will take, notably—for scientific items—whether they will be in print, digital form, or both.[8]

Designing publications for hard-copy printing focusses on layouts and visual elements. However, page size (see below), number of pages (and hence thickness),

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[8] Readers remember more from a print publication than from an equivalent version read onscreen, at least for the plot of narrative works. Moreover, some anecdotal evidence suggests that more information is remembered when it has been read on a large rather than a small screen.

paper quality, binding methods (e.g., to allow an open book to lie flat), thickness and stiffness of the cover, and other features that determine durability are important. They enhance the ease with which copies can be handled or consulted, and help a potential reader to assess the quality of the publication.

Digital scientific publications are nearly always posted as downloadable pdfs, with the same layout (but not handling) demands as for print. Indeed, if the work is also printed, both print and digital versions are normally identical and have exactly the same pagination.

On the other hand, interactive digital outputs, such as websites, favour formats that will enhance online visual experiences and optimize functionality and interactivity. For instance, user-friendly menus are required on the web, with easily visible links that all work, and are labelled (users are reluctant to click on mysterious links). Among other needs are user actions that are "frictionless"—there should be no requirement to press down and hold a link to activate it, for example—and screens that are not too busy. Animation and other special effects should be used sparingly lest their impact is reduced, or users are distracted.

These requirements mean that a publication designed for print or for simple pdf download must be modified substantially for direct website use, with different layout and the ability to work properly on different user platforms. However, this work is not regarded here as part of "scientific publishing". Guidance about website requirements and how to implement them can be found elsewhere. Hosting services (e.g., WordPress 2026) are one source of preliminary guidance.

Therefore, the recommendations here apply to the design of digital outputs for print or download.

Clarity

The clarity of documents is highest when they are logically structured and consistent, qualities that help readers to assimilate the content.

Hierarchy

Material that has been organized into a clear hierarchy is easy to follow. Adequate design shows how members of the hierarchy are related to one another. A hierarchical scheme can be made clear using headings and subheadings in conjunction with layout (e.g., spacing and indents) and typography (e.g., font style and size), and reinforced with page numbers.

Consequently, the titles or headings of chapters or sections must be concise and clear. Strong headings not only help the reader to find sought-after subjects, but also stimulate interest in the content. Therefore, headings and subheadings should be scrupulously edited, as for the text. A publication can be improved, with the cooperation of the author, if the designer, copy editor, and scientific editor are able to work together (or are the same person).

A properly structured table of contents makes longer works easier to use. It introduces the reader to the hierarchy and shows where information can be found.

Consistency

Design should give a consistent appearance to the whole work. A cohesive, and therefore professional, look increases visual appeal. Consistency depends on maintaining features of page layout, typography, and illustration throughout the work. That task is assisted by listing in one place all of the design standards that have been finalized (see *Desktop-publishing style sheets* below).

Page layout

Page layout refers to how text and images are arranged on the page. Attention to readability and aesthetics reinforces the usability of the work. Moreover, a reader's first impression of a document depends greatly on how its components (sections, headings, page numbers, headers, footnotes, blocks of type, paragraphs, images, captions, embellishments, instructions, rules and other bounding marks, etc.) are laid out.

Therefore, laying out pages involves a long series of deliberate choices. The aim is to create a format that is polished, balanced, and easy to understand. These decisions overlap with many aspects of *Typography* and *Images*, as described in later sections.

Page size

A first decision, and major determinant of the layout, is the size of the page. The best size depends on the purpose of the product.

Digital products need not adopt any particular size, because they are not printed. However, for familiarity and convenience, and for products that might eventually be printed, most of them mimic the sizes used for print. Also, journals that are now exclusively digital generally retain the size and basic layout of earlier printed volumes.

For material that will be printed, there are many standard sizes, depending partly on whether a flyer, folded leaflet, booklet, or book is envisaged. Imperial units are used in the United States, and partly too in Canada. Most of the rest of the world uses metric sizes, which are also used in Canada.

A dominant finished size for ordinary documents in North America is letter size (8½ in × 11 in), but it is used infrequently for printed material. The sizes of ancillary products like leaflets depend partly on how they are folded.

The size of a book depends on its purpose, but also on the amount of content. In particular, page size and the thickness of the book are balanced to enhance the feel of the finished product and to arrive at the most economical production cost. Fewer pages are cheaper to print.

The finished size also reflects the fact that books are produced by printing on large sheets of paper, which are folded in half one or more times, gathered together, and trimmed. Therefore, the size of the large initial sheets (and whether they accord with an imperial or metric standard), and the machine used by a particular printer, influence the exact size.

The page size of most books is relatively small (e.g., 5 × 8 or 6 × 9 in, for fiction), although scientific and other non-fiction works tend to be larger. Textbooks and non-fiction books that contain detailed information, or are used mainly for study and reference, adopt sizes such as 7 x 10 in.[9] This document uses the similar metric size B5 (176 mm × 250 mm, or about 6.9 × 9.8 in).

Given these variables, commercial printers insist that material submitted to them digitally meets several specific requirements. Therefore, scientific authors using desktop publishing to generate a manuscript that will be printed (especially a book) should consult their printing company in advance. Commercial publishers handle all such matters for the books they produce.

Orientation

Scientific publications are nearly always laid out in portrait orientation (long dimension vertical). Readers are used to that orientation, which facilitates leafing though or reading the document. Landscape layouts are used chiefly for special purposes, and they may produce volumes that are harder to handle or shelve. Leaflets are commonly printed in landscape orientation with three columns, but folded across twice so that the long dimension of each column is vertical. Such short items would normally be printed on single sheets, without subsequent trimming.

Unlike typical publications, the interactive components of most websites are laid out to suit the landscape orientation of computer screens.

Spacing

Important to achieve a polished look are sufficient white space around the items on a page, and a pleasing alignment of text blocks and images. The pages of scientific documents should look organized and uncluttered (even though some artistic products are better served by less formal arrangements).

These requirements stand in opposition to the displeasing and cramped appearance of pages that have inadequate space and random alignments.

Text blocks

By the same token, solid blocks of text may daunt the reader, and may detract from an otherwise attractive layout. Dense blocks can be made less severe by techniques such as breaking them up into a larger number of paragraphs, inserting space between sets of paragraphs, adding headings or subheadings, separating some blocks of text (especially key points) in boxes, and interpolating images or pull quotes (sections of text repeated separately in a larger font). In all instances, clear headings guide readers through the content.

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[9] Measures apply to the trimmed paper size after printing; covers are a little larger.

Position of elements

Most layout elements are placed in ways that serve the design functions of utility and aesthetics. Elements that can be adjusted include headers and footers (with title, page numbers, etc.), headings, text blocks, text boxes, figures (and their size, captions, and credits), tables (and their rows, columns, and captions), footnotes, and references.

Some potential adjustments, such as the sizes of related images, are constrained by the need for consistency. When hard-copy printing was the norm, copy editors might reduce costs by shrinking illustrations to the minimum legible size, reducing their impact and ease of use. Such strategies are not necessary for digital publications, although figures are still sized partly to meet layout requirements.

Tables and figures are placed to meet two main objectives. First, they should be as close as possible to where they are cited and explained in the text. Second, they should be laid out in a neat and pleasing fashion in relation to text and other elements. A designer seeks to balance those demands.

Captions (concise and informative, as in all publications) should fit in neatly with the tables and figures they describe. Table titles belong above tables, introducing their contents. Figure captions belong below illustrations, explaining what is shown.

In general, the edges of figures and tables are aligned with the left-hand margin of the page. That placement minimizes interruptions to the flow of the text, which continues alongside elements that do not occupy the full width of the page. Figures and tables narrower than a page but not wide enough to leave room for adjacent text can be centred. Alternatively, their size can be adjusted. Grouping several figures together, rather than throughout a page, also reduces breaks in the text.

In many scientific publications, illustrations and tables begin at the top margin, and text continues only below them, again reducing text interruptions. If that location places them too far ahead of where they are cited, they may end at the bottom margin instead, with any text above them.

These general principles are loosened to align figures more closely with the text, or to allow more aesthetic layouts. The degree of flexibility depends on the designer and the publication.

The best arrangement also depends on the audience. For example, in illustrated children's books, a page with a single picture is commonly placed opposite the relevant text, which is confined to that single facing page.

Page numbers are vital for navigation, so their placement and font should be consistent, but unobtrusive in relation to the content of the pages. Nevertheless, they are easier to see, and easier to use, if they are on the tops of pages, and also on the right-hand side, a position well-suited to digital outputs that will not be printed. However, for the facing pages of printed books they should be on the outside (the right-hand side of odd-numbered pages but the left-hand side of even-numbered ones)

Readers scan text lines from left to right and from top to bottom. Centred major headings, for example, should therefore be large and preceded by extra space. Subheadings and other side elements are encountered routinely as people read the text.

Despite the left-to-right reading pattern, a reader who opens or leafs through a book, or views a new document, tends to notice the right-hand side (as well as the top) first—making it a good place for important information or images on introductory pages.[10]

These layout preferences apply to printed publications and pdfs. Designers of website pages and popular books can implement more spectacular options, but most of them are not suitable for scientific documents.

Typography

Many typographic features—such as font and spacing—can be adjusted to improve readability. They signal content categories or hierarchies, and add visual interest—but only up to a point. Note the caution, under *Diversity* below, not to employ too many fonts.

Typography has been developed and discussed in remarkable depth (e.g., Felici 2012). However, scientists do not need to know all of the technical details, and for most purposes the guidelines provided by Butterick (2026) are sufficient.

Many of the features can be set up in word-processing programs. However, desktop-publishing software gives additional options and much greater control.

Margins

Pages need consistent and adequate margins. Content that is too close to the edge of the page seems to crowd in on the reader. The width of margins is less significant for most digital products, because there is no physical edge to the page.

Columns

The visual impact of a page is affected dramatically by the number of columns. Apart from such overall impressions, single columns suit scientific works because the reader can scan a whole page at once, without being forced to go back to the top of the page to see the second column. See also *Line length* below.

Adequate space between adjacent columns (the gutter) favours readability and avoids a crowded appearance. That requirement is met when the width of the gutter is at least equal to the distance between adjacent baselines of type (which would normally be larger than the font size, see *Interline spacing*). The width of the margins also influences the choice. However, columns should not be so far apart that the blocks of text seem disassociated.

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[10] Indeed, the location on the page of names or logos of organizations—such as those sponsoring a publication—may influence the degree to which they are noticed by readers.

Font style

The style of font depends to some extent on author or editor preference, but an important decision is whether to use a serif font, which has small embellishments at the ends of longer strokes in each letter, or a sans-serif font where they are absent.

Serif fonts such as the one adopted for the body of this article (Times New Roman) give a formal and polished look. Most viewers see them as more aesthetically pleasing and with better flow than sans-serif fonts, and in addition they help with legibility at small scales, because readers can distinguish the letters more clearly.

Sans-serif fonts such as this one (Callibri) have clean lines, and may be preferred if the subject or approach of a publication would be consistent with a modern minimalist look. They are used extensively for websites and blogs.

Occasionally, however, sans-serif fonts lead to ambiguity. For example, the Belgian town known in French as Ypres is spelt in Dutch as Ieper (and pronounced somewhat similarly to the French name). In a serif font the letters are clear, but in this sans-serif font, Ieper (the town) looks the same as leper (someone with leprosy). Therefore, for example, an entomologist who constructed a table with the abbreviations I for Imago and l for larva would find that those abbreviations look identical in a sans-serif font [Il]. There are even sans-serif fonts in which the number one is identical too: in Gill Sans MT, for example, that number shows as 1.

Different fonts, in both serif and sans-serif families, can also be used to provide contrast within a publication. For example, headings with contrasting styles stand out. Figure captions can be distinguished from the main text, or their font can be chosen to be slightly more legible at a smaller size. Even so, consistency is often more appealing to a reader, and contrasts can be indicated instead by alignment, size, and emphasis.

Elaborate script and decorative styles—*such as this one* (French Script MT)—make the text difficult or tiring to read and should be avoided except for special purposes.

Narrow fonts, even in bold face—**such as this one (Gill Sans MT Ext Condensed Bold)**—should be avoided for the same reason (see *Letter and character spacing* below).

Font size

The units of distance used in printing have changed greatly over time, but modern standards are based on points (pt) of 1/72 inch (0.0139 in, 0.3528 mm),[11] on other units derived from them, or directly on units such as millimetres or inches. Because digital output depends on many factors, digital content is based on pixels.[12] The application can generate sizes that mimic print, showing the magnification as a percentage of the "original".

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[11] Chosen originally because it was the smallest distance that could feasibly be measured with a ruler!

[12] A pixel is the smallest unit that can be switched on or off (or given a colour) on a digital screen. Most people work with displays from the older EGD (Extended Graphics Display), 1024 × 768 pixels, to the modern UHD (Ultra High Definition), 3840 × 2160 pixels They can be expressed in pixels per inch (ppi) to include the influence of screen size. The size of a pixel depends on screen resolution, but one common standard for web design specifies the "physical" size as 1/96 in (0.265 mm). Even so, an ultra-high-definition screen includes about 8.3 million pixels, so that a 24-inch screen has 184 rather than 96 ppi (cf. footnote 15). Many recent smartphones have 460–500 ppi on their small screens.

Font size reflects the vertical distance allotted to a single line of type, as given in points. However, because the letters themselves do not have to occupy the full height of their letter block, typefaces of the same point size can look different. For example, 11 pt Times New Roman appears smaller than 11 pt Tahoma and larger than 11 pt Centaur.

Because the physical length of a line also depends on the design of the characters, the number of characters per line depends on the font (see *Line length* below). For Times New Roman, a line of 11 pt type as here (margin to margin) would have about 88 characters; Tahoma would have only about 80; and Centaur would have more than 95. Of course, the number of characters per line can also be changed by changing the size of the font.

Fonts used in scientific publications should be large enough to be easily legible, even for readers whose vision is not perfect. Their size is less critical in publications that are available only in digital form, because a reader can enlarge the display. Even so, digital reading will be hindered if pages have to be enlarged beyond the dimensions of the screen.

A small font reduces the length of a publication, but may increase the frustration of the reader. Indeed, as subscriptions to print media dropped off (because more readers used digital content instead) some daily newspapers responded by reducing font size to save funds. They saw even greater declines in readership when the reduced legibility prompted additional cancellations, primarily among older readers who had previously been more likely to favour printed than digital documents.

For the text (using Times New Roman as a reference), 11 pt is comfortable for most people. This slightly smaller 10 pt font is adequate; indeed, it was (and still is) used by many journals. However, main text at 9 pt, like this sentence, is too small. Although 12 pt type, as in this sentence, was customary for typewritten documents for many years, it is generally regarded as unnecessarily large for published products.

