

Advice for German Writers of English Scientific Prose

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1 Introduction

As one of only two native English speakers at my workplace, I am frequently called upon to proofread and correct scientific and technical articles written by my German colleagues. Over time I have noticed that certain types of errors tend to occur particularly frequently; oftentimes these mistakes can be traced to a misapplication of German writing rules to English. I have therefore prepared this short guide to English technical and scientific writing directed specifically to German speakers. It addresses common translation problems plus some important differences between German and English punctuation and diction. I have also endeavoured to indicate some differences in usage between American and British English.

The reader should note that the descriptions and recommendations presented in this document are not meant to be taken as the final word on what is correct. Like every other language, English is largely arbitrary and is constantly changing and evolving. What may be an inviolable rule to one writer may be bendable to another, and may be completely wrong to yet another writer. When in doubt as to which style to use, consult your publisher or the style sheet he or she has provided. If you are self-publishing, as on a web page, then what style you adopt is not so important as simply choosing one style and applying it consistently.

2 Punctuation, spacing, and general typography

There are a number of important differences between punctuation as used in German and as used in English. In particular, there are a few punctuation marks which exist in English but not in German. Table 1 summarizes possibly unfamiliar English punctuation and indicates how to produce each symbol in \LaTeX , HTML, and Microsoft Word.

2.1 Ampersand

The ampersand ($\&$) means “and”, but only in the context of company names and lists of authors. In all other contexts the word “and” should be spelled out in full.

Incorrect	Correct
We programmed in C & Java.	We programmed in C and Java.

2.2 Comma

In English the use of commas (,) is largely a matter of personal style. However, it is never correct to put a comma before a subordinating clause introduced by a subordinating conjunction, or between two main clauses.

Symbol	Name	L ^A T _E X	HTML	Word
—	em-dash	---	—	Ctrl+Alt+Num -
-	en-dash	--	–	Ctrl+Num -
-	hyphen	-	-	-
-	minus sign	-\$	−	Equation editor ^a
×	times symbol	\$\$\times\$	×	Alt+0215
“ ”	double quote marks	‘ ’	<q> </q> ^b	" " ^c
‘ ’	single quote marks	‘ ’	<q> </q> ^b	’ ’ ^c
&	ampersand	\&	&	&
...	ellipsis	\ldots	…	Ctrl+Shift+.
£	pounds	\pounds	£	Alt+0163
¢	cents	\textcent ^d	¢s;	Ctrl+/, C
§	section symbol	\S	§	Insert→Symbol ^e
¶	pilcrow symbol	\P	¶	Insert→Symbol ^e
	non-breaking space	~	 	Ctrl+Shift+Space
	thin space	\,	 	Insert→Symbol ^e

^aWord provides no facility to enter this symbol outside the equation editor. However, many people choose to substitute the en-dash for the minus sign in running text, in which case it should be surrounded by thin space.

^bAccording to the HTML 4.0 standard, the <q> element produces quotation marks appropriate for the document’s given language. However, support for this element is poorly implemented in many browsers. For this reason most people choose to use single or double tick marks (’ ’ or " ") instead when writing English.

^cIn its default configuration, Word should convert single and double tick marks to proper quotation marks. In the English version it may be necessary to turn on the “Smart quotes” feature from the Tools→AutoCorrect dialog.

^dRequires the `textcomp` package.

^eBy default Word does not bind a keystroke combination to this symbol. However, it is possible to add your own custom keystroke combination in the Insert→Symbol dialog.

Table 1: English punctuation

Incorrect

I know, that he’ll come.
Our method has been criticized, despite this we will continue to improve it.

Correct

I know that he’ll come.
Our method has been criticized; despite this, we will continue to improve it.

Many writers prefer to put a comma before the last item in a list. This often helps disambiguate confusing or unintendedly humorous juxtapositions.

Ambiguous

We ate eggs, ham, peanut butter and fish sandwiches.

Unambiguous

We ate eggs, ham, peanut butter, and fish sandwiches.

2.3 Ellipsis

The ellipsis (...) is used to indicate text omitted from a quotation. In scientific writing it should not be used to indicate a pause or to terminate

lists as a substitute for “*etc.*” Note that the ellipsis is its own symbol; it is more widely spaced than three periods (...).

Julius Caesar once said, “I came, . . . I conquered.”

2.4 Emphasis

To indicate emphasis in English, use italicized text (see §2.7). Indicating emphasis with all-uppercase, underlining, boldface, or quotation marks are all hold-overs from the days of typewriters and should never be used with modern word processors and other document preparation systems. Also, the older German practice of increasing interletter spacing (like `l i k e t h i s`) is never used in English.

