Scientific Writing
Foreward / Forewarned / Foreword
Foreword / Forewarned / Foreword descriptivism versus prescriptivism.
Three Style Guides
THE CHICAGO MANUAL OF STYLE

The Essential Guide for Writers, Editors, and Publishers

15th edition
The Thinking Person’s Guide to Writing in the 21st Century
Some rules are flexible, debatable.
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What’s important is to be consistent!
But some things aren’t a matter of debate.
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But some things aren’t a matter of debate. So if you’re doing it you’re doing it wrong. Typography and punctuation is at the top of this list.
Punctuation is how we render speech to a page.
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Typography is how we style and arrange printed material.
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(See that single word well in the line above?)
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Typography is how we style and arrange printed material. How we space apart letters & punctuation so it reads well. And to make sure the correct punctuation is used.
Rule 1: period

- double space after sentence (\LaTeX does this automatically)
- but single space after periods for abbreviations (vs. cf. etc.)
  - et al. said (right)
  - et al. said (wrong)
  - use $\sim$ to make a non-breaking single space
- but \LaTeX assumes a CAPS word is always abbreviation
  - enough RAM. Still (wrong)
  - enough RAM. Still (right)
  - use \textbackslash@ as in RAM\textbackslash@.
Rule 2: units spacing

- units get a tiny space
  - 4kg (super wrong)
  - 4 kg (wrong)
  - 4 kg (correct)
  - make it with \,
Rule 3: SI for power of 2

- $\text{KB} = 1000$ bytes
- $\text{KiB} = 1024$ bytes
  - you usually mean KiB
  - also MiB, GiB, etc.
Rule 4: don’t break numbers
As we see in Section 2, the worst case
Breaking numbers looks bad

- use Section~\ref{s:intro}
- (and use Section~\ref{s:intro}).
- this applies to:
  - cites\cite{reference}
  - Figure~3, Tables, Chapters
Rule 5: capitalize section as a title

- it is Section 3
- but it is “in the next three sections”
- Table 2, Tables 3–5
- but it is “these tables provide evidence”
Rule 6: quotes

- “open then close”
- “nested ‘subquote’ ”
- ` in \LaTeX{} makes an open quote
- ‘’ makes the closed one
  - only one for the single quote
Rule 7: dashes

- four types:
  - minus sign ($-$)
  - hyphen -
  - N-dash (--) | M-dash (---)
- these all **look** different
  - and they **are** different
  - they have different meanings!
Dash Use

- **Minus**: use it to indicate subtraction and negative numbers
- **M-dash**: use it to separate parenthetical remarks
  - "the evidence—from both field and laboratory studies—does not refute"
  - sentence should be complete omitting it: the evidence does not refute
  - it can also end the sentence:
    - “full sentence—interjection or clarification”.
- **N-dash**: use it for ranges
  - Figures 4–6; 10–20 cm; Monday–Friday
  - you can also use in lieu of M-dash with a space:
    - main clause – parenthetical – main clause
  - but be consistent!
Hyphen Use: Compound Adjective

- hyphenate compound adjectives **before** noun
  - compound adjective, compound-adjective rule
  - ugly-looking sweater
  - sweater is ugly looking
  - sixty-third time

- adjective is not compound if you can swap them
  - ugly red sweater, red ugly sweater

- can be factored out
  - single- and multiple-factor analysis
    - means single-factor and multiple-factor analysis

- not for adverbs: quickly moving vehicle
Hyphen Use: As a Hyphen!

- breaks last word on a line to justify text
- \texttt{LaTeX} does this automatically for you
  - but sometimes it doesn’t know how
  - e.g., inode is in-ode
  - in and ode are words, inode is not
- you can specify hyphenations of words manually
  - at the word itself: de\texttt{-con-struct}\texttt{-iv-ism}
  - or in the preamble: \texttt{\hyphenation{de-con-struct-iv-ism}}
the rule is before a colon comes a complete sentence
  - not a fragment: this is wrong (wrong)
  - This is right: not a fragment (right)
the full sentence rule is the most important part of a colon
how else to use one
  - introducing a list
  - before a full sentence quote
  - having a fragment explain a detail
    - Doing the science was easy: prepare the experiments and analyze the results.
Semicolons are most commonly used in C programming; some languages use them as a comment.

Semicolons are used for pause cadence; they lie halfway between a period and comma.

Semicolons are famously misused; many suggest simply avoid them if you don’t know what you are doing.

This may be the most properly-used semicolons you’ve ever seen at one time!

