Lecture 8
Textual Presentation

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General Principles

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the lowercase letter x has a similar height in all of them.

Also ensure that your text is set in a suitably **large font**.
This principle applies especially for slides and posters.

Bold and Underline

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> **if** $x < y$ **then**
> $x := y$
> **else**
> $y := x$

Underline—e.g., _Journal of Cryptology_—is **ugly**.
It was used on typewriters when italics were not available. Prefer italics if possible.

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Within an italicized passage, you can emphasize a passage by unitalicizing it.

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If you use colors, check that your document is readable when printed in black and white. In addition, choose your colors with taste.
Choose colors that offer a good contrast with the background and with each other.
Avoid primary colors, and consider using **palettes recommended by experts**.

Headings

Chapter, section, and subsection headings should be viewed as **meta-information**. The text following a heading should make sense if the reader skips the heading. Compare:

2.2 First-Order Relational Logic

This logic, implemented in Alloy, is used . . .

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Alloy's underlying formalism, first-order relational logic, is used . . .

Capitalization