A smaller body font also decreases the size of captions, footnotes, tables, and references, which are reduced in size to help distinguish them from the text and to show their adjunct status. For example, 9 pt main text may prompt 7.5 pt subsidiary text that is barely legible to some readers. Those sizes show as 9 pt main text, and 7.5 pt subsidiary text.

Neither should very large fonts be used for the text of scientific publications. A 16 pt font like this one may seem ugly or child-like.

Superscripts and subscripts (used for footnotes, some abbreviated, squared, or cubed units, mathematical functions, chemical formulae, and so on) are reduced in size automatically when selected in a given font. At the same time, the characters are offset to the appropriate degree, and the weight is changed if necessary to improve legibility.

The contrast between the sizes of different text components needs specific attention. Designers and printers use type scales to fix the size hierarchy of headings. Any consistent type scale can be used, provided there is enough difference between successive ranks (in emphasis and size) to distinguish them clearly. The amount of space above or below a heading also affects its apparent distinctness.

Many popular publications deploy impressively large headings, sometimes emphasized further by colour or artistic effects. For example, headings and text might be sized as shown below:[13]

text/ ***Subheading***/ **Heading/**
Major heading

However, such large differences among headings are not favoured in typical scientific publications. Most designers simply assess what differences are adequate and look appropriate, and establish an arbitrary scale. The large headings above would normally be considered unduly emphatic.

Even so, headings that are too similar in size give insufficient guidance to readers, as in:

text/ ***Subheading***/ **Heading/ Major heading**

Consequently, it is wise to test various possibilities for any particular publication. The sizes just below, though close to the minimum effective contrast, might suit a scientific article when coupled with spacing effects, for example.

text/ ***Subheading***/ **Heading/ Major heading**

Extreme changes in font size on a page (other than headings, and perhaps quotations or other inserted material) should be avoided whenever possible, because after a section of large font some people briefly see the normal one as too small for comfortable reading.

Font emphasis

Each font is available with its regular appearance, but also in **bold**, *italic*, CAPITAL, underline, combinations of these, and other forms. The variants provide ways, in addition to style, size, spacing, and colour, to emphasize particular entries. However, they should be used sparingly.

In scientific publications, emphasis is seldom used in the text: scientific readers are expected to understand the text without the additional signposts given by emphasis. Instead, bold typefaces serve chiefly to make headings stand out. Italics distinguish foreign words, quotations, examples, minor subheadings and, less commonly, table column headings and numbered labels. Capital letters are used for major headings, to a

[13] Some typographers favour mathematical constructs for type scales, like single- or double-stranded Fibonacci sequences (e.g., Bringhurst 2013). Terms in a Fibonacci sequence are equal to the sum of the two preceding terms. Therefore, apart from the first few terms, successive numbers are related by the golden ratio (approximately 1.618), a degree of difference deemed by designers to have pleasing balance to human eyes. Therefore, successive font sizes could be calculated by multiplying by 1.618 and rounding. The largest headings exemplified in this discussion about font sizes are in that sequence: 11 pt for body text; and 18 pt bold italic, 29 pt bold, and 47 pt bold for headings. Sizes in the final example—and in this article—are only 11 pt, 11 pt bold italic, 12 pt bold, and 14 pt bold.

degree that varies with designer and country, but are never used in the text; indeed, the need for rewriting is signalled if ever words in capitals seem necessary. Underlining is frowned on, except to signify that the underlined text is hyperlinked (when the colour will be changed too), because it is used to indicate italic font in copy for printers.

Occasionally, SMALL CAPITALS and a few other cases are useful. However, special effects, such as outlined, shadowed, 3-dimensional, ornamented, and patterned characters are generally regarded (even in headings) as too flashy for serious scientific discourse!

Special characters

Some printed characters have specific forms that differ from how they are sometimes typed in a manuscript (e.g., horizontal lines and multiplication signs: see *Copy editing*, Table 1).

Interline spacing

Interline spacing is the distance between the baselines of adjacent lines of type. It is also called leading [pronounced *ledding*], from the thin lead (metal) inserts used in earlier printing techniques to put space between lines of metal letters held in printing frames.

Adequate interline space is important to the appearance and readability of the text. In particular, lines of relatively dense text (as might occur in scientific papers, for example) are difficult to read when narrowly spaced.

Word-processing and desktop-publishing programs do not all express or calculate interline spacing in the same way, but the best line spacing for main text is between 120% and 145% of the point size. Fonts that look small for a given point size need less interline space than ones that look relatively large. For the typeface used for the text of this article (Times New Roman), 11 pt on 13 pt [about 120%] is relatively easy to read.

The same font on an 11 pt base (100% or no leading), as in this paragraph, is too dense. The text appears unhelpfully solid, and the reader finds lines more difficult to distinguish, especially for longer lines and paragraphs of several lines.

However, too much interline spacing, such as 18 pt for an 11 pt font (l64%, like this paragraph) loosens the text so much that the finished pages are more difficult to read fluently, and may suggest to readers that the publication is a draft or amateur one.

Adequate interline space is essential for long lines, because it helps the reader's eyes to scan back to the beginning of the next line. White text on a black background also needs more interline space to be as readable as black on white, as do other non-standard patterns.

Changes in line spacing change the length of a document more than changes in the point size of the font. Therefore, for example, they can be used to test whether a document might have a satisfactory appearance when fitted into a set number of pages.

Because smaller interline spaces reduce the number of pages significantly, they also limit the cost of printing hard copies. Some scientific journals, for example—which lack elaborate effects—economize by spacing lines at (or below) the minimum comfortable distance for reading.

Line length

The length of each line influences how easily and rapidly text can be read. Line length depends on page width and number of columns, and is reported as number of characters per full line including spaces, or cpl. The number of characters in a line of specific length is font-dependent, see *Font size* above.

Many readers are comfortable with about 60 characters per line, as exemplified in this paragraph, but a range of at least 45–85 cpl is considered suitable by most authorities.

Lines that are extremely long are difficult to take in with one glance, and may even require movements of the head, not just the eyes. Below that extreme, scientific readers tolerate (and indeed tend to prefer) longer lines. Indeed, reading is faster at longer line lengths such as 95 cpl, and some readers prefer them, primarily because more information appears on a page (Shaikh and Chaparro 2005). However, some authorities continue to view 80 cpl as the upper limit. Others cite 90 cpl, and a number of scientific journals have even greater average line lengths.

Full lines in this paragraph have about 88 cpl. The average for ordinary text sections in this document is similar, although the effective line length is reduced because many paragraphs have hanging text.

Of course, most lines at the ends of paragraphs have fewer characters, which helps the text to breathe. As a result, text with long lines is more readable when there are few very long paragraphs. Fortunately, paragraphs are shorter when lines are longer.

Short lines are well suited to dialogue, key points, and some other items.

Short lines are less desirable for most normal text, because lines with less than about 40 characters force the reader to move down to the next line too often. The full lines in this paragraph, for example, have an average length of about 30 cpl.

Although text with short lines is read more slowly than text with long lines, some readers prefer it. Line length can also be limited locally by interpolating text boxes or other items.

Multiple columns reduce line length, and are a favoured layout for the large size (and less attentive readers) of daily newspapers. However, the fact that relatively long lines are preferred for scientific texts limits the use or number of columns. Even presenting this article in two columns rather than one would yield lines close to the minimum length of 40 cpl (not simply 44 [88/2]), because there would be a gutter between the columns.

Paragraph recognition

Text is easier to read if paragraphs can be distinguished easily from one another. That is customarily achieved by indenting the first line of each paragraph, which serves to guide the eye. Too small of an indent is hard to notice. One that is too large disconnects the line from the edge and looks unprofessional. Most typographers recommend an indent between 1 and 4 times the point size. For this 11 pt text, that would be between about 0.4 and 1.5 cm.

Large indents (1.5 cm in this paragraph) are the default setting in some word-processing programs, but are not necessary. For scientific texts like this one, indents close to the minimum are sufficient. This document indents the first line of each normal paragraph by 0.4 cm.

There is no need for space between regular paragraphs of a professional-looking publication, despite the fact that word processors default to include a significant amount. However, space helps to distinguish examples or other elements from the narrative. Even so, most spaces should be relatively small.

A space of one line or less can be used to indicate a natural break point within a continuous section of text. Small inter-paragraph spaces can also be used to adjust the length of text sections to help in layout (see *Using desktop-publishing programs*).

Alignment and hyphenation

Text can be aligned in one of four ways, according to how the edges of the text relate to the margins: aligned to the left margin only (as here), with a right edge that is ragged because lines have different lengths; aligned right so that the left edge is ragged; centred, so that each line is equidistant from left and right margins; and justified, where both type edges have been aligned to the margins by adjusting the space between words.

Most books use full justification for the main text, because it gives a more professional look. In general, it looks better at longer line lengths. It is less successful for short lines:

Full justification produces peculiar spacing—as exemplified in this paragraph—if lines are short (because pages or columns are narrow), if the text includes long words, and if hyphenation is l i m i t e d .

These unwanted effects can be reduced by hyphenation, which prevents the whole of a word from being taken over to the next line, thereby reducing the amount of space between words on the current line. Most software can be set to hyphenate automatically, following a hyphenation dictionary for the correct placement of the hyphen in a given word. Allowing hyphens in the passage above reduces the largest spaces:

The same text with full lines hyphenated:
Full justification produces peculiar spacing—as exemplified in this paragraph—if lines are short (because pages or columns are narrow), if the text includes long words, and if hyphenation is limited.

Nevertheless, aggressive hyphenation creates awkward effects if it results in a cascade of hyphens on multiple successive lines. Judicious manual adjustment of selected hyphens (and, in some software, specifying the maximum amount of space allowed between words before hyphenation is invoked, and the maximum number of consecutive hyphens) minimizes those effects.

Left alignment is adequate for newsletters, articles, and ancillary documents. The ragged edge is not obtrusive when the lines are relatively long. Hyphenation can be used judiciously to adjust any lines that seem objectionably short. That option is also available for the shorter lines that run beside figures and other interpolated items.

Right alignment is used occasionally for components on the right-hand side of a page that look better when they are flush with the margin.

Centre alignment is used chiefly for major headings. It is likely to annoy readers if used for text.

Letter and character spacing

Nearly all modern publications use proportional or variable-width fonts, in which the width of the space that each letter occupies changes according to the width of the letter [for example, t versus r versus i versus m: trim *not* `trim`].

```
Each letter in non-proportional or monospaced fonts like this one
(Lucida Sans Typewriter) occupy the same horizontal space along the
line: many of them now look amateurish, as if they had been produced by
obsolete typewriters. They are still used locally for special purposes.
```

Adequate space between letters aids legibility. Word-processing software can implement spacing effects automatically, such as normal, condensed, or e x p a n d e d, by decreasing or increasing the space between letters equally throughout the word, known as tracking. These simple changes are seldom worthwhile, at least for the main text: condensed text is less legible, and expanded text soon becomes tiresome. However, more specific tracking (available in desktop-publishing programs) may improve appearance, impact, or legibility, especially in headings.

In addition, adjusting the space between adjacent letters to help them fit smoothly together may improve appearance in some instances, a process known as kerning. For example, letters that end with long diagonals can be put closer than usual to letters that start with diagonals of the opposite slope. The process is illustrated by the fact that AV, kerned so that the serifs of adjacent letters overlap slightly, is more pleasing than an unkerned AV.

Small fonts are more legible when the spaces between letters are relatively wide, but the same proportions would seem excessive in large fonts of the same style. Typefaces in modern digital programs have already been kerned by the designer—or at least this automatic option can be selected for larger fonts—and so no specific attention to the main text is required.

Nevertheless, oversized headings and artistic effects (such as an enlarged first letter of a paragraph) may profit from letter-by-letter adjustments to achieve a more attractive appearance. Such kerning is done by eye. Scientific publications seldom include special effects or giant fonts, and these adjustments are rarely needed.

Unnecessary spaces in the text should be eliminated for a neat appearance. In particular, obsolete typewriter customs such as double spaces after periods, colons, question marks, and exclamation marks—which were deemed to help clarify text with non-proportional fonts—are not followed. Moreover, with proportionally spaced fonts they can introduce unsightly gaps into the text.

Diversity

Using more than one font, and varying spacing on the page, may add interest and avoid monotony. Fonts that differ in style, size, or colour can help to establish hierarchies, distinguish or highlight certain items, or show direct quotations, for example. One common pattern is to use serif text and sans-serif headings.

Nevertheless, undue diversity leads to busy and confusing layouts. That possibility was not always acknowledged when individuals were first able to prepare digital newsletters. The fact that hundreds of font options can easily be introduced by digital processing does not mean that they should all be used in a single publication!

Images

Tidy layouts are easier to attain when images have a limited number of patterns (such as photographs, plus relatively few styles of graphs), provided that those limitations do not interfere with delivering the optimal content.

For scientific work, a scramble of sketches amongst formal photographs, and graphs in multiple formats, may be discordant. Likewise, whenever possible, graphs that show similar data should have the same orientation and the same dimensions on the page.

Figures must be integrated with the text. That requirement is chiefly satisfied by ensuring that both the illustrations themselves and the text that refers to them have been well crafted by the author. However, integration also depends on the size of illustrations, their placement on the page, and their closeness to the relevant text (see *Position of elements* above).

Communication is the main aim of publication design. Paradoxically, therefore, brilliantly creative artwork, garish picture frames, and other visual highlights may actually distract scientific users or make the core information harder to follow. In other words, undue cleverness in the use of images and colour can harm the design. See also *Images* under *Features of desktop-publishing programs*.

Colour

Most regular scientific texts use colour mainly for illustrations, but newsletters and popular works may profit from using it more widely. Digital products of all kinds can easily include colour. In contrast, commercial colour printing can cost 5 times or more than black and white, even though it is now remarkably inexpensive compared to a few decades ago.

Despite the ease with which colours can be used in digital publications, combining too many looks messy. It is advisable to establish a balanced palette for the publication as a whole, a scheme that can be implemented by assigning a fixed colour to each of a few chosen components.

Colour is appealing to readers, who may associate it with quality. It also sets mood and is closely tied to emotion. For example, most people regard cool colours like blue as relaxing; red is less restful and implies action; green might be used to invoke environmental themes.

Colour should not hinder usability, however. A page with a striking overall appearance is not well designed if, for example, the table of contents it bears is difficult to read because the background colour is too intense. Combinations without sufficient contrast, such as yellow or light grey text on a white or pastel background, have especially low legibility, and should be avoided altogether. Indeed, most colour combinations are less legible than black text on a white or pastel background.