2.5 Exclamation mark

Use of the exclamation mark (!) is considerably more restricted than in German. Do not use the exclamation mark for commands unless you mean to indicate that they are shouted.

2.6 Hyphen, minus sign, and dashes

In German, there are only two forms of dashes: the short *Bindestrich* or *Divis*, and the longer *Gedankenstrich* (also called *Halbgeviertstrich* or *Von-Bis-Strich*). In English orthography, there is an important *four-way* distinction among such horizontal lines:

- The *em-dash* (—) is a long dash, about the width of an uppercase M, and is used to set off parenthetical comments.

Early computerized writing assessors focused on mechanical properties—grammar, spelling, punctuation—and on simple stylistic features.

Whether to insert space around em-dashes is a matter of style. If you do insert space, however, be sure that a line never begins with a dash. You can ensure this by using a *non-breaking space* before the dash and a regular space after the dash.

- The *en-dash* (–) is a medium dash, about the width of an uppercase N, and is used to specify ranges, or for compounds of names or other words of the same part of speech. In these cases, there is never any space around the en-dash.

Flavius XVII (1327–1409) was a fictional pope.

The Church–Turing thesis has nothing to do with minimum–maximum problems.

Many British printers use an en-dash with surrounding space where American printers would use an em-dash. This is closer to the German usage of the *Gedankenstrich*.

Early computerized writing assessors focused on mechanical properties – grammar, spelling, punctuation – and on simple stylistic features.

Again, ensure that a line never begins with an en-dash by making the leading space non-breaking.

- The *hyphen* (–)—technically not a dash—is a very short horizontal line used to join words of different types, or prefixes to stems.
- In proper typesetting, the minus sign (−) is distinct from the hyphen and en-dash; it is used only to indicate subtraction and negative numbers.

2.7 Italics

Italics are used for emphasis, and also to set foreign terms (including German words). Whether to italicize commonly-used Latin abbreviations is a matter of personal preference.

We had a *tête-à-tête* at the *Deutsche Bahn* headquarters.

2.8 Multiplication symbol

To indicate multiplication or scaling, use the multiplication symbol (\times), or spell out the appropriate word, such as “by” or “times”. The asterisk (*) and the lowercase **x** are incorrect in this context.

Incorrect	Correct
The screen resolution was 640x480.	The screen resolution was 640×480.
The hole measured 15 mm * 27 mm.	The hole measured 15 mm by 27 mm.

2.9 Quotation marks

In technical writing, double quotation marks (“...”) always come in pairs. They look like miniature versions of the numbers 66 and 99 and are always printed at the top of the line. German-style quotation marks („...“ or »...«) are always incorrect, as are double tick marks (“...”). (The latter should be used only in monospaced fonts and in program code.) In American English, double quotation marks are used for the following purposes:

- to report speech

“You’ve all done very well,” he said.

- to indicate questionable or idiosyncratic usage

We can think of x as a sort of “pseudo-pointer”.

- to set the names of articles in journals and magazines

“C99: a novel approach to text segmentation” was published in the *Journal of Artificial Intelligence*.

In British English, single quotation marks (‘...’) are usually used instead of double quotation marks for the above purposes.

The following uses of quotation marks are *incorrect*:

- to set section titles in a paper

Incorrect	Correct
“Results”	Results

- for emphasis

Incorrect	Correct
Albert Einstein was a “very” important physicist.	Albert Einstein was a <i>very</i> important physicist.

2.10 Quotations

Short quotations from third parties should be set in single or double quotation marks as described in §2.9. For quotations longer than a couple lines of text, do not use quotation marks, but rather widen both margins for the entire quotation:

Bertrand Russell, the notable British philosopher and mathematician, is rumored to have remarked,

[The] kind of philosophy that I value and have endeavoured to pursue is scientific, in the sense that there is some definite knowledge to be obtained and that new discoveries can make the admission of former error inevitable to any candid mind. For what I have said, whether early or late, I do not claim the kind of truth which theologians claim for their creeds. I claim only, at best, that the opinion expressed was a sensible one to hold at the time.

2.11 Section and paragraph symbols

In English, § is used to refer to numbered sections, whereas ¶ is used to refer to numbered paragraphs. Note that this is the reverse of most European usage. When referring to multiple sections or paragraphs, the symbols §§ and ¶¶ are used. Unlike in German, it is not usual to insert a space between the symbol and the number.

Please refer to the results in §4.3.1.

