Scientific Writing

Foreward / Forewarned / Foreword

Foreward / Forewarned / Foreword
descriptivism versus prescriptivism.
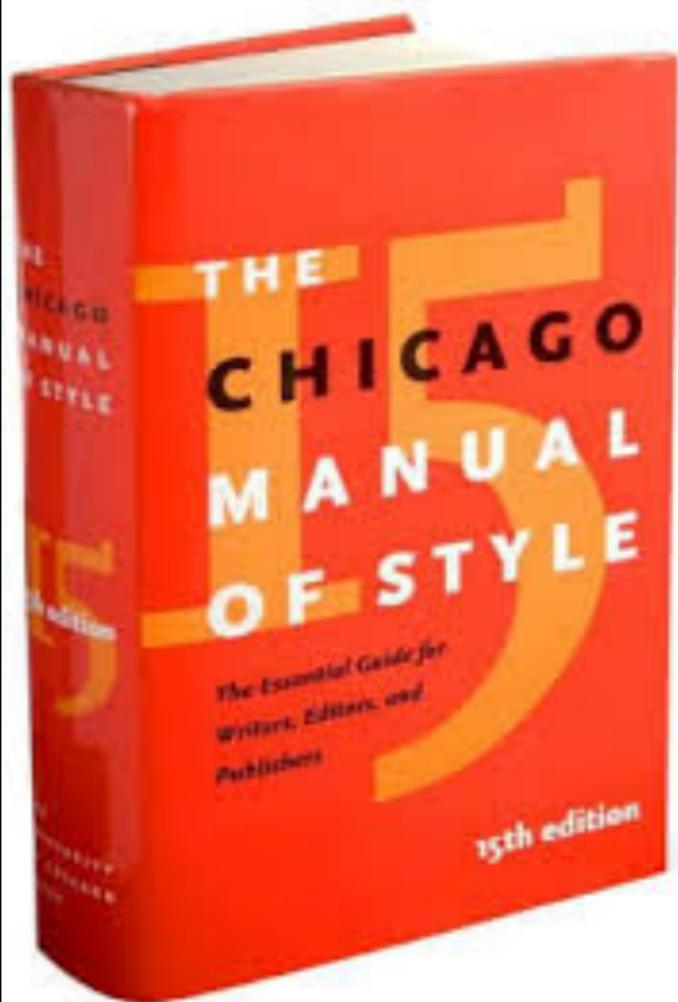
Three Style Guides

THE
ELEMENTS
OF
STYLE

WILLIAM
STRUNK, JR.

WITH
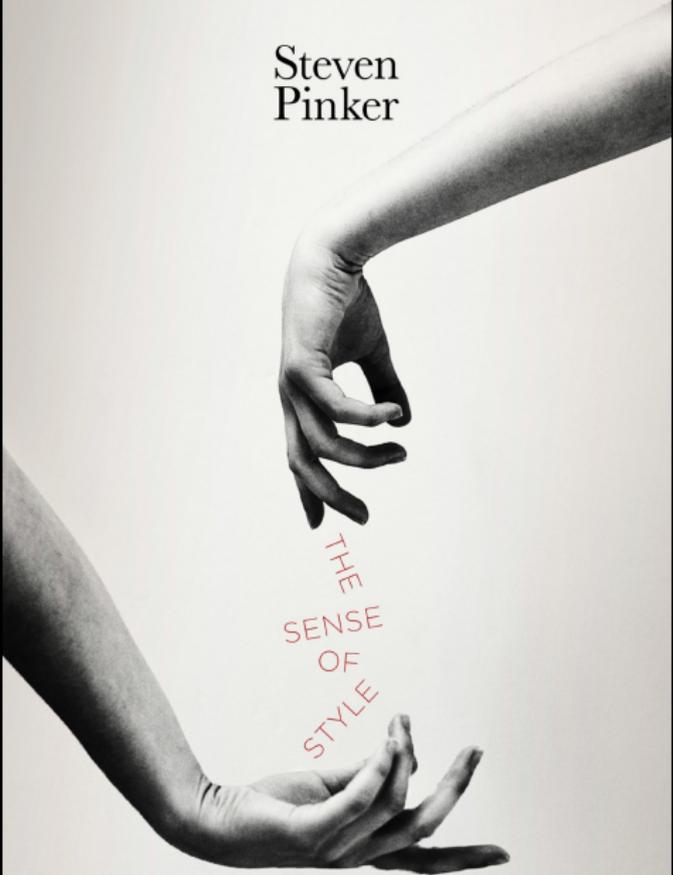REVISIONS,
AN INTRODUCTION,
AND
A NEW CHAPTER
ON WRITING
BY

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Steven Pinker

THE SENSE OF STYLE

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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Typography and punctuation is at the top of this list.

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How we encode cadence and rhythm, melody and pitch.

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well.
(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 \@ as in RAM\@.

- units get a tiny space
    - 4kg (super wrong)
    - 4 kg (wrong)
    - 4 kg (correct)
    - make it with \,

Rule 3: SI for power of 2

- KB = 1000 bytes
- 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~2
- (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

- 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!

- 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

- breaks last word on a line to justify text
- 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\-con\-struct\-iv\-ism
  - or in the preamble: \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.

Rule 8: Semicolon; why can't I understand you?

- 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

Rule 10:

- footnote "placement[1]"[2].[3] (Which is right[4]?[5])[6]
- depends on style guide, country, etc.
- be consistent!

Footnote placement

- 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"

Diaeresis Marker

- 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

- figure captions go **below** the figure
- table captions go **above** the table

- 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"

Rule 15: Less vs. Fewer

- "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

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these are just tips, not rules

Style
these are just tips, not rules
some apply to all writing, others scientific only

Style 1: Run on sentences

- 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

Style 3: Prepositions are prepositioned

- 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 pre position
  - 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 **pre**position
  - 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

- 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

Style 5: Widows and Orphans

- 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

hline table
item
item
item
item
item
item

booktabs table
item
item
item
item
item
item

Style 6: Book Tabs

- use booktabs for your rules
- \usepackage{booktabs}
- . . .
- \begin{tabular}{c}
- \toprule
- header
- \midrule
- row
- row
- \bottomrule
- \end{tabular}

- 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 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 capital

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
- LIKE THIS! ACCESS_COARSE_LOCATION
- \textsc{UPPER case} is UPPER CASE

- "we think that our results might show that"
- you're allowed to think that it does show it!

- 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

- 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

- 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

- 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

- 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"

Style 18: One Datum Two Data

- 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

- 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"

Style 20: Hypotheses (plural of hypothesis)

- 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, ... 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

Style 21: iOS

- 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, 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

- LaTeX 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.}

- 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