Therefore, caution is needed when contemplating the possibility of colouring sections of text. On occasions when coloured text is deemed beneficial, the size and interline spacing can be increased to compensate for lower legibility. See also *Colour* under *Features of desktop-publishing programs*.

Titles and covers

Commercial publishers have marketing and editorial teams that make great efforts to choose the “best” titles, because titles are the initial trigger for reader interest. Likewise, large publishers employ multiple designers to work on book covers and ancillary materials. Smaller publishers have groups with similar responsibilities, but often employ outside specialists. These designs are intended to persuade casual readers to pick up a publication and consider purchasing it.

Marketing is much less significant for most scientists, and sophisticated designs are not needed. Nevertheless, a clear and precise title is essential to tell readers exactly what a document contains, and any descriptions added to explain or promote the content also have to be short.

Titles should be condensed as much as possible, following the principles that make for concise text. For example:

Producing easily read title pages
A guide to how the number of words on a title page
or sign can be reduced to improve its legibility

is hopeless. More impact is given by

Designing clear titles
Ways to minimize words

Scientific readers are seldom swayed by elaborate cover typography or artwork. Designers need only to ensure that titles are conspicuous and easily distinguished (avoiding elaborate and pastel fonts), any explanation of the content is concise and clear, and artwork, photographs, or icons are relevant, aesthetically pleasing, and easily understood.

The key to effective design

Designers consider the target audience and the form of the finished product. Simplicity is clearer than complexity and makes scientific publications easier to use. Indeed, a good design, it has been said, is as little design as possible. Nevertheless, many details have to be chosen and coordinated to give the work a neat, professional appearance.

The choices can be optimized through the relatively simple design principles recommended above and summarized in Table 6. To restate the quotation about printing that ends the *Introduction*, no single principle is important as long as it is followed!

In contrast, ineffective designs have faults such as narrow margins, ambiguous hierarchy of content, large text blocks with little separation, unclear paragraph definition, fonts that are too small for easy reading, insufficient interline space, too many different fonts, dense or elaborate font styles, close letter spacing, text with insufficient contrast, cramped table entries, busy groups of images with captions too large or too close, bounding lines that crowd in on the elements, confusing colours, and so on. All of those faults can easily be avoided.

Choosing a desktop-publishing platform

Introduction

The properties of different systems are characterized in sources ranging from manufacturers' promotional materials to operating manuals, and from brief overviews of a number of systems (e.g., Indeed 2025) to highly technical reviews of selected systems. Most of them are available online. However, the field is fast-moving and competitive, and improvements (or at least extra selling points) are introduced frequently. Many systems have chequered histories.[14]

The desktop-publishing program most suitable for a given project depends on the intended output as well as the properties of the system. Depending on the task, essential features are program capability (variety of tools or controls available), ease of use, ease with which the program can be learned, ability to interface with other software (such as word processors and image editors) or import their files, and formats available for output. Stable performance (reliability) and cost are also important.

Weighting the value of all of these features for a given project requires detailed consideration of several possible programs—just as for other kinds of software. Unfortunately, reviews are less helpful than might be hoped. Individual user opinions of the same software differ not just because of the quality and efficiency of the software, but because users are influenced too by individual project requirements, and even by how long the user has spent to become familiar with a program before pronouncing judgment. Also, long previous experience with a program makes an alternative program seem bothersome, because some habitual actions no longer work. (In the same way, great familiarity with a particular keyboard layout, desktop arrangement, or function-key configuration seems to increase the difficulty of learning another.)

Reviews by "authorities" necessarily generalize the performance of the program rather than focus on projects relevant to any particular user; and some "reviews" are little more than biased product promotions. Some manufacturers provide free trials of their software, but only for a limited period, and people new to desktop publishing may find it difficult in the time available to evaluate a program thoroughly whilst trying to learn how it works.

Ways to decide on a suitable program despite the impediments just described are suggested below under *Evaluating the suitability of different programs*.

The computer used to run the software must be adequate. More powerful programs require greater processor speed (and dual-core capability may be needed), sufficient Random Access Memory (at least 8 GB), and large screens with high resolution. Full

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[14] Even well-established programs have been discontinued over time (e.g., Calamus, Fleet Street Publisher). Others are not being updated. Pagestream (which uses the Operating System for Amiga computers) is still available because it was adopted—after Commodore ended production in 1994—by a few manufacturers, prompted by groups of enthusiasts! Programs have often been renamed, including PagePlus, which became Affinity Publisher (owned by Serif), now part of Affinity (owned by Canva). Changes in the development, ownership, and marketing of desktop-publishing programs are best exemplified by the history of Timeworks Publisher, which was marketed in various versions and countries, and for various platforms, under the names Timeworks Publisher (1987), Timeworks Publish-It!, Publish-It!, Acorn Desktop Publisher, KeyPublisher, Publish-It! Easy, and Publisher Home & Business (2009).

HD is useful (1920 × 1080 pixels ["1080p"], giving 110 pixels per inch even on a 20-inch screen[15]), although resolutions found in cheaper computers, such as 1280 × 768, are feasible for general applications. Most of the common programs are available for Windows and Mac (and for some others) although Microsoft Publisher runs only on Windows. Most programs can use both recent and a few older operating systems.

Despite the extraordinary abilities of advanced programs, their main disadvantage is the time that must be taken to learn them adequately. Indeed, the level of familiarity needed to produce complex documents of professional quality is reached particularly slowly.

Roles of desktop-publishing programs

The potential elements of publications can be processed with software specialized for each task, such as text processing and image processing (specific examples are noted in a later section). However, desktop-publishing programs combine some of the roles of all of them, together with other functions that facilitate layout and consistency.

1. *Page layout*. Arranging text, images, and other content on the page is the core ability of desktop-publishing software, with more precise control of layout and editing than other platforms.
2. *Text editing*. Most desktop-publishing software can process text in detail. Many stand-alone word processors are very able too. Programs that edit pdf files can be used for some purposes. Other kinds of professional software are available for document processing and typesetting, but are more difficult to use.
3. *Special text editing*. Tables and complex text formats can be generated by desktop-publishing software, but also by word processors, spreadsheets, and databases. Some software can import these formats directly. Composing intricate formulae is challenging, and relatively few programs can handle them.
4. *Image editing and design.* Desktop-publishing programs allow images to be edited to various degrees, but dedicated programs are needed for serious manipulation. Most of them focus on only one of the two main types of digital images (see *Images* below for details). Raster graphics are based on pixels, and are used mainly for photographs. Vector graphics are defined mathematically, and are used mainly for logos, technical drawings, and a wide array of design options.
5. *Presentations*. Presentations (although they are not publications and are not treated in this article) can be generated by some desktop-publishing programs. However, they are usually prepared with other software.[16]

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[15] The ppi of a computer screen is assessed (without reference to its aspect ratio) by calculating the number of pixels along the diagonal [$\sqrt{(\text{pixel width}^2 + \text{pixel height}^2)}$], and dividing by the screen size cited by the manufacturer, which is the distance in inches along the diagonal (see also footnote 12).

[16] Presentation software that is useful, depending on the form of presentation, includes Beautiful.ai, Google Slides, Keynote, Microsoft Powerpoint, Prezi, and Visme. Presentations can also be prepared adeptly by some graphics design programs, such as Canva.

6. *Output.* Generating files for hard-copy or digital publications of high quality is the main role of most desktop-publishing programs. Word processors and other programs do similar things, but with much less sophistication. Some desktop-publishing programs can also generate files to post on social media.

Features of desktop-publishing programs

All of the features potentially seen as desirable are listed in Table 7. This section gives more details about each one. The next section (*Evaluating the suitability of different programs*) considers some of the software available for desktop publishing and allied tasks. The section on *Using desktop-publishing programs* shows how these capabilities can be implemented to produce a document.

Layout

Layout features allow the basic parameters of a document to be set, and facilitate the placement and arrangement of items on its pages. The simplest systems do little more than could be done by a word processor, but advanced ones add many ways to choose layouts, make precise layout adjustments, establish consistency, and incorporate complicated items.

Document definition. Desktop-publishing software can set up the basic parameters of a document (including intended output, page size, orientation, margins, and columns), resolution in ppi ("dpi"[17]), rendering of colour, and so on. Advanced programs have more choices, and allow finer control, than simple ones.

Content placement and objects. Some desktop-publishing programs use the term "object" for each separate item of content. For example, text blocks, images, tables, and design elements such as curves, shapes, and arrows can be treated as objects. The separate status of objects gives great flexibility to page layouts because individual objects can easily be moved, resized, or changed.

Frames. For some kinds of content (images, tables, and sections of text), desktop-publishing software places each item into a defined area termed a frame. Each frame can then be modified and moved. The properties of text frames that enclose sections of text differ from those of image frames that contain images (see *Text and typography*, and *Images* below).

Layers. All advanced programs use layers, which stack multiple components of a page and maintain them separately. (Image processors use separate image layers.) Some software can handle a very large number of layers. This system gives powerful control of layout, because each separate component can be moved, modified in shape, colour, and opacity, made invisible, and moved forward or backward to change its relationship with other layers. Layers allow both simple adjustments like the alignment of a caption with its image or superimposing one object on part of another, and sophisticated modifications in the appearance of a page or an image.

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[17] The technically correct term for digital resolution is pixels per inch, but dots per inch (dpi) is often used even though, strictly speaking, it is applicable only to printed products.

Table 7. Potential features of desktop-publishing programs. Different programs have different combinations of few to many of these features.

Potential component	*Function or potential features*
Layout	
Document definition	Basic parameters of the publication and its pages
Content placement and objects	Components added to the document as separate objects
Frames	Defined enclosures into which text and images can be placed
Layers	Components of a page or image maintained as separate layers
Text arrangement	Text flow, text wrap, and other adjustments
Master pages	User-generated formats that can be applied to multiple pages
Templates	Preset layouts that can import different content
Alignment guides	Reference points to assist positioning
Pinning	Pinned objects always stay with chosen text
Grouping	Objects can be combined into a single group
Flexibility	Choice and modification of content elements
Other tools	Tools supporting precise layout
Organization and navigation	
Reader guides	Page numbers, table of contents, and indexes to assist navigation
Footnotes	Manual or automatic footnotes
Internal anchors and links	Markers that hyperlink to other parts of the document
External hyperlinks	Links to web references
Text and typography	
Variety and editing	Diversity of typographic features, and their adjustment
Saved formats	Sets of features saved together for reuse
Text frames	Frame text and alignments
Other tools	Common word-processing functions
Strokes, shapes, and rules	
Variety	Types of strokes and shapes, and their features
Flexibility	Editing and transformation
Tables	
Cells	Number and size of cells, rows, and columns, and their flexibility
Rules and fill	Variety of rules between cells, and of fill
Structure	Layout, combination, and moveability of table components
Table entries	Positioning of cell contents, and availability of typographic options
Table templates	One or many pre-set formats, custom templates

(Continued)

Table 7 *(continued)*. Potential features of desktop-publishing programs.

Potential component	*Function or potential features*
Images	
Types of images	Raster and vector graphics
Image frames	Relationship of frame and image, image fit within frame, border options
Image handling	Ability to use different image types
Image editing	Editing capability within program
Other image properties	Colour, resolution, format, see below
Colour	
Rendering colours	RGB and CMYK systems
Colour codes	Options for viewing and output
Range and adjustment	Variety, precision, and ability to adjust colours
Selection	Choosing and matching colours
Import and integration	
Import capability	Common and less common text and image formats that can be imported
Linked software	Related or independent proprietary programs that are compatible
Export and output	
File export formats	Formats for different publication avenues, including pdf and commercial printing
Links	Internal and external links transferred to exported files
Error checks	Detection of errors before export
Ease of use	
Interface	Interface intuitive or not
Viewing area	Option for more than one window, easy navigation within page and document
Shortcuts	Number of common and other keyboard and function-key shortcuts
Toolbars	Commonly used tools always accessible
Tool menus	Tools for related functions displayed as a group
Save	Save options

Text arrangement. Text can be arranged on the pages in several ways. Placing frames in multiple columns breaks up the text. Changing frame dimensions realigns text with the new edges. *Text flow* permits material to flow unbroken from one page (or linked frame) to another. Therefore, for example, the whole text of a document can be imported at once, and text flows down if material is added. *Text wrap* forces text to flow around other objects (such as images). Some programs enable precise control of the distance between the text and the object it flows around, and can curve the type edge around the curved edge of an image.

Master pages. Master pages are custom formats established by the user to ensure that design and layout parameters will be repeated exactly on every page that has the same master. Changes made on the master apply to all of those pages, reducing the likelihood of errors or unwanted differences, and contributing to organization, consistency, and efficiency. Usually, master pages include page headers or footers (and page numbers would be placed there), and layout guides (see *Alignment guides* below), in addition to margins and columns. They are also used to apply branding such as logos on every page. Master pages are found only in advanced programs such as Affinity, InDesign (where they are now called parent pages[18]), Microsoft Publisher, QuarkXPress, and Scribus.

Templates. Templates are preset layouts, intended to help in the design of publications. (The templates of presentation software reflect a similar idea.) A user can place desired text, images, and other design elements into that framework, and modify the layout to some degree for a particular project. Advanced programs generally offer more template choices, plus the ability to save user-modified templates for later use. Templates for popular programs, including ones that are free of charge, are also available online. However, typical designs support commercial operations (such as the production of illustrated advertising brochures). Most are less useful for formal scientific publications, although some are suitable for newsletters.

Alignment guides. Alignment guides are reference points that do not appear in the final document but can be seen onscreen to steer the positioning of page contents. These reference points (margins, columns, and other indicators) can also be made invisible if required, so that users can evaluate the appearance of the page without distraction. Built-in grids and rulers can also be used. Advanced programs have more kinds of guides, and greater control of their scale, density, and visibility.

Pinning. Pinning associates a word or other item in the text with an object such as a figure, so that if that text moves within the document, the pinned object stays at or alongside the point of insertion of the pin.

Grouping. Advanced programs allow objects on a page, such as a set of images with captions, to be grouped together so that they can be moved as a single entity (and also ungrouped).

Flexibility. Programs vary widely in how much flexibility they provide in the choice and modification of objects placed on a page. Especially valuable is subsequent adjustment of the characteristics and placement of objects, by means of functions such as add, drag, drop, combine, transform, flatten (combining layers), and conversion to a different type of object. Programs differ in how simply the shape or aspect ratio of objects can be changed.

Other tools. Advanced desktop-publishing programs have other layout tools to help adjust the position of page components. One of the most useful options is snapping, which causes the edge of an object, or a stroke, to snap into exact alignment with a nearby guide. Objects can also be aligned precisely when they can be nudged around with the arrow keys, and some programs even allow the distance of each nudge to be adjusted.