Another use is as punctuation “promotion”

 normally a comma would be appropriate, but then it is confusing

The following were in attendance: John, the parliamentarian; Jason, the senator; various constituents; etc.
Rule 9: Dual Number

- English grammar has three “numbers”
  - single, plural, and dual
- dual number has special words to be used
  - either / any or one
  - neither / none
  - between / among
  - both / all
  - former / first
  - latter / last
  - pair / set
  - Author and Author / Author et al.

- communication between (any two) nodes
footnote “placement” \(^1\)\(^2\)\(^3\) (Which is right\(^4\)?\(^5\))\(^6\)
depends on style guide, country, etc.
be consistent!
LaTeX lets you do accents easy so take advantage!

- e.g., Köppen climate classification
- or transliterate it: Koeppen climate classification

- thankfully most transliterations are just “drop the accent”
the diaeresis is **not an accent**
if you write naïve you are (probably) doing it wrong
unless you write reëncrypt, coöperate, zoölogical
so just write naive
Rule 12: Captions

- figure captions go **below** the figure
- table captions go **above** the table
Rule 13: Further vs. Farther

- further: a metaphorical distance
  - we further the state of the art
- farther: an actual distance
  - it is 10 kilometers farther
Rule 14: Affect vs. Effect

- if you can replace the word with “consequence”, it’s effect
  - the effect of the legislation
  - common noun form of effect
- affect is always a verb
  - the legislation affected everyone
- effect can also be a verb
  - effect (v): to bring about
  - “Brexit effected Britain’s worst recession in history”
“Whenever someone misuses less I have fewer respect for them”

fewer:
- something you can count
  - numbers, bicycles, molecules of oxygen, grains of sand
  - there are fewer errors in my writing than yours
- ‘less’ is tolerated but wrong

less:
- something you can’t count
  - love, joy, oxygen, sand
  - “there is fewer oxygen in this room” (wrong)
  - “there is less oxygen in this room” (run!)
Style
Style
these are just tips, not rules
Style
these are just tips, not rules
some apply to all writing, others scientific only
these are things grade school teachers care alot about
and indeed they are bad if they aren’t well constructed
but it is possible to write a long sentence that isn’t unclear
  e.g., Camus
the problem is that you aren’t usually doing it
active versus passive voice
- “the passive voice is spoken by me” (passive)
- “I am speaking the passive voice” (active)

subject (animate, alive) does verb-like things to objects (passive)

object (passive) is affected in a verb-like way by (possibly by active things)

people do not usually speak in the passive unless they are avoiding taking responsibility
- this can be good or bad
- this is in English though, other languages don’t have a weird feeling about the passive
prepositions: of, in, out, around, through, above, below
- used for spatial relations of a noun
called such because in Latin they were affixed before a verb
- thus, a preposition
- in German prepositions are joined to verbs but then required to be separated and put at the end!
  - ja bitte ruf mich an! (anruf is the verb)
many claim you cannot end a sentence with a preposition
- about what are you talking?
- of this I’ve never heard!
still, following this arcane rule does add sophistication in formal writing
- perhaps because many cases of ending a sentence with a preposition are informal
Style 4: Oxford Comma

- say you have a list of three things: A, B, C
- there are two standards
  - A, B and C
  - A, B, and C
- anyone who says one is wrong is wrong
- but anyone who uses both in the same paper is wrong
- my suggestion: use oxford comma and & for joining things
  - we have engineering, research and development and finance
  - we have engineering, research and development, and finance
  - we have engineering, research & development, and finance
Widows and Orphans are ugly and should be killed
“an orphan has no past; a widow has no future”
orphan: first line of paragraph at bottom of page
widow: last line of paragraph at top of page
also ugly: one word on a line
<table>
<thead>
<tr>
<th>hline table</th>
<th>booktabs table</th>
</tr>
</thead>
<tbody>
<tr>
<td>item</td>
<td>item</td>
</tr>
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<td>item</td>
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</tbody>
</table>
Style 6: Book Tabs

- use booktabs for your rules
- `\usepackage{booktabs}`
- ... `\begin{tabular}{c}`
- `\toprule` header
- `\midrule` row
- `\midrule` row
- `\bottomrule` row
- `\end{tabular}`
Style 7: Repeated Words

- the cause of of this phenomenon
- usually caused by a line break in source text
- this can can be **easily** found: checkwriting
Style 8: Latin

- **i.e.**
  - *id est* or **that is**
  - sentence must make sense with this substitution

- **e.g.**
  - *exempli gratia* or **free example**
  - used to give an example of something
  - not the same as i.e.!

- **cf.**
  - *confer* or **compare**
  - used to contrast a difference
  - tells reader to look at something while aware of a difference

- **&**
  - *et* or **and**
  - useful to pair words amid a series: A, B & C, and D & E.
Style 9: Caps after colons?