This theory is discussed in §§8–12.

2.12 Slash

Slashes (/) are used to specify alternation, and to separate numbers in numerically written dates. Note that there is no space around a slash.

Incorrect	Correct
I want a cat and / or a dog.	I want a cat and/or a dog.

3 Numbers, time, and measurements

3.1 Numbers

In informal writing, the period or full stop (.) is used as the decimal point and the comma (,) is used as the thousands separator for numbers to the left of the decimal point. In scientific writing it is permissible to follow the SI convention and use a *thin space* as the thousands separator for digits to the left or right of the decimal point.

Incorrect	Correct
1.234.567,890	1,234,567.890
1234567.890	1 234 567.890

American and British English have different vocabularies for describing powers of ten; the first few terms are summarized in Table 2. Confusingly, there is currently a trend in British English to adopt the American usage. To avoid ambiguity many writers always use the unambiguous term *thousand million* for 10^9 . For higher powers of ten, it is usually best in scientific writing to write the number numerically in scientific notation.

3.2 Dates

In American English the day is written after the month and is separated from the year with a comma. In British English the day is written before the month; unlike in German, there is no period following the day. In neither case is it necessary to write the ordinal after the day (*e. g.*, 3rd June, August 12th). Also, it is rare to prefix a 0 to single-digit days and months.

American	British	power of 10
million	million	10^6
billion	milliard, thousand million	10^9
trillion	billion	10^{12}
quadrillion	thousand billion	10^{15}
quintillion	trillion	10^{18}

Table 2: English names for powers of 10

When the entire date is written out numerically, the slash (/) is usually used as a separator. Less commonly one sees hyphens (-) or en-dashes (–); unlike in German, periods (.) are never used. In scientific writing it is permissible to format numeric dates as per the ISO 8601 standard¹—*i. e.*, YYYY–MM–DD, with leading 0s in the case of single-digit days and months. This format is especially appropriate when addressing an international audience which may contain both British and American readers.

- American English

July 6, 2004
7/6/04

- British English

6 July 2004
6/7/04

- ISO

2004–07–06

Traditionally the abbreviations **B.C.** (*Before Christ*) and **A.D.** (*Anno Domini*) were used to refer to dates before and after the beginning of year 1, respectively. However, the modern trend in secular writing is to use the religion-neutral terms **B.C.E.** (*Before Common Era*) and **C.E.** (*Common Era*). Both abbreviations follow the year. These religion-neutral terms do not carry the social stigma some Germans feel accompany use of the equivalent **v.u.Z.** and **u.Z.**

The science of information retrieval began in 543 B.C.E., when...

¹<http://www.cl.cam.ac.uk/~mgk25/iso-time.html>

3.3 Time

The 24-hour clock is not widely understood in American English, but it should be acceptable for scientific writing. As per ISO 8601, separate hours, minutes, and seconds with a colon (:). Do not use a period (.) as was formerly specified by DIN 5008 before May 1996.

The experiment was concluded at 23:59.

3.4 Currency

For currencies with their own special symbols, the symbol generally comes *before* the amount, with no intervening space. If the currency has no symbol, use the standard ISO 4217 abbreviation² instead. In running text it is also permissible to write the name of the currency out in full *after* the amount.

- \$10,345.88
- £10,345.88
- €10,345.88
- NOK 10,345.88
- 10,345 Norwegian Krone

Subdivisions of currencies, such as the abbreviation for *pence* (p) and the symbol for *cents* (¢), come *after* the amount.

We estimate a cost of 15¢ per user.

Volunteers were paid 27p per word.

Note that it is *incorrect* to use a dash (—) to indicate an exact figure:

Incorrect	Correct
€10,345.—	€10,345.00

3.5 Measurements

In scientific writing, format measurements as per SI guidelines³.

4 Diction

4.1 Abbreviations

With a few exceptions, English generally uses Latin for commonly-used technical abbreviations. Those most commonly seen in scientific writing are summarized in Table 3. Traditionally, Latin abbreviations have been printed in