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[18] Apparently, this change was made to introduce more inclusive language.

Organization and navigation

Organizing the document helps users to understand its content and to access subjects of interest. In simple systems page numbers are the only form of reference.

Reader guides. Aids for users (in addition to page numbers) include indexes and tables of contents. Many programs add page numbers automatically in sequence (including through headers on master pages, for example). Some advanced programs can automatically generate a Table of Contents (Affinity, Indesign, QuarkXPress, and Scribus), or an index (all those except Scribus), through marked ("tagged") headings or style settings.

Footnotes. Footnotes can be added manually, but some programs number them automatically and place them at the foot of each page (or assemble them as endnotes). More adept systems move footnotes reliably to accompany the text whenever the relevant section moves, and renumber them if the order changes. The best systems retain footnotes brought in from word-processor files, and include them in exported files.

Internal anchors and links. Many desktop publishers allow markers (called anchors, for example) to be placed in the text (although they do not appear in the publication, and normally are hidden onscreen too). Markers can be hyperlinked to other locations in the document, so that clicking on a linked heading in the table of contents, for example, would take the reader to the marked location. Anchors also serve for indexing and automatic listing of content.

External hyperlinks. Advanced systems can add web hyperlinks and export them into the final document, allowing readers to navigate directly to a specific web address. The linked term in the text can take any form (name, whole URL, etc.).

Text and typography

Complex desktop-publishing programs allow the user to compose and adjust typography, and also to import text composed by word processors and other software (see *Import and integration* below).

Variety and editing. The best programs can implement a full range of features, including the style, size, emphasis, and colour of fonts, flexible spacing (with broad control and easy adjustment of interline and paragraph space), typographic adjustments such as kerning, and special characters. Text can also be selected directly and fully edited.

Saved formats. Advanced programs allow users to save detailed text formats so that they can be applied easily to selected blocks of text.

Text frames. Text frames (see *Layout* above) facilitate the alignment, hyphenation, and other characteristics of text. Together with saved formats, they help to ensure the consistency of typography, and the appropriate placement and aspect ratio of blocks of text on the page.

Other tools. Some programs include common word-processing functions like Find, Replace, and Spellcheck.

Strokes, shapes, and rules

Graphic elements can be used to emphasize the separation between units of content and to augment designs. In desktop publishing, a *stroke* is the outline or border of a shape, frame, graphic element, or other object, defining its edge with adjustable colour, thickness (width, weight), and style (continuous or broken). A single stroke has similar properties, but using the word stroke rather than the "line" of popular language avoids ambiguity with a "line" of type. A *shape* is a two-dimensional object bounded by strokes, and has a *fill* of pattern and colour. [The term stroke is also used in typography to mean the elements of letters, which differ among fonts.]

A *rule* is a linear design element, commonly applied between text sections, paragraphs, or rows in a table, although in ordinary parlance it too is often called a line or straight line. In typography, a rule is a straight element of chosen thickness. In most desktop-publishing software, it is a straight stroke distinguished by its use as a separator. [In general use, of course, the word rule has meanings such as regulation, principle, or control.]

Even the simplest programs permit straight strokes, but advanced programs are much more capable.

Variety. Many programs can generate curves and shapes. However, some allow custom curves and shapes, and permit the width, length, colour, style, and opacity of strokes and fill to be chosen.

Flexibility. Advanced programs treat strokes and shapes as editable objects that can be transformed to exact requirements.

Tables

Tables are treated differently by different programs. Some favour direct import from other programs, such as word processors and spreadsheets. Others allow similar layouts to be constructed directly. Some include great precision, flexibility, and custom layouts, but all have their own quirks or limitations.

Cells. Most programs allow a wide range in the number and size of rows and columns. Other capabilities, such as custom size adjustments and merges, are less universal (especially in tables composed in other programs).

Rules and fill. Programs differ in how many kinds of rules between rows and columns, and how many kinds of fill, can be selected. The most competent programs permit a great variety of thickness, colour, and visibility of both horizontal and vertical rules, and in the pattern, density, opacity, and colour of fill. They also make it easy to make adjustments. Some programs that allow precise adjustments on text pages are less flexible for tables.

Structure. The most competent programs can modify individual cells, rows, and columns, and move them within the table. The whole table, within its frame, can also be treated and moved as a single entity.

Table entries. Some programs can apply all available text tools to table entries. Therefore, text can be aligned individually in each cell relative to the edge, all typographic details can be adjusted, and the features of individual paragraphs, such as interline spacing and hanging text, can be formatted.

Table templates. Preset table formats, and the ability to save custom formats for reuse, help to maintain consistency within the document. The number and variety of preset formats, as well as potential customizations, differ among programs.

Images

All programs import images (typically in several formats) and adjust them to a limited extent, but relatively few are able—or link directly to software that is able—to perform comprehensive editing, or modify or coordinate images on export.

Types of images. As noted above, there are two main types of images.

Raster graphics are based on pixels; they store information in a pixel grid (in well-known formats like jpeg, as well as in program-specific files). They can reproduce details and complex colours, as in photographs, and potentially can be edited at the level of individual pixels. However, multiple images and high resolutions result in large and unwieldy files.

Vector graphics are based on mathematically defined points, lines, curves, and shapes, and are used for charts, infographics, and logos, and also for design purposes. The files are relatively compact, and do not pixellate when enlarged, so are best for images that might need to be resized. Vector graphics are stored in common formats such as svg, and in program-specific files.

Image frames. Frames allow the position and aspect ratio of images on the page to be adjusted easily. In some programs, the size of the image frame and its content can be changed independently. The relationship between the image and the frame can also be selected in some programs. However, stretching an image to fit the frame distorts the image by changing its aspect ratio, which is not acceptable for realistic illustrations, but may allow designs and graphs to be adjusted to fit the layout. The border of an image frame can also be changed. Deciding on the best thickness of a solid black stroke is all that is required for most scientific illustrations. However, custom styles, colours, and corner geometry are appropriate for some purposes.

Image handling. Most stand-alone programs focus on either raster or vector graphics. Some can be used to prepare publications. Most advanced desktop-publishing programs are vector-based, but can incorporate raster images like photographs.

Image editing. In simple programs, images can be placed as they stand but not edited. Some of the advanced programs (rarely internally, and more often through links with related software) give greater control of layers and editing, permitting the composition of the image and the configuration of its components to be modified. Thus included are characteristics such as white balance, brightness, contrast, hue, and saturation. Of course, the most critical qualities of figures are those already given by the author to fulfil the scientific purpose of the image.

Some editing tools (e.g., “paint” brushes, textures) work at the pixel level, and so require vector objects to be rasterized. The program can make that transformation, but the image may degrade if it is then enlarged.

Other image properties. Colour codes, and the resolution and format of exported images, are treated below.

Colour

The availability of colours (for images, text, fill, and other constituents of the design), and the ability to adjust them, varies among systems.

Rendering colours. Colours are generated by combining primary elements, in two main ways. The RGB mode adds together Red, Green, and Blue (representing the wavelength bands registered by the three kinds of photoreceptors in human eyes) in different proportions (on a scale of 0–255 for each[19]) to produce different colours. RGB is used for digital products, because screen colours are generated by illuminating subpixels of each of the three primary colours within each screen pixel. Maximum brightness of all three components (255-255-255) yields pure white. Minimum values (0-0-0) yield pure black.

The second common colour system is CMYK (Cyan-Magenta-Yellow-Key), which is used for printed products, and is also known as process colour or four colour. Key is black, and contains the most detail. Cyan, magenta, and yellow absorb red, green, and blue light respectively, so maximum values (100%) of each component including black absorb all the incident light and appear pure black. White is derived from the expected colour of the background (usually paper), which reflects all of the incident light when no inks have been applied.

Image processors and some desktop-publishing software can set colours precisely with the numerical parameters (e.g., 0–255 or 0–100), and may also allow existing hues to be sampled or cloned for exact reproduction elsewhere. However, the rendering of colours on different screens is not always identical, and colours often differ too when printed. For some applications, verifying outputs is worthwhile in case there are significant differences.

Combining primary colours through either system yields millions of possibilities, but human eyes can distinguish only a fraction of them.[20]

Colour codes. Given the two main modes of rendering colour, the one adopted for export should reflect the primary destination of the document, as a digital or a printed product. Images (and text) for publications are now normally supplied to commercial printers as digital files that have been edited onscreen, where the RGB mode may have been used by default. Because printing uses CMYK colour, professional printers expect to receive images in that form, so it is better to work in CMYK for products that will be printed.

Software can convert from one code to the other, but conversion between additive and subtractive systems with different numbers of components is not exact. In particular, CMYK colours usually appear duller and less vibrant than the equivalent

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[19] This scale accords with the fact that 8 computer bits yield 256 combinations (2^8). However, 16-bit and even 32-bit colour depths can now be selected in some software, providing many millions of additional colour combinations. They are not necessary for most purposes, but the increased fidelity and precision may enhance High Dynamic Range (HDR) images and some visual effects.

[20] At least 16 million colour combinations are possible with RGB (0–255 for each component for 8-bit colour = 256^3) and 100 million with CMYK (0–100 for each = 101^4]. However, human photoreceptors detect only about 100 levels of brightness in each of the three sampled wavelength bands (the primary colours red, green, and blue). Therefore, as a theoretical maximum, human eyes can distinguish about one million colours, well below the number of possible RGB or CMYK combinations.

RGB. Authors may be disappointed if some of their meticulously crafted RGB images seem lifeless when printed.

Range and adjustment. Advanced programs, particularly dedicated image processors, allow every facet of colour to be set or changed. As noted above for *Image editing*, the simplest systems can render images prepared elsewhere but not change them, although images can be resized.

Selection. Easiest to use are systems in which colours can be chosen from a chart or wheel that displays all of the options available. A tool, already mentioned, that can sample hues from the document and clone them exactly elsewhere is essential for some purposes.

Import and integration

Some desktop-publishing programs are not efficient for developing long or detailed content, as opposed to laying out material prepared by programs such as word processors. Therefore, the ease with which text, tables, and images can be imported, the variety of formats that are acceptable, and how easily the software can coordinate with other programs that generate content determine which programs are suitable for a particular end product.

Import capability. In general, complex programs can import a wide range of content. Most can copy and paste text from common word processors or other programs. Valuable too is the ability to import widespread formats such as jpeg and svg images, and Microsoft Word and Adobe pdf documents. Some features embedded in these documents, such as footnotes, may transfer with the same capabilities. Advanced programs can also handle compatible files prepared by a few other desktop-publishing programs. However, material from proprietary files often cannot be transformed into formats that allow significant editing.

Linked software. Some desktop-publishing programs interface with external software to adjust files from graphic-design and image-processing programs, or to perform additional tasks. Software from the same manufacturer is more likely to be compatible. Most advanced programs also allow active links, whereby the desktop-publisher document is updated whenever a linked image file is modified (see *Choose import options* under *Using desktop-publishing software*). A few programs link directly to programs with other capabilities, as for the seamless switches (in place until late 2025) between the separate but linked programs Affinity Publisher, Affinity Photo, and Affinity Designer. [These layout, pixel, and vector components are all now part of a single Affinity program.]

Export and output

The ability to export files in different formats, and to retain existing settings or links, varies widely among programs. Some programs also alert users if they try to export a document with potential errors.

File export formats. Programs save files in the desktop-publishing program's native format, of course, but most are able to put out files in other formats (see *Advanced programs* and Table 8 below for representative differences in export capability). The appropriate format depends on the route of publication, such as pdf, desktop printing, commercial printing, images, eboook, or web-ready. One or more of publications (emphasized in this article), presentations, business and marketing materials (such as brochures and calendars), and web content (for websites and social media) can be generated by different programs. Typical desktop-publishing programs are primarily intended for print or pdf publication.
Demands for commercial printing are exacting (see *Colour* above, and *Initial settings* under *Using desktop-publishing software* below).

Links. Advanced programs can transfer included links so that they function in exported documents. For example, internal links are available as pdf bookmarks, and external ones retain connections to their URLs.

Error checks. When the software can check for errors automatically before export, it detects problems such as text that extends beyond the frame allowed for it, unavailable fonts, and unsupported image formats. That feature prevents critical faults, including hidden content, in the final publication.

Ease of use

The ease with which desktop-publishing programs can be learned and used varies widely, and together with program capability is a key determinant of user satisfaction. Capability and ease of use interact, because more capable programs are harder to learn and use. Nevertheless, some programs are kinder to users than others.

Interface. The main characteristic of user-friendly interfaces is that they are intuitive: steps the user takes work as might be expected; outputs from the program mimic what the user sees onscreen (WYSIWYG); submenus are located where the user expects to find them.

Viewing area. Programs that readily allow switches between windows, or more than one window to be viewed at the same time, are helpful for some purposes. Useful too are tools (e.g., "Navigator") that facilitate moving from page to page, moving around a page, and zooming in on part of it. For example, they orientate users by showing the whole of the page as a small inset that has the current window marked.

Shortcuts. Programs in which many of the common keyboard shortcuts or function-keys work as expected save time while learning and using the software. Advanced programs include not just widely known shortcuts, but also many additional specific or custom ones (see *Using desktop-publishing software/Shortcuts*).

Toolbars. Content is easier to manage when tools are accessible from a toolbar. This benefit is higher if the toolbar can be customized to show the tools most commonly needed by an individual user.

Tool menus. Advanced programs can display tools for related functions together (in a subsidiary panel) when the user selects a particular category from a menu. This grouping of similar tools gives simple access to all of the actions needed for precise control of sets of features such as spacing, colours, strokes, and symbols. The features are even easier to use if (like toolbars as just noted) groupings can be customized.

Save. All programs allow Save and Save As, of course. Some users appreciate files that are continually backed up automatically, or large numbers of previous versions that remain accessible. Programs with many options tend to generate large files when there are multiple images.

Evaluating the suitability of different programs

Many of the features just described, and listed in Table 7, are absent from simple programs. Desktop-publishing software can best be chosen by deciding which of these features might be essential for likely projects, how easy the program is to use, and whether the user will find the effort of learning the program worthwhile for the expected purpose. Help content available online from manufacturers and others (especially indexed help screens or manuals that can be searched) often reveal whether a system includes the desired features.

The cost also differs considerably, and there may be a continuing monthly or annual fee rather than a simple purchase. Prices increase periodically. Among advanced programs, InDesign is particularly expensive, with with no permanent option but only an annual subscription, last increased in mid-2025, of $360 Canadian ($30 per month). Discounts for accredited teachers and students are available only for the full Creative Cloud[21], at a cost of $396 ($33 per month), rather than the undiscounted $1 104 ($92 per month).