- Style guides can vary, but here is the Chicago manual
  - If a question, capital (see title)
  - If a colon introducing more than one sentence, capital.
  - If you would otherwise have to capitalize, capital
  - Else do not capitalize
Style 10: Small Caps

- USING CAPS LOOKS HUGE
  - it’s okay for API and FS
  - not for ACCESS_COARSE_LOCATION
- \textsc{} lets you do small caps
- \textsc{UPPER case} is UPPER CASE
“we think that our results might show that”
you’re allowed to think that it does show it!
**Style 12: Extra Words**

- don’t ever be more wordy that you need to be to say something just be brief instead of that
  - avoid being repetitive
  - prefer fewer words

- if you can remove a word, and the sentence is the same, then **remove it**

- **very** and **just**
  - good examples of this
  - usually adds nothing
  - better adjectives for the purpose
Exception: ‘that’

- add ‘that’ whenever it still makes sense
  - we found most surprising results
  - we found that most surprising results
Exception: ‘that’

- add ‘that’ whenever it still makes sense
  - we found most-surprising results
  - we found that most surprising results

- avoids branch prediction failures
some words have specific means in subfields

- avoid misusing them because it makes the writing unclear
- “significantly more than”
  - means that the measurement has passed a relevant statistical test
- “our system is usable”
  - means that you performed a usability study
Style 14: Avoid

- part and parcel
  - and other legal doublets (null and void; break and enter)
- whether or not
  - it’s just whether
- biweekly
  - appearing or taking place every two weeks or twice a week
  - misuse has made it useless
Style 15: Parenthesis $\rightarrow(\leftarrow$ these things $\rightarrow)\leftarrow$

- okay when clarifying something non-mainstream but understood for expected audience
- or the exact opposite: hiding narrow-audience details that are safely ignored
- bad when used when other punctuation—like M-dashes—will do
- don’t (double (nest) them)
- treat them as M-dashes with “ignore me” markers
“above we showed that”
“the above figure”
“earlier we showed that”
“the following code describes”
“the code below”
when printed, the text does not appear as a top-to-bottom
when read, it does go temporally forward
Style 17: Singular They

- some people will say that you have to write he/she and not they
- they’re wrong
- singular they has long been used in English, it was just one grammar prescriptivist in the 1800 who decided it was worse to violate a noun’s gender than its number
- in Canada singular they is sanctioned for use by parliament for more than a decade
- for anyone/none/someone/everyone it is much clearer
  - no one speaks “everyone knows his or her name”
some people say the data show that
others that the data shows that
technically correct does not make good writing
   - datum is rarely used
   - you can avoid with dataset / datapoint sometimes too
Style 19: Verbs that Ascribe Extra Meaning

- avoid words that suggest
  - a choice that may not have been
  - a motive that may not have been
  - a decision process operating
  - “previous worked **failed** to study”
hypotheses are refuted, not proven
- wrong: these results prove that humans like humour
- right: these results **fail to refute** that humans like humour

this seems like a phrasing but it is the entire basis of the scientific method
- $H_0$ is the null hypothesis and represents no relation
  - humans are humour are unrelated
- $H_1, H_2, \ldots$ are alternative hypotheses
- science refutes $H_0$ (and also $H_j$) but fails to refute $H_i$
- $H_i$ is now a target for future refutation
it is impossible to underestimate the amount of human-hours spend worrying about how to capitalize it
  there’s only eight choices!
  ios, ioS, iOs, iOS, IoS, IOs, IOS
  but consider it at the beginning of a sentence. iOS doesn’t flow, agreed?

use: The iPhone, The iPhone development environment, An iOS system

or try to not put it at the start
Finally a couple tips on useful $\LaTeX$ packages.
Tip 1: Line penalty

- \TeX\ punishes itself for bad formatting
  - things like hyphens, new lines, hbox overfulls, etc.
- you can control these variables directly
- `\linepenalty\{200\}` is a good value if you are struggling with page limits
Normal list
1. first item
2. second item
3. third item
4. fourth item
5. fifth item

Packed list
1. first item
2. second item
3. third item
4. fourth item
5. fifth item
Tip 2: Compact list

\begin{enumerate}
  \setlength{\itemsep}{1pt}
  \setlength{\parskip}{0pt}
  \setlength{\parsep}{0pt}
\end{enumerate}
Tip 3: Scale Box

- takes whatever’s inside and shrinks it
  - useful for hbox overfulls
  - or just to subtly get a bit more space

\scalebox{.95}{a table, figure, etc.}
\scalebox{\columnwidth}{a table, figure, etc.}
Tip 4: Sort Cites

- which looks better for citations?
  - 7, 4
  - 4, 7
  - 7, 4
  - 4, 7
  - if only there were a way a computer program could do this!

- use sortcites option when importing bibtex