²<http://www.xe.com/iso4217.htm>

³<http://www1.bipm.org/en/publications/brochure/>

Abbreviation	Expansion	Meaning	German term
A.D.	<i>anno domini</i>	in the year of our lord	n.Chr.
B.C.	<i>before Christ</i>	before Christ	v.Chr.
B.C.E. ^a	before common era	B.C.	v.u.Z.
<i>c., ca.</i> ^b	<i>circa</i>	about	ca.
C.E. ^a	common era	A.D.	u.Z.
<i>cf.</i> ^c	<i>confer</i>	compare with	vgl.
<i>e. g.</i> ^d	<i>exempli gratia</i>	for example	z. B.
<i>et al.</i>	<i>et alia</i>	and others	et al.
<i>etc.</i>	<i>et cetera</i>	and so on	usw.
<i>ff.</i> ^c	<i>folios</i>	and the following (pages)	f., ff.
<i>ibid.</i> ^e	<i>ibidem</i>	same as previous reference	a. a. O.
<i>i. e.</i> ^d	<i>id est</i>	that is	d. h.
<i>N. B.</i>	<i>nota bene</i>	note well	N. B.
p.	page	page	S.
pp.	pages	pages	S.
<i>q. v.</i> ^c	<i>quod vide</i>	see elsewhere	s. d.
<i>viz.</i>	<i>videlicet</i>	namely	nämlich, d. h.
<i>vs.</i>	<i>versus</i>	versus	im Vergleich zu

^aOften preferred to B.C. and A.D. in secular writing.

^bNormally used only with dates.

^cNormally used only inside parentheses.

^dNormally used outside a main clause and followed by a comma.

^eNormally used only in footnotes and endnotes.

Table 3: Abbreviations used in English

italics, though many publishers now prefer to set them in standard roman type. As with their German analogues, there is a thin space after the first periods in *e. g.*, *i. e.*, *N. B.*, and *q. v.*

Be careful not to overuse Latin abbreviations, or you will come across as stuffy and pretentious. For instance, instead of using *i. e.* several times in a row, try substituting “that is”, “that is to say”, “in other words”, “namely”, *etc.*

4.1.1 *c.*, *ca.*

As in German, *c.* and *ca.* mean “about” or “around”. However, it is unusual in English to use them, or their expanded form *circa*, for anything other than dates. For measurements and other contexts, it is usually better to write “about”, “around”, or “approximately”.

4.1.2 *cf.*

The abbreviation *cf.* means “compare”, not “see there” or “for example”. It should be used only when you wish to indicate a distinction (or, more

rarely, a similarity) between something you have just said and something you are referencing.

Incorrect	Correct
There are several functional languages (<i>cf.</i> Lisp).	C is an imperative language (<i>cf.</i> Lisp, which is functional).

4.1.3 *e. g.* and *i. e.*

Many publishers prefer that the abbreviations *e. g.* and *i. e.* be followed by a comma, since a comma would usually be necessary had the expanded forms “for example” or “that is” been used. Unlike in German, it is extremely rare for these abbreviations to be used in a main clause; they should generally be set off from the main sentence using parentheses, a semicolon (;), or an em-dash (—). In main clauses it is more common to spell out “for example” and “that is”, or use some alternative wording.

Incorrect	Correct
If we had used, <i>e. g.</i> , a bubble sort, the program would be slower. We used a better sort instead, <i>i. e.</i> , one with $O(n \log n)$ time.	If we had used, say, a bubble sort, the program would be slower. We used a better sort instead— <i>i. e.</i> , one with $O(n \log n)$ time.

4.2 Translation problems

4.2.1 *bzw.*

The German term *beziehungsweise* or *bzw.* translates into English literally as “respectively”, though in practice a word-for-word translation is almost never appropriate. In the majority of cases, *bzw.* translates simply as “or”, and sometimes as “and” or “and/or”. When it is absolutely necessary to emphasize the order of the things, the word “respectively” can be used, but since it is not a conjunction, it is always in a different sentence position from the German *bzw.*

German	English
Bitte drücken Sie den Knopf 1 oder 2, wenn Sie in den 1. bzw. 2. Stock fahren moechten.	Please press button 1 or 2 if you want to go to the first or second floor.
Sie können uns anrufen bzw. unter der folgenden Adresse postalisch erreichen.	You can contact us by phone and/or write to the following address.
Äpfel und Birnen kommen in den ersten bzw. zweiten Eimer.	Apples and pears go into the first and second bucket, respectively.

4.2.2 *since vs. for*

When speaking of past events, the preposition *since* is used in respect to a fixed point in time, whereas *for* is used for durations.

Incorrect**Correct**

We have been working on the project since five years.

We have been been working on the project for five years.

5 Resources

Besides this guide, there are a number of other useful resources for writing or translating into English.