The advanced program QuarkXPress is also expensive. The 2026 version costs about $380 Canadian per year (as USD 279 through the US site), but indefinite use of the current version with a single year of updates is available for $960 (USD 699). Moreover, students and faculty can obtain an annual subscription for only about $150 (USD 109).

Most free software is more or less limited, although some free platforms have fee-based premium versions too. Even so, they are not as capable as InDesign or QuarkXPress for desktop publishing.

However, two other highly capable programs, Affinity and Scribus, are completely free of charge. Affinity has desktop layout, photo editing, and graphic design capabilities, and provides updates. Scribus is an open-source system: such systems make the source code publicly available to encourage further development, but they tend to be more difficult to use than proprietary programs, and have less support.

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[21] Creative Cloud ("CC") is the banner for a suite of Adobe products available solely through subscription; therefore, the desktop-publishing software is properly called "InDesign CC". However, few people use the full name. Earlier versions that were available for outright purchase were called "InDesign".

Desktop-publishing programs and related software

Given the range of potential properties shown in Table 7, the nature of the intended publications (current ones but also possible future ones) dictates what kind of system would be feasible. Some programs are well suited for printed magazines or newspapers, for example. Others can prepare material for web pages.

If the intended output resembles a simple document more than a formal publication, a competent word processor can produce it without much effort (e.g., Microsoft Word, Apple Pages, Google Docs). Various pdf editors are available too, in addition to Adobe Acrobat itself, allowing those files to be edited (e.g., Wondershare Pdfelement, Foxit pdf Editor+).

Document processors alone are not powerful enough for more demanding applications. Some potential alternatives (such as Lyx and the LaTex system it uses), are especially suitable for mathematical notation, but are not WYSIWYG. However, complex items can often be prepared with simpler stand-alone software, and imported as images into the publication.

A leaflet, poster, or illustrated brochure of adequate quality can also be prepared with software that is chiefly intended to support graphic design, as well as with various desktop-publishing programs.

Any substantial manipulation of the images used in desktop publications calls for dedicated image processors, because most desktop-publishing programs are limited. Adobe Photoshop, Corel Paint, and the free programs Affinity (pixel studio) and GIMP work with pixels (raster graphics), and are designed chiefly for photographs (see *Types of images* above). Among others, Adobe Illustrator, Corel Draw, VistaCreate (online), and the free Affinity (vector studio) and Inkscape use vector graphics and are best for graphs, logos and general design. Software that can generate graphs (such as the spreadsheets Microsoft Excel and Google Sheets) normally can save files in either format. Vector images are the better choice if they might have to be resized.

Desktop-publishing software that can link or integrate with these specialized programs is valuable for some purposes (see *Linked software* under *Import and integration*).

Several programs intended for graphic design are relatively easy to learn, because they rely heavily on provided templates. Such possibilities include Adobe Express, Canva, Libre Office Draw, Marq, PosterMyWall, and VistaCreate. Xara page and layout designer is another program that is relatively easy to use, although it cannot handle complex documents.

A number of these and other programs are available exclusively online, a setting not universally liked by users and not necessarily convenient for scientific publishing. Moreover, the majority of them are intended to prepare social media posts, presentations, flyers, posters, videos, and logos. The many available templates allow even beginners to prepare attractive designs. Online platforms are commonly promoted too to highlight marketing, brand control, real-time editing by business teams, and other roles in support of business operations.

More exacting tasks require advanced desktop-publishing software that can produce longer publications of full professional quality. Of course, they can be used to prepare simple publications too. Other specialized software is available for certain purposes (e.g., Adobe Framemaker for long technical manuals and other specialized technical documents).

Scientists generally avoid exotic designs, and would not need all of the tools available in advanced desktop-publishing programs. Even so, both advanced and basic programs tend to frustrate scientific users. Complex programs can do almost anything the user might want, but finding the relevant features and learning how to use them is time-consuming and potentially frustrating. Limited programs frustrate users too because, although basic commands are relatively easy to implement, some desired features will prove to be absent. Most scientists prefer to do things thoroughly and precisely, and so are likely to prefer the first kind of frustration! Some ways to mitigate these problems are indicated under *Using desktop-publishing software*.

Advanced programs

Advanced programs that are well established, popular, and most likely to support scientific publications are [in alphabetical order] Affinity (Affinity 2026a), InDesign (Adobe 2026a), QuarkXPress (QuarkXPress 2026a), and Scribus (Scribus 2026).

In addition, Microsoft Publisher (Microsoft Publisher 2026) is a desktop-publishing program available to Windows users, often adopted for home use. I have not examined it, because support by Microsoft will end in 2026. However, the software has not been updated recently and appears to be less effective than other advanced systems.

The overall similarities among these programs, at least for desktop publishing, are more noticeable than their differences, because all of them can apply and adjust a remarkably wide range of features. All have upper toolbars with drop-down menus and submenus, and context-sensitive toolbars that reflect parameters of the current display. All allow panels to be opened by the user (and docked again), to show subsets of relevant tools. All have various shortcuts. Nevertheless, how documents and options are set up, what types of output are easily produced, and other operational details are different.

One example of the sorts of differences to be expected is shown in Table 8, which compares the export formats available in each of the advanced programs.

The table lists widely used file formats, and shows what programs can export them (in addition to program-specific files). Some of those formats would be used mainly by professionals (e.g., high dynamic range images), or would serve a purpose other than scientific publications (e.g., web interactivity).

All of the programs can export high-quality pdf files, which are the most useful format for scientific publications. In addition, pdfs can be used by external software to generate files in some other formats. Therefore, depending on the task at hand, a scientist might find output differences to be less significant than ease of use and other features.

The advanced programs take considerable effort to learn well enough for effective use. I offer comments about each one. The next section describes how to learn and use them.

Adobe InDesign has long been regarded as the leading choice for professionals. However, it is now challenged by its competitors because it is so expensive—with a subscription-only model—and is by no means free of difficulties. The software has

Table 8. Representative file formats that (as of late 2025) can be exported by the advanced programs Affinity (A), InDesign (I), QuarkXPress (Q), and Scribus (S).

File format	*File characteristics*	*Available in*
Documents		
pdf	Portable document format; dominant file format for documents of all kinds	All
pdf/x	Pdf files with presets for professional printing and error-free transmission of graphics	All
Text		
txt	Plain unformatted text	I, Q
rtf	Rich text; includes formatting	I, Q
xml	Extensible markup language; flexible and widely compatible text-based files	I, Q
Images		
Raster, Lossless	*Files include all of the original image data*	
tiff	Tagged image; high quality, often used for professional printing and scanning	A, Q, S
bmp	Bitmap image; simple uncompressed format with large file sizes	S
gif	Graphics interchange format; for simple animation and graphics	A, S
png	Portable network graphics; transparent web graphics [improved replacement for gif]	I, A, Q; S[1]
Raster, Lossy	*Less important and less detectable information removed to reduce file size*	
jpeg	Joint photographics expert group; most widely used image format	All
Vector	*Resolution normally maintained at any scale*	
svg	Scalable vector graphics	A; S (limited)
ps, eps	Postscript, Encapsulated postscript; multiple- (ps) and single-page (eps) formats used for desktop publishing, professional printing, and embedding images in documents	I, Q, S; A[2]
Special		
webp	Web picture; high quality images in small files	A
exr	OpenEXR; high dynamic range images	A
Ebooks		
epub	Electronic publication; for ebooks (with fixed, or flexible [“reflow”], size)	A, I, Q
Web		
html	Hypertext markup language; web pages and web applications	I, Q
Proprietary[3]		
dwg, dxf	Drawing, Drawing exchange; for CAD (computer aided design)	A
idml	InDesign markup language; can be used by InDesign	I, Q

[1] png files in Scribus are not directly transparent.
[2] Affinity exports eps, and also psd files compatible with Adobe, but not ps.
[3] Program-specific formats are aff (A), indd (I), qxp [qxd] (Q), and sla [scd] (S).

been built up over many years chiefly by the addition of modules, so that problems can arise not just within a module, but also if one of a series of chained modules is flawed, making a remedy difficult to find. Users report that the software sometimes crashes computer systems, especially those of moderate quality. Several problems have been encountered with cloud-based fonts, which may disappear. [They can be made available again by restarting the computer, or sometimes through more extreme measures.] Even so, the biggest "weakness" of InDesign for ordinary users—apart from the complexity of the program—is the ongoing cost.

QuarkXPress was the leading desktop publisher for many years (especially in the 1990s), and is still favoured by many long-time users, but it fell behind its competitors. However, the software is now updated regularly. Recent versions have brought significant improvements in functionality and in the user interface. A one-time purchase is available, although some users complain about the substantial cost of subsequent updates. QuarkXPress can produce a variety of quality outputs, including files for direct website use (html).

Scribus is highly regarded, especially by afficionados (including those with operating systems such as Linux), and is the best open-source desktop publisher. However, it has limited support and the help functions are incomplete. The interface of a new version released in 2025 has been improved, but it is still not notably user friendly. In particular, the interface lacks some of the instant adjustments available in other advanced programs. Such capabilities would assist users who are not fully familiar with the software, and make it easier to verify or adapt designs. Methodical organization is required to lay out the content efficiently, and users with limited experience are likely to find Scribus particularly frustrating. On the other hand, Scribus can produce excellent outputs, including those needed for commercial printing.

Affinity was recently made available free of charge, and at the same time three highly competent previous programs for publishing (layout), photos (raster), and graphic design (vector) were combined. Affinity can be used to prepare many kinds of documents, and is well suited to digital and printed scientific documents (although recent updates emphasize design components). It is almost as capable as InDesign for that purpose, and easier to use because it has a more intuitive and flexible user interface, and can edit images and design elements without the need for additional programs. A few InDesign features are not present in Affinity, but they are advanced features unlikely to be used by non-professionals, and Affinity has features (even for the layout aspects) that are not present in InDesign. For example, Affinity allows users greater flexibility to modify toolbars, and can set up toolbars and panels with any desired combination of tools.

Nevertheless, one or two capabilities important for scientific publications are not yet fully developed. In particular, Affinity uses a custom format for tables that does not allow them to continue across more than one page. Also, it cannot place or import tables from a manuscript prepared in Microsoft Word, nor copy sections of a table, but only the content of a single cell. It can place, but not edit, Excel files.[22] Despite such

[22] Future versions might include alternative table functions, because Affinity continues to develop (for example, automatic footnotes were added between versions 1 and 2 of Affinity Publisher).

difficulties, the software is free of charge and a leading choice in an advanced desktop publisher, even though it creates problems for users who have lengthy tables and are not prepared to use work-around solutions.[23]

In summary, these complex programs are highly competent (and regularly updated), but take considerable effort to learn. InDesign is very expensive and available only by subscription. QuarkXPress is also expensive, but there is a permanent option. It has many positive features (and can output files for web design and other products beyond formal publication), and recent versions are easier to use than InDesign. Scribus is open-source, but best used by people with experience of desktop-publishing programs, and also with computer expertise. Affinity is free of charge and relatively easy to use. It is effective for scientific publications, despite difficulties with long tables. Some further notes about these programs are included under *Problems and troubleshooting*.

It is worth repeating that for leaflets, brochures, some kinds of newsletters, and most other publications that do not have exacting layouts (or do not require full professional quality), many simpler programs are adequate, such as those mentioned under *Desktop-publishing programs and related software*. They can be evaluated by looking for the few features (among those listed in Table 7) that are essential for the given project.

[23] Feasible work-arounds are to split the Affinity table manually, or to import an image of each page after saving it at the desired size directly from Word.

Using desktop-publishing software

Introduction

This section shows how desktop-publishing programs can be used to implement all the design details of a publication. The recommendations pertain especially to scientific publications of high quality that require advanced software.

As with most publication-related matters, the best results come from attention to every specific aspect. Time will be saved if the source manuscript has been thoroughly copy edited to start with to remove errors and inconsistencies (see *Copy editing*).

Once the software has been chosen, those altogether new to desktop publishing may find it intimidating to learn. However, frustration decreases when the operation of the software is efficient. That requirement is met by learning how to construct a document, where to find common menu items, arranging tools or panels onscreen according to their frequency of use and the preference of users, memorizing common keyboard shortcuts, and using the software regularly for relevant projects.

After a first program has been mastered it is much easier to learn a new one if necessary, because so many of the needed operations (though not necessarily their implementation) are the same, despite the bother of overcoming habits that are no longer applicable.

Getting started

Three combined approaches are particularly effective while learning a program: consulting video and written tutorials and information; proceeding slowly and methodically to consolidate each fraction of the learned material before proceeding further; and actually using the program in detail rather than just finding out how to use it.

Instructional materials differ widely in quality. The web has many explanations that are not particularly easy to understand, even though they were prepared by people familiar with the software.

For those who prefer written communications over videos, or who have some experience with desktop publishing, manuals and help functions are informative (e.g., Adobe 2026b, Affinity 2026b, QuarkXpress 2026b, Schäfer and Pittman 2009 [help functions for recent versions of Scribus are accessed from the program]). They are especially useful to look up how to use an individual tool as the need for it arises—including operations that might not have been suspected.

Many treatments merely show how to produce a single kind of document, such as a brochure. Tutorials of that sort on individual aspects or outputs are available from manufacturers (e.g., Adobe 2026c, QuarkXPress 2026c), but many of these are more or less advanced. Some of the materials that were once available for Affinity Publisher have not yet been replaced, but help for the successor equivalent (Affinity layout studio) is given by Affinity (2026c), and the onscreen help function is user friendly.

However, a few helpful web tutorials for beginners make much of the basic material accessible, notably Scott (2019) for InDesign, and CLAX (2021) for Scribus. MacDonald (2023) covers Affinity Publisher, and that tutorial is still useful although the format of the new Affinity layout studio is significantly different. Tutorials for the new Affinity are starting to appear (though they emphasize design aspects), and more would be expected from individuals or from the manufacturer.

In any event, as emphasized above, it is essential to go though any guide or tutorial in short sections, repeatedly if necessary, and to use the software at the same time to consolidate knowledge of each feature as it is explained. It is also wise to aim for a defined product relevant to the area of interest, because—as the work proceeds—all of the needed tasks will have to be learned, and all of the problems that might be encountered will have to be solved, rather than deferred until later.

Keyboard shortcuts

Keyboard shortcuts greatly increase the efficiency with which desktop-publishing software can be used, because selecting simple actions from diverse command bars, drop-down menus, submenus, and panels is less convenient and much more time-consuming.

If someone learning a desktop-publishing program does not already know the common shortcuts (used for programs such as Microsoft Word, for example) they are well worth memorizing. Most of them work on both Windows and Mac computers, except for the keyboard differences: Ctrl on Windows is Cmd ⌘ on Mac, and Alt on Windows is Alt Opt [⌥] on Mac.

The most useful Windows shortcuts include:
Copy: Ctrl + C
Paste: Ctrl + V
Undo: Ctrl + Z [can be repeated]
Redo: Ctrl + Y [as in Scribus, but Ctrl-Shift + Z in Affinity and InDesign]
Cut: Ctrl + X
Select all: Ctrl + A
Save: Ctrl + S
Find: Ctrl + F

Other shortcuts, some of them found in software such as Affinity and InDesign, include:

Zoom in: Ctrl + + [=/+]
Zoom out: Ctrl + -
Zoom out all the way: Ctrl + 0
Place [opens directory for file placement in selected frame]: Ctrl-Shift + M in Affinity, Ctrl + D in InDesign

More specific options should be learned too. In particular, users should try to find shortcuts for the actions they use most commonly. As a rule, keyboard shortcuts are identified alongside the individual items in drop-down menus.

Specific shortcuts for some actions differ among programs. For example, a selected object or group can be duplicated with Ctrl + J in Affinity, Alt + Click in InDesign, Ctrl + D in QuarkXPress (but that is used for Place in InDesign, see above), and Ctrl-Alt-Shift + D in Scribus.[24]

Detailed recommendations for preparing a document

Introduction

The best way to prepare a document with desktop-publishing software is to follow a fixed sequence of steps, as listed in Table 9 and described in this section. A subsequent section briefly summarizes those steps for reference.

A fixed procedure ensures that nothing is forgotten. Otherwise, subsequent additions might create unnecessary work because the layout has to be changed or content re-imported. The features referred to here (such as master pages and layers) were outlined in *Choosing a desktop-publishing program*. Layout and typography were addressed under *Design of publications*. That information is repeated here only when deemed essential for clarity and to limit the need to look back at other sections.

Make a style sheet

Following the design is greatly assisted by building a style sheet for desktop publishing.[25] This document parallels the style sheet used for copy editing, but gives specific layout and typographic information, rather than text conventions.

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[24] How shortcuts facilitate routine operations is best demonstrated by an example. A set of matching picture frames with a text box to hold each caption can be created on a blank page in Affinity as follows. Such a scheme could be used to lay out a tidy page of figures, for example, or for a leaflet about publications that shows an image of each one with appropriate text.

Insert picture frame (on the selected page): F

Size and align it (e.g., in a column), or snap it to guides; the frame can be nudged with arrow keys.

Insert text box: T

Size and align it with the image frame.

Group objects (so that they can be moved or copied together): Click object [image frame] then hold Shift and click other object [text frame].

Duplicate the selection: Ctrl + J

Move the duplicate: Drag (still selected) from on top of the original group to be alongside or below it.

Repeat as necessary (for the original group, or for the larger group with the duplicate added).

Populate each image frame: Select frame; Ctrl-Shift + M; select a file

Doing the same thing using menu options instead of shortcuts would take much longer, because many additional cursor movements and clicks would be required, especially if individual items are copied instead.

[25] Not to be confused with the term Style Sheet used in some programs for the sets of typographic standards applied to individual blocks of text—see *Confirm typographic standards/Set up Type Styles* below.

Table 9. Recommended procedure for desktop publishing.

Recommended steps and actions	
1. Make a style sheet	**6. Add design features**
Prepare a desktop-publishing style sheet	Add graphic elements (e.g., horizontal rules, shading), or include in the next stage
2. Set up document	**7. Place and space tables, images, and other objects**
Create new document and establish basic layout	Add remaining objects into text, proceeding page by page
Set estimated number of pages	Space each object as you go
Set colour mode	Align objects (use guides, rulers, tab stops, or grids)
Choose import options	Wrap text (to flow neatly around other elements)
Choose default resolution	Adjust images and frames (e.g., size, cropping, resolution)
Set bleed if necessary	Adjust captions and credits (e.g., orientation, alignment)
Save document	Adjust spacing (e.g., respace text, resize images)
3. Establish the format	Review whole document
Create master pages (with page numbers, layout guides, and other repeating elements)	Record any new standards that were applied
Consider using templates (for some documents)	**8. Detect errors**
4. Import text elements in sequence	Check for sequence and completeness
Check that master pages are appropriate	Confirm typographic details
Finalize main text frames and link as required	Proofread several times
Insert preliminary material	Use automatic checks
Insert text	**9. Export**
5. Verify typographic standards	Select export file format
Confirm or adjust typographic choices (e.g., fonts, spacing)	Choose or verify output options (e.g., colour mode)
Set up Type Styles (to ensure consistency)	Export and name file
Mark location of non-text items	

Prepare a desktop-publishing style sheet. The sheet serves primarily for reference as the program is used to lay out content, ensuring that the publication will be consistent throughout. However, it also provides a means to transmit the layout structure directly to someone else, as opposed to simply providing them with the file of a publication laid out in the specified format. In addition, the settings can be applied on a different software platform. A sample style sheet is shown in the Appendix. Further details about each component were given under *Design*.

Set up document

The software will have default settings and preset combinations, but offer choices for layout and other parameters.

Create new document and establish basic layout. Measurement units, page size and orientation, margins, columns and the gutters between them (in some programs), and whether the document starts on a left-hand or right-hand page, can be selected.

Set estimated number of pages. Pages can be added or deleted later.

Set colour mode. Normally, either RGB or CMYK are selected (see *Colour* above).

Choose import options. Image files from external programs can be either embedded or linked in some programs. Linking allows changes made in the linked external file to be reflected in the document, while embedding creates a copy of each file within the desktop-publishing file. Embedding makes file management easier (unless embedded objects will be modified), but files can become very large when there are many images. If files are linked, archived copies need to be saved in packages that include both publication files and linked files.

Choose default resolution. For nearly all purposes, 300 ppi is the best selection, because it has enough resolution for printing (even if printing is not currently envisaged), without inflating the file size unduly.

Set bleed. Bleed is needed only in documents that will be printed in hard copy. It gives space along the page edges to allow for trimming during the printing process without loss of content, as required by a particular printer.

Save document. It is advantageous to keep a base copy with the chosen parameters before work on content begins.

Establish the format

Laying out each page is assisted by patterns and guides. Typical scientific publications are based on relatively rigid formal grids to align components, and on relatively conservative typography, such as the size and nature of headings.

Create master pages. Master pages (found in advanced programs) ensure consistent design and layout because the same master can be applied to multiple pages. They are especially useful for scientific publications, which strive for consistency. Master pages show the margins, and commonly include vertical and horizontal guides added by the user (see *Place and space tables, images, and other objects* below). However, it is possible to toggle between guide and no-guide views.

A header (or footer) can be set to number pages automatically. Masters can be set up to alternate the position and content of headers automatically on printed products, providing the “facing pages” arrangement is used when creating the document. Although text frames, image frames, and other items can be included on master pages, those that will need to be adjusted should not be added, because master-page formats cannot be edited on individual pages. Therefore, no item can be moved, resized, deleted, or modified unless the master itself is changed; but that will affect all pages with that master. However, an alternative master with the format that applies to a given page can be substituted. Therefore, additional master pages will be needed, such as one with no header for the title page.

Consider using templates. Templates are preset layouts that serve particular purposes; they consist of frames and other layout elements into which user content can be placed. Many scientific publications consist chiefly of text (and diverse figures) and have no need for layouts of that sort, but templates may give continuity to short documents like leaflets and brochures. A suitable template can be chosen, somewhat modified if necessary, and also saved for future use so that the same format can be populated by new content in future. Some programs allow pages with different templates to be pasted into a single document.

Import text elements in sequence

Text elements should be placed into the document first. Then the text should be finalized (see *Confirm typographic standards* below). Only after those steps should tables and other objects be added. Otherwise, parts of the document will certainly have to be respaced more than once. The work can be done in sections if preferred.

Check that master pages are appropriate. Each page should be based on an appropriate master (or template), although, as just noted, the master of a given page can be temporarily or permanently switched if necessary.

Finalize main text frames. Text frames on each page can be set to continue the text from page to page ("link frames"). In some software, columns are established within a frame (rather than during initial set up), using the Text Frame panel, or guides on the master page.

Insert preliminary material. Title, front matter about the publication, table of contents, foreword, abstract, or other preliminary material should be placed before the main text. Those pages may require different masters.

Insert text. Main text, list of references, appendices, and other text content should be added in order, ensuring that all pages, page numbers, and contents are correctly sequenced.

Confirm typographic standards

Typography must be consistent throughout, and features of the design (font styles and sizes, alignment and spacing, paragraph indents, and interline spacing) should be verified to ensure that they fit in well with the appearance of the document after the text has been prepared or imported.

Confirm or adjust typographic choices. Text, headings, tables, references, captions, and other components can be reviewed onscreen and modified if necessary for best appearance. Samples can be used to verify that the choices fit in with the potentially different page size, basic layout, and other features of the finished publication, and adjusted where needed. Finalizing text standards before more content is placed reduces the need for later respacing, as already noted.

Set up Type Styles. Advanced software allows sets of typographic standards to be saved as *Type Styles* (termed Style Sheets in some programs) so that they can be applied to

further sections of text. Each set should receive a simple unique name, such as Body, Major heading, Footnote, Caption, or Reference. The saved style includes paragraph and line spacing as well as type size and form. For example, different font sizes need different amounts of interline space. A larger space might be inserted after a higher rank of heading. (Normally, type styles do not include space before headings, allowing that space to be adjusted for layout purposes.)

Choosing all the parameters of each set early on helps to make the text consistent. It also facilitates a match between publications forming part of a series. All of these conventions should be recorded in one place for reference (see *Desktop-publishing style sheets*).

Many programs retain detailed settings from imported text. If so, some users prefer (once the typographic choices have been confirmed) to standardize formats chiefly in the word-processed manuscript rather than with Type Styles. The whole text can then be placed, and final adjustments made in the desktop-publishing program if required.

Mark the location of non-text items. When all the text is in place, the locations of tables, figures, and other content that will be interpolated can be temporarily marked. Highlighting the whereabouts of those items facilitates their later placement.

Add design features

The main aspects of design for scientific publications pertain to the visibility and ease of use of content, effected through hierarchy, page layout, and typography (see *Design of publications*). However, vector graphics can be introduced as further elements of design.

Most programs can add rules, straight and curved strokes, and shapes—with options for fill, texture, and colour—to documents. Complex designs, and images not related to specific content, are used in popular and advertising materials in an attempt to attract or engage the audience. In such instances, themes or branding may be added to master pages. More elaborate designs—such as intensely coloured or textured bars, arrows and other shapes, as well as unusual text or image frames, swirls of background colour, gradient effects, and text boxes or tables with coloured fill or patterned margins—are much less used in scientific publications, because they may obcure rather than add to the content. These features are easily overdone, even in informal newsletters.

Add graphic elements. Integral design graphics in typical desktop publications produced by scientists tend to be restricted to neat horizontal rules, modest shading, and other conservative additions intended to separate sections and assist users. Even so, they affect the layout and therefore might be added before the rest of the content. Most of them can be pinned at their places in the text so that they remain correctly positioned (see *Pinning* above). However, some users prefer to add design elements during the final page-by-page layout (see the following section).

Graphic elements can also be used as ancillary design features, at least in less formal publications, to ensure a pleasing appearance, act as visual cues to items of content, and serve as fillers during the spacing of page content—see *Adjust spacing* below.

Place and space tables, images, and any remaining objects

The main layout is completed by adding final content elements to the document.

Add remaining objects into text. Each item of content should be inserted in sequence, page by page, in its preferred location in the text. Minor adjustments such as local emphasis can be made at this time. Each table, image, and added text frame (used for image captions, credits, and pull quotes or sidebars, for example) is best put in a separate layer if the software allows it, a status that facilitates subsequent changes.

Space each object as you go. It is essential to establish the layout of each object and page as fully as possible before going to the next, to limit later respacing of the following objects or pages. Challenges on individual pages are dealt with under *Adjust spacing* below.

Align objects. Objects should be aligned to margins or other set guides. See *Page layout*/*Position of elements* in the *Design of publications* section for a few preferred alignments, such as the top of the page for tables and figures.

- Guides on master pages include margins, but columns, the preferred placement of images, and other alignment aids can be added (additional guides can be set in View/ Guides, from the text ruler, and in the form of a grid as noted below).[26]
- Rulers can be made visible along the periphery of the document (often through View/ Show rulers. or shortcuts such as Ctrl + R), and used for reference.
- Some programs provide a baseline grid to support consistent spacing. (It can be activated once it has been made visible from the View menu, for example.) However, unless the baseline grid of a given frame or paragraph is set to be ignored or disabled, text will stick to baselines, and the interline space will change. The best programs allow various grid formulations with automatic or custom spacing, which can be added to master pages if required. Some display smaller and smaller subdivisions of the grid interval as the zoom level increases.
- Most programs allow tab stops to be set (for example, by clicking and dragging on the text ruler, or from menus, e.g., Window/Text/Paragraph, or Type/Tabs). Tab stops help to indent individual text units consistently.

Wrap text. Text wrap causes the text to flow around a selected object. Displaced text will move outside an image, for example, and down the page or to the next linked text frame. The clearance between object and text can be set, to a precise distance in some software, for best appearance in that document. That distance should be standardized (as far as possible) for every object, and recorded for future reference.

Adjust images and frames. Many adjustments are available for images and their frames in advanced programs. Some software yields better raster image quality when the import size is larger.

- Images can be placed, with the same aspect ratio, to occupy the minimum area of the frame (empty areas remain), the maximum area (parts of the image are concealed), or

[26] Alternative master pages with multiple additional guides can be created to align design elements, or components such as complex Table entries. It may be best to put crowded horizontal and vertical guides on separate masters, because the content may be obscured if all of them are put on a single master.

with no fixed relationship (the user can adjust the fit). Fitting the whole image into an existing frame of different aspect ratio, however, causes distortion. The most versatile setting is no fixed relationship, which leaves all adjustments to the user.

- For layout purposes, the size of the image, its orientation, and how it is cropped can be modified. Some programs allow changes such as horizontal or vertical flips. However, most detailed adjustments in the image itself require image-processing software. Therefore, linked software is particularly useful, because the appearance of the document can be improved when a photo can be modified (for example, simply by increasing the vibrance) without the need to re-import it.
- Changing the size of an image affects its resolution (ppi). Reducing size increases ppi, and superfluous resolution can be reduced on export. However, increasing the size reduces resolution, which may lead to pixellation. Upsampling in an image processor reduces this weakness, but is not effective beyond a certain point because it merely interpolates pixels, inferring their hues from adjacent pixels using software algorithms.
- Frames can be used to size and crop images for best appearance. Therefore, a desktop publisher who is also the author may wish to import uncropped images. The size of both the image and its frame can then be changed in the document, a modification that may give better results than cropping images before they are imported.
- Already-framed images should not be used if possible (although the frame can be masked with a program frame), because resizing images will resize the fixed frames too, making their widths inconsistent within the document. (Program frames are set as strokes of fixed width, which are maintained independent of frame size.)