5.1 Style guides

As mentioned in the introduction to this paper, it is very likely that the publisher to whom you are submitting your writing has specified a certain style guide to use. Such a guide usually indicates which variant of English to use (American *vs.* International); how to format citations, footnotes, endnotes, figures, and tables; and how to prepare your manuscript for printed or electronic submission. The guide may be written by the publisher himself, or he may simply refer you to one of the standard style guides used in academic writing. (The latter category includes the Chicago, MLA, and APA styles, for which printed books and online summaries are available.) Always follow the prescribed style guide, even if it contradicts this paper, another English guide, or your personal preferences or notions of what is “correct”. A style guide does not exist to ensure correctness, but rather consistency. Consistency in spelling, punctuation, capitalization, and abbreviations enhances any publication; inconsistencies are distracting for the reader and reflect poorly on both the author and the publisher.

5.2 Books

- **Robert Schoenfeld.** *The Chemist’s English*. John Wiley & Sons, 3rd revised edition, 1989. ISBN 3527280030
Schoenfeld, longtime editor of the *Australian Journal of Chemistry*, wrote an article, “Say It in English, Please!” primarily for German-speaking chemists. It is reprinted as the final chapter in this book.
- **William Strunk, Jr. and E. B. White.** *The Elements of Style*. Pearson Higher Education, 4th edition, 2000. ISBN 020530902X
This important handbook has been used by writers for nearly a hundred years. It covers the basic rules of English usage and principles of composition.
- **Henry Fowler.** *A Dictionary of Modern English Usage*. Oxford Language Classics Series. Oxford Press, 2nd revised edi-

tion, 2003. ISBN 0198605064

This is another venerable usage guide which covers grammar, syntax, style, and word choice. Many different versions and editions are available.

5.3 Online writing guides

The `alt.usage.english` FAQ links to a number of online writing and grammar guides. The full list can be found at http://alt-usage-english.org/intro_b.shtml#WritingandGrammarGuidesOnLine.

5.4 Online bilingual dictionaries

You can find more online English–German and/or German–English dictionaries besides the ones listed here at these Open Directory Project pages:

- http://dmoz.org/Reference/Dictionaries/World_Languages/G/German/
- <http://dmoz.org/World/Deutsch/Wissen/W%c3%b6rterb%c3%bccher/Sprachen/Englisch/>

5.4.1 General-purpose

- *LEO English–German Dictionary*
<http://dict.leo.org/>

5.4.2 Archæology

- *Excavation Dictionary*
<http://ausgraeberei.de/woerterbuch/>

5.4.3 Computing

- Queen Mary, University of London's *English–German Dictionary of Common Computing Terms*
<http://www.css.qmul.ac.uk/foreign/eng-german.htm>

5.4.4 Engineering

- *German–English Dictionary of Railway or Technical Terms*
<http://worldrailfans.org/Germany/Dictionary.shtml>

5.4.5 Libraries, books, data processing

- Birgit Wiegandt's *Bibliotheks-Glossar*
<http://www.bibliotheks-glossar.de/>

5.4.6 Mathematics

- Rainer Baule's *Mathematisches Wörterbuch*
<http://www.math.uni-goettingen.de/baule/wbuch.html>

5.4.7 Organic chemistry

- *Beilstein Dictionary*
<http://www-sul.stanford.edu/depts/swain/beilstein/bedict1.html>

5.5 Usenet

5.5.1 alt.usage.english

The newsgroup `alt.usage.english` is a forum for the discussion of how particular words, phrases, and syntactic forms are used. The participants of `a.u.e.` are generally very welcoming and pleased to answer questions from non-native speakers on English usage. The newsgroup has its own dedicated website at <http://alt-usage-english.org/>, which hosts a comprehensive FAQ.

5.5.2 sci.lang.translation

`sci.lang.translation` is a forum for those translating from one language into another. While the group was founded mostly for discussion of translation tools and education for professional translators, translation requests for difficult or unusual technical terms or short passages are also considered on-topic. To maximize the chances of a speedy reply, be sure to include in your article's subject header the source language, destination language, and a brief summary of the translation problem. For example:

Subject: DE>EN "Küß die Hand, schöne Frau"

The group's FAQ is available at <http://www.faqs.org/faqs/language/translation-faq/>.

5.6 Search engines

When in doubt as to which of two or more English phrases is “correct”, Google or another search engine may be able to provide the answer for you. For example, there is a common English idiom which means to talk without actually telling the main point. Say you can't remember whether it is to “beat around the bush” or to “beat the bush around”. A Google search for the former yields 42 700 results, while the latter gets only 9. It's therefore more likely that the former phrase is the one you intended—indeed, this can be verified by examining some of the results to see if the phrase is being used in the manner you expected.

6 Acknowledgments

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