Adjust captions and credits. The spacing of image captions and credits should be consistent. Not all such standards will necessarily have been decided at the design stage, but all now need to be finalized. Details include: the width of captions (e.g., up to the width of the image frame) and their alignment (e.g., to the left-hand side of the image frame); the orientation of image credits (e.g., vertical beside the image, or at the end of the caption) and their alignment (e.g., beginning at the bottom of the image frame, to the right of the image, or toward the outside of the page, aligned within the credit frame to the same side as the image); and the exact distances from image frames to the text frames that contain captions and credits. (Those frames will not be made visible in the document, of course.) The distances should be set exactly from the measurements provided by the software, rather than estimated by eye.

Adjust spacing. The text flow of the continuing document should be monitored as each object is added. In particular, noticeable space should not remain where it is not needed, pages should not be crowded through insufficient space, and sections or subsections should not end with only one or two lines at the top of the page, nor start with only one or two lines at the bottom (although this is not always feasible). At the same time, essential relationships must be maintained, as between tables or figures and reference to them in the text.

- It is easier to add space than extra material on a given page, because a crowded layout must be avoided at all costs. However, a line can be added without any other changes by moving the bottom of the text frame for that page below the normal

margin. Likewise, a line or two can be subtracted from the page by the reverse move. Space can be decreased or increased modestly between sections, and space left at the end of a page that precedes a heading.

- Additional strategies that will not distract the reader include: changing the space below a table or image; adding a point or two of space between rows in a table to lengthen it; adjusting the relative sizes of table or text columns to lengthen one of them; changing the size of an image and its frame; increasing the text-wrap distance or the width of a narrow table to force away more text; adding a small space (e.g., 2 pt) between all of the paragraphs on a page that is too short; and leaving the bottom of a page empty before a major heading (even if that is not part of the design).
- It may be possible to solve a layout problem only by adjusting a number of preceding pages too. Adding space on each of those pages (using the techniques just noted) successively forces over content to end at a desirable place on the final page. Less commonly, text can be forced back modestly on multiple pages without compromising the layout.
- Ancillary design elements can be used, at least in relatively informal publications such as newsletters, to occupy unwanted space that is difficult to adjust in other ways. Potential fillers might include icons, silhouettes, images, separators, and even quotations, for example, as long as they are appropriate to the subject matter.
- Attempted changes can have undesirable consequences. For example, reference to a table or figure could move away from its target, which might have to be moved too, even to a different page. A footnote could be forced over with its reference, which might disrupt the continuity of the text. Several attempts to improve the layout of problematic sections may be called for.

Review whole document. When every page has been laid out in sequence, a review of the whole document confirms that every page has a good appearance.

Record any new standards that were applied. All additional spacing decisions should be recorded as they are made (see *Desktop-publishing style sheets*).

Detect errors

It is vital to check the document thoroughly before export.

Check for sequence and completeness. Items may have been misplaced or omitted during the layout stages. Any such faults can be remedied by verifying that all components are correctly sequenced, that every table and image has a caption, that captions are complete and correct, that necessary credits have been included, that internal references are accurately linked, and so on. Checking every word against the original manuscript would be the most comprehensive, but most onerous, check.

Check typography. Ensuring that typography is used consistently throughout requires attention to sections such as: publisher, copyright, and information about the author; headers, footers, and page numbers; text and text headings; the list of references; table titles and contents; figure captions and credits; footnotes; and added material such as a table of contents or an index. Using the program's Type Styles make these inconsistencies less likely—unless the wrong style has been applied inadvertently to a particular section of text.

Proofread several times. Proofreading the whole document meticulously several times will detect any remaining omissions, spelling mistakes, and other text errors including any remaining mismatched type styles. This work should be done with reference to the copy-editing and desktop-publishing style sheets, so as not to introduce inconsistencies. It is worth paying special attention to the difference between hyphen, en-dash, em-dash, and minus sign (see *Copy Editing/Special characters*). If any special characters (including bullets, arrows, letters that are accented or come from other languages) have not been transcribed correctly, they can be changed under glyphs (e.g., Type/Glyphs, or Window/Text/Glyph browser). It may be useful to enlist an additional proofreader to look for errors with a fresh eye.

Use automatic checks. Advanced programs can search automatically for layout problems, such as text that is hidden because it exceeds the boundary of its frame. These tools are called Preflight, for example.

Export

The file format and other relevant parameters are confirmed or selected when the file is exported. Some programs do not show all of the options—such as bleed for documents that will be printed—but they can be included during document setup or added afterwards by that route.

Select export file format. Documents are commonly exported as pdf files, but most programs offer other formats such as jpeg and eps. Files intended for commercial printers are frequently transmitted as high-resolution pdfs, but some companies prefer high-resolution images to be in tiff format. Some printers accept files directly from desktop-publishing software.

Choose or verify output options. Options include colour mode (if not chosen already during document setup), raster image resolution, downsampling images that exceed a certain ppi, and allowing jpeg compression. An option to include bookmarks and hyperlinks can be enabled. Common export formats are preset in many programs. Commercial printers will request material with specific settings (e.g., printers marks if any), in addition to CMYK colour, and appropriate bleed.

Export and name file. The file is easier to find or modify if it receives a meaningful name, preferably with a version number or date.

Summary of recommended procedure for desktop publishing

The detailed recommendations above can be briefly summarized as follows:

1. *Establish a desktop-publishing style sheet.* Prepare a style sheet with all details of layout, typography, images, and other elements, to ensure that the design remains consistent throughout. Update it if necessary as the work proceeds.
2. *Initial setup.* Create a new document and set its parameters, including page size, margins, and other output requirements. Save and title the document before beginning work.

3. *Establish the format*. Add master pages with headers, guides, and other arrangements to ensure consistency in repetitive elements. (For brochures, some newsletters, and some other documents, templates or wireframe skeletons with the basic layout can be used instead, but they are less often needed for scientific texts.)
4. *Import text elements in sequence.* Place main text elements in sequence after adding and linking frames to hold them.
5. *Confirm typographic standards*. Verify or adapt text parameters such as paragraph spacing and the hierarchy of font sizes and styles.
6. *Add design features.* Incorporate any integral design elements such as strokes, shapes, and colours. Those that repeat on each page, like rules below headers, are best included on a master page. Some can be added at the next stage if preferred.
7. *Place and space tables, images, and any other objects.* Add objects in sequence in the appropriate locations, in existing or new frames. After each addition, align, wrap text around, and adjust the spacing as needed for best appearance. Finally, review the spacing of the whole document.
8. *Detect errors.* Proofread carefully page by page, and use the pre-output layout checks built into many desktop-publishing programs.
9. *Export.* Output the product or its files in the required format.

Problems and troubleshooting

General problems include slow loading and computer crashes, although insufficient RAM, outdated drivers, faulty operating-system updates, and other computer weaknesses are at least as prevalent as issues caused by the programs themselves. Profusely illustrated documents, even short ones, can create problems because files might exceed 100 MB in the native format of advanced software, 15 times larger than a pdf file (even one without pdf reduction or optimization). File sizes are much smaller for documents that consist chiefly of text.

To speed up operation of the software, in fact, InDesign defaults to show images in low resolution, which may cause them to pixellate. [The higher resolution needed to work with scientific publications can be implemented under View/Display Performance, or Preferences/Display Performance.]

Some potential limitations in the software itself are irrelevant for many scientists, because they do not need all of the tools used by professional designers. However, users encounter difficulties in advanced programs, which are the most useful because they are so versatile.

There are several kinds of specific problems. First, operations are hard to grasp when they are not intuitive, and explanations are hard to understand. For example, in Scribus, Properties (appearance) and Attributes (characteristics) might be confused. Organizing tables in QuarkXPress causes particular problems for some people. Affinity is not well suited for tables that are long or were prepared with other software.

A related set of problems occurs when the user cannot work out how to do what they want. Most of them arise not because something does not work properly or cannot be done, but because it is difficult to find the required tool, or learn how to use it.

In some programs, context-sensitive options make relevant tools available onscreen; online help programs accessible from the software can assist too. However, sometimes the easiest way to find out how to do something that is difficult to find or to understand is to "ask" a search engine such as Google, rather than comb through the software or its Help function. Search results may answer general questions. For more specific problems, other users are likely to have encountered them (at least for programs that are widely used), and often their pleas prompt helpful answers online. Many popular programs have community forums about the software, although new users should make every effort before contributing to find a solution and to look for similar discussions.

When a proper solution is difficult to find, however, false substitutes should be studiously avoided. Stretching a font for emphasis or other reasons, for example—rather than changing the font or its tracking (space between letters)—engenders unwanted distortions because it alters the structure and weight of letters that were assiduously designed by the typographer.

A third set of problems arises because complex programs have so many features that users do not know about some of the settings incorporated into their work. In particular, default settings might not be noticed, which can lead to outputs with unexpected problems. For example, a potentially embarrassing quirk of Affinity is that an exported pdf is named from an internal label in the Affinity document, not from the file name. That label is the first file name given to the document, which is not changed if the document is modified, or used to produce another document with the same layout but on a different subject. Therefore, the exported pdf continues to label itself with the first name, even though it has been given a different file name to reflect the new version or subject. [Document names can be changed under Window/References/Fields.]

Last but not least, all programs have known weaknesses and potentially annoying characteristics. A few such problems, such as fonts that go missing in InDesign, were noted under the evaluation of advanced programs. Not all of the weaknesses can be overcome. Some versions of InDesign automatically generate "helpful" popup banners, but they cannot be permanently disabled and so continue to interrupt and slow down users.

What features are viewed as most troublesome depends mainly on the individual user. However, counterintuitive interfaces and unduly complicated menus are the main candidates.

Conclusions

Desktop-publishing software has become readily available and relatively easy to use, so that nowadays scientists can produce some kinds of publications themselves without outside help. Indeed, it is particularly satisfying to take responsibility for the production as well as the content of scientific work. The recommendations here provide a basis for generating publications of high quality.

Preparing a desktop publication begins with superior writing and editing. Subsequently, considerable effort is required to develop a document of professional standard, because desktop-publishing software does not "publish"; it serves only to make in-house publication feasible. The scientists using the software, in fact, must tidy up the manuscript by copy editing it, design a detailed layout for the publication, decide on a software platform capable of implementing that layout, and learn to use the program well enough to ensure that the output fully reflects the design.

Copy editing eliminates errors and inconsistencies in the data, the language, and the organization of the manuscript. Many minor errors can persist even after scientific review. Copy editing also standardizes every detail to ensure that the final product has polished content.

Data should be checked for simple careless errors, such as column entries in a table that do not sum to the total given for the column. Checks of the language serve to correct errors of grammar, which are particularly frequent in manuscripts that were prepared without sufficient care. Singular verbs with plural subjects, misused tenses, incorrectly used pronouns and prepositions, faulty punctuation, and many other faults can be identified by meticulous copy editing.

Verifying the organization of the manuscript ensures that a reader will be able to follow the content. Paramount here are accurate headings and numbering, internal cross-references and external citations that are correctly matched, and any essential definitions or explanations.

Standardization brings a wide range of minutiae, including abbreviations, numbers, capitalization, reference list formats, and many others into compliance with the specific features adopted for the publication. Implementing all of the standards is greatly assisted by preparing a style sheet for copy editing, which summarizes conventions for the work. It can be augmented as the work proceeds.

The style sheet includes published style guides and other resources selected as reference baselines. They are augmented by noting standards that differ from those of the adopted reference works, exceptions that apply in a few instances, selected items that do not appear in the guides, and other notes added by the copy editor about matters that are frequently consulted or hard to remember. Complex specifications are often included, notably examples of the different kinds of entries in the reference list.

The contents of the copy-editing style sheet should be organized into the categories, subcategories, and arrangements preferred by a particular copy editor. However, style sheets are not intended to be comprehensive. They list key examples, selected instances, and useful reminders, rather than many instances of each general rule.

Copy editing will be thorough if the editor follows a consistent sequence of steps, consulting the style sheet as needed. A first continuous read of the manuscript identifies potentially significant errors, which can then be followed up. Examination of factual

content looks for careless inconsistencies in data and for mismatches between text citations and reference-list entries.

More than one sentence-by-sentence read of the whole manuscript is needed to find errors of language, and to standardize punctuation and a wide range of other minutiae to match style-sheet conventions. Remaining inconsistencies can be checked with word-processor search functions. A final careful read of the whole manuscript verifies that it is now fully copy edited and ready for desktop publishing.

Design creates a detailed plan for the function and layout of the publication. Scientists can certainly design successful and attractive publications for scientific audiences by adhering to basic principles, and by understanding the many actions needed to implement them.

The content of a publication depends on the work it presents, but is most effective when the approach and complexity are appropriate for the target audience. The design also depends on how the publication will be made available. Most scientific desktop publishing aims for digital pdfs, printed volumes, or both.

Well-designed publications are easy for the reader to use because they are clearly and attractively laid out and completely free of errors, and the elements fit neatly together. In general terms, that means providing a hierarchy that the reader can follow easily, and making positioning, size, typography, and every other component as consistent as feasible.

In specific terms, good design calls for every aspect of individual pages to be deliberately planned: size, the space around individual elements, how blocks of text are structured, the location of illustrations, and a wide range of typographic details. Desktop-publishing programs give precise control of far more of these details than word processors do. Careful study of a program ensures that the options available can be coordinated to achieve the best appearance.

Examples of relevant parameters are the width of margins and columns (page-width text is often best for scientific publications), the choice of fonts (size, style, and emphasis), the space between lines, the distinctness of paragraphs, the alignment of text, and even the space between letters. However, only a few different fonts should be used in a given publication. Otherwise, pages are busy, messy, or distracting rather than attractive.

Rendering images properly needs specific attention. Illustrations in scientific works are not decorations but primary content to be organized and integrated with the text. Therefore, they must be of high quality.

In addition, the use of colour should be planned. General colouration should not be overdone in scientific works, but colours need consistency as well as sufficient contrast. Flashy covers, titles, and headings designed primarily to attract readers are unnecessary. Conciseness, legibility, relevance, and aesthetics are more important.

Choosing an appropriate software platform depends on deciding which features—from a potentially bewildering array—are needed to produce the publication(s) envisaged. In particular, the time that must be taken to learn how to use a complex program will be rewarded only if a much simpler program would not suffice for the job at hand.

In complex programs, layout tools that give maximum flexibility to the user might include master pages to favour consistency, frames to receive content, independent layers that allow versatile arrangements, guides for alignment, and ways to associate components.

Automatic page numbers and footnotes, and links to other sections or to web references, help readers to navigate information-rich documents. A wide variety of fonts and graphics, and great ability to modify and position text, illustrations, and the content of tables, are valuable assets. So too is the option of saving sets of typographic features (such as the specific font and spacing of headings and body text) for consistent reuse.

Capabilities to handle imported images include independent adjustment of images and their frames, and the ability to resize and edit them. Variety and adjustments of colour, what file formats can be imported, and file exports in various configurations (depending how the output will be produced) facilitate the production of final publications.

Simple programs should be chosen if they are powerful enough, although they are seldom adequate for scientific publications of high quality. Most important in advanced programs are intuitive interfaces that behave as the user expects and are easy to follow, diverse but simple keyboard shortcuts, rapid access to common tools, and easy links to other programs.

A few advanced programs that have the majority of the features just mentioned are briefly reviewed in this article. Their cost varies widely, and the most expensive—available only through an annual subscription of several hundred dollars—may not be worthwhile for individuals and small organizations.

Using desktop-publishing software is efficient only if the operator knows how it works. First, diligent study of the program will limit future frustration. Working slowly through tutorials and other materials to consolidate knowledge about one aspect at a time, whilst producing a test document, helps a student to assimilate what has been learned. Second, knowledge of frequently used keyboard shortcuts—both universal ones and others specific to the software—is needed for efficient use.

Many precise details of layout, typography, and other standards are incorporated into each document. Therefore, a desktop-publishing style sheet should be prepared for reference, listing the practices to be followed.

Implementing them all is best assured by following a fixed procedure so that nothing is overlooked. An appropriate procedure first establishes the document by setting the initial parameters, staffs it with items that repeat on successive pages, and adds guides that help to align content.

The order in which content is imported matters a great deal, in order to minimize subsequent time-consuming adjustments. Introductory pages should be set up first. Then the main text can be imported and set to flow from page to page. All typographic standards should be verified against the design, and adjusted if necessary.

Graphic design elements are relatively limited in scientific publications, but any enhancements such as rules, shading, or logos can be placed—now or during the next stage—at their locations in the text.

The layout is completed by bringing in remaining content. Each table, figure, text box or other element should be added and spaced in strict sequence, and every page laid out entirely before the next one, to reduce the number of later changes. A pleasing overall appearance is created by proper alignment of text, captions, and other items, by allowing adequate space between text and inserted objects, by choosing concordant image sizes, and by avoiding crowding or unsightly spaces. Page spacing can be manipulated in several ways described here.

Once the layout is complete, the whole document should be reviewed to verify that no content has been omitted, that everything is in the correct sequence, and that typography is consistent. Diligent proofreading, and deploying automatic software tools—included in advanced programs to flag errors in the layout such as text that does not fit into its frame—complete the necessary checks. Finally, all export formats should be verified before the files for publication are generated.

Every user encounters difficulties with desktop-publishing software. Programs that are not intuitive make it particularly hard to find out how to do something. In any event, discovering a procedure simply by sorting through the many options, menus, and submenus often takes a long time. Default settings that the user does not know about lead to unwanted features. Online searches (rather than built-in help functions) often yield specific solutions quickly.

In summary, paying attention to all of the tasks discussed in this article allows individual scientists to produce scientific publications successfully. The undertaking is feasible in part because it focusses on how best to present accurate scientific content to other scientists, unlike most popular publications, which aim to attract potential purchasers through striking or artistic designs and commercial promotion.

Even so, both scientific and popular publications must take account of design and layout criteria such as tidiness, consistency, logical hierarchy, balance, and flow. Those demands can be met if the publication has been thoughtfully designed, a desktop-publishing program suitable for the product has been acquired, and the user is sufficiently familiar with its operation.

In other words, fault-free publishing requires concentration throughout, with fanatical attention to detail! Therefore, each phase of the work—copy editing, design, and composing and producing the final document—is best carried out through a fixed sequence of focussed steps, along with constant checking and verification.

That approach, explained in this article, ensures that nothing is overlooked. It makes certain that every desktop publication does justice to its scientific content.

References

[All links were verified on 2 January 2026; current websites are cited as 2026]

Adobe. 2026a. InDesign. Goodbye tedious work, hello creativity. adobe.com/ca/products/indesign.html

Adobe. 2026b. Welcome to the InDesign user guide [last update 2023]. helpx.adobe.com/ca/indesign/user-guide.html

Adobe. 2026c. Learn InDesign [tutorials]. adobe.com/ca/learn/indesign

Affinity. 2026a. Affinity by Canva. https://www.affinity.studio/

Affinity. 2026b. How can we help?; Browse by topic. https://www.affinity.studio/help/

Affinity. 2026c. Affinity Page layout. https://www.affinity.studio/page-layout-software

Barber, K. (Ed.). 2005. Canadian Oxford Dictionary, 2nd edition. Oxford University Press. 1830 pp. [Online version available to institutions at https://www.oxfordreference.com/]

Bringhurst, R. 2013. The elements of typographic style. 4th edition, Hartley and Marks, Vancouver. 398 pp.

Butcher, J., C. Drake, and M. Leach. 2012. Butcher's copy-editing. The Cambridge handbook for editors, copy-editors and proofreaders. 4th edition. Cambridge University Press. 543 pp.

Butterick, M. 2026. Butterick's practical typography. 2nd edition. https://practicaltypography.com/

CLAX. 2021. Scribus tutorial series, 00–24 [about 3 hr total]. Getting started with Scribus. https://www.youtube.com/watch?v=ptFCHUNZVtU et seq.

CSE Manual. 2024. The CSE manual, 9th edition. Scientific style and format for authors, editors, and publishers. University of Chicago Press. 880 pp. https://www.csemanual.org/Home.html [Online 8th edition of Scientific style and format at https://www.scientificstyleandformat.org/Welcome.html]

Danks, H.V. 2023. Wider aspects of a career in entomology. 26. Evolution of the Entomological Society of Canada. pp. 1–77. Available at https://esc-sec.ca/wp-content/uploads/2023/12/Danks-26.-Evolution-of-the-Entomological-Society-of-Canada.-20231202.pdf

Danks, H.V. 2024. How to write scientific papers. pp. 1–49. https://doi.org/10.7939/r3-0vzm-nj50

Danks, H.V. 2025. Editing scientific publications. pp. 1–36. https://doi.org/10.7939/51516

Felici, J. 2012. The complete manual of typography. A guide to setting perfect type. 2nd edition. Pearson-Peachpit. 372 pp.

Indeed. 2025. What is desktop publishing software? (plus 15 examples). https://ca.indeed.com/career-advice/career-development/desktop-publishing-software

MacDonald, D. 2023. Affinity Publisher for beginners, Free course (1hr.18.11). Envato Tuts+ https://www.youtube.com/watch?v=tLtGOUSQjAY

Microsoft Publisher. 2026. Microsoft Publisher. https://www.microsoft.com/en-us/microsoft-365/publisher

MLA Handbook. 2021. MLA Handbook, 9th edition. Modern Language Association of America. 400 pp.

QuarkXPress. 2026a. QuarkXPress Desktop publishing and page layout software. https://www.quark.com/products/quarkxpress

QuarkXPress. 2026b. QuarkXPress 2026 user guide. https://www.quark.com/documentation/quarkxpress/2026/english/A%20Guide%20to%20QuarkXPress%202026/

QuarkXPress. 2026c. QuarkXPress tutorials. https://www.quark.com/quarkxpress-tutorials

Schäfer, C., and G. Pittman. 2009. Scribus: Open-source desktop publishing. The official manual. FLES books. 452 pp.

Scott, D.W. 2019. InDesign for beginners, Free course (2hr.24.15). Envato Tuts+ https://www.youtube.com/watch?v=RXRT3dHu6_o

Scribus. 2026. Scribus. Open source desktop publishing. Scribus is the go-to Libre desktop publishing application. https://www.scribus.net/

Shaikh, A.D., and B.S. Chapparo. 2005. The effect of line length and passage type on reading speed, comprehension, and user satisfaction. https://www.researchgate.net/publication/250841956

Termium Plus. 2026. [Government of Canada terminology data bank.] https://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng

The Canadian style. 2026. The Canadian style: a guide to writing and editing; revised and expanded. Canada. Public Works and Government Services Canada, Translation Bureau. pdf available at publications.gc.ca/site/eng/9.889618/publication.html 312 pp. [Last modified 2026; initially published in hard copy as Publication S2-158/1996E 256 pp.]

WordPress. 2026. WordPress, done right. wordpress.com/

List of Tables

Appendix. Sample style sheet for desktop publishing, reflecting the detailed design of the publication. This list shows the main standards used for this article, and others that would apply to figures if they had been included. Units are included here for clarity, but normally would not be necessary.

Item	*Dimensions*
Page layout [size B5]	*mm*
Page width	176
Page length	250
Margins	Left 18, Right 18; Top 20, Bottom 20
Type width (1 col)	140 [18–158]; target 88 cpl [characters per line]
Page middle	88 [70 from type edge]
Type length	210 [20–230]
Fonts and strokes	
Start and stop bars	8 pt stroke, round cap; and 1 pt stroke, black, full width *(18–158 mm)*
Header (name+title on L)	Times New Roman 9 bold
[No footer]	
Page numbers (header top R)	Times New Roman 9 bold
Rule below headers	1.5 pt stroke, black, full width *(18–158 mm)*
Title	Times New Roman 20 bold
Subtitle	Times New Roman 16 bold
Author	Times New Roman 16 bold
Abstract	Times New Roman 10, interline 12
Page 1 citation and Creative Commons info	Times New Roman 10 ital, interline 12
Author biography if included	Times New Roman 10 ital, interline 12
Table of contents	Times New Roman 10; label bold caps; main entries bold, and numbers regular; interline custom for arrangement
Abstract	Times New Roman 10, interline 12
Text	Times New Roman 11, interline 13
Headings in text	Times New Roman: Major heading 14 **bold** centre*, at least* 6 pt space below; Heading 12 **bold**, left, 3 pt space below; Subheading 11 ***bold ital,*** left, 2 pt space below; Subsubheading 11 *ital*, left, followed by a period and on same line as text, no space below
References	Times New Roman 10, interline 12
Tables	Times New Roman 10, interline 12
Footnotes	Times New Roman 9, interline 11
Figure captions	Verdana 8
Further caption notes if any	Verdana 8 (but Verdana 6 if needed for spacing)
Image credits	Verdana 6 [vertical]
Guides	*mm*
Vertical *(from L edge of page)*	Master for text frame placement:18 (L margin), 65 (one third), 88 (centre), 112 (two thirds), 158 (R margin) Master with extra guides for image placement (see below): 18 (L margin), 23, 28, 38, 63, 68, 78, 88 (centre), 98, 108, 113, 138, 148, 153, 158 (R margin)
Horizontal *(from top edge of page)*	Standard master: 20 (top margin),75 (one third),125 (middle),175 (two thirds), 230 (bottom margin) Master for custom alignments: every 4–5 or as needed

(Continued)

Appendix *(continued)*. Sample style sheet for desktop publishing, reflecting the detailed design of the publication.

Item	*Dimensions*
Spacing [font info repeated here for Tables and Figures]	[But adjusted if needed for layout]
Alignment	Left (unless noted otherwise)
Paragraph indent, text	First line, 4 mm
Examples or subsub headings	Hanging, 3 mm
Kerning	Standard for font
Minor text separators	2–3 pt
Examples set off in text	Hanging 3 mm; 6 pt before, 6 pt after
Space below headings in text (repeated above in Fonts and strokes /Headings in text)	Major heading at least 6 pt, Heading 3 pt, Subheading 2 pt, Subsubheading none
Space between hanging paragraphs in text	4 pt
Footnotes	Times New Roman 9 pt, interline space 11 pt [First line indent 0, minimum gap before 18 pt, 0.6 pt rule with 2 pt vertical offset, gap between 2 pt]
References	Hanging 3 mm, Times New Roman 10 pt, interline space 12 pt
Captions	Verdana 8 pt, align L edge of frame, 2.5 mm below frame
Further caption notes	Verdana 8 pt (but Verdana 6 if needed for spacing)
Image credits	Verdana 6 pt, vertical, align start of credit with bottom edge of frame. *Left*: vertical text alignment bottom; align 1 mm from frame *Right*: vertical text alignment top; align 1 mm from frame
Text wrap	Normally tight, 2 mm
Tables	
Title	Times New Roman 10 pt, interline 12 pt
Column titles	Times New Roman 10 pt *ital*, interline 12 pt
Body	Times New Roman 10 pt, interline 12 pt, hanging 3 mm
Headings within table	Times New Roman 10 pt, interline 12 Bold or ital if needed for different ranks; additional rank indents if needed 2 mm
Cell insets [distance of cell content from border]	Left 0, Right 0; Top 1 mm, Bottom 1 mm; unlinked
Rules	Horizontal rules only, top and bottom of table 1 pt, Intercell 0.6 pt, and only if essential for clarity
Inter paragraph space	4 pt; 2 pt below main heading
Appendix	Same as Tables, but interparagraph spacing 1 pt not 4 pt
Colour	sRGB-8
Images	
Picture frame	0.6 pt. black
Picture frame settings [how image is fitted in the frame]	None [no automatic resizing or change in aspect ratio of the original image]

(Continued)

Appendix *(continued)*. Sample style sheet for desktop publishing, reflecting the detailed design of the publication.

Item	*Dimensions*
Image width and placement	*mm*; change sizes, ratios, and guides if needed for layout and spacing; equalize portrait and landscape sizes at 4:3[1]
Portrait 45 W	L margin to 63 [18 + 45] *or* 113 to R margin [158 − 45]
Double portrait joined 90 W	L margin to 108 [18 + 90] *or* 68 to R margin [158 − 90]
Two portraits opposite with captions between (separation 50 mm)	L margin to 63 [18 + 45] 113 to R margin [158 − 45]
Landscape 60 W	L margin to 78 [18 + 60] *or* 98 to R margin [158 − 60]
Double landscape joined 120 W	*Centre*: 10 from L margin (28) and from R margin (148) [18 + 10 + 120 + 10 + 18 = 176] *Left:* Margin to 138 [18 + 120] *Right:* 38 to Margin [158 − 120]
Two landscapes opposite with centre gutter	*20 mm gutter*: L margin to 78, 98 to R margin *10 mm gutter*: 5 from L margin (23) and from R margin (153) [18 + 5 + 60 + 10 + 60 + 5 + 18 = 176]

[1]An aspect ratio of 4:3 is common for figures in scientific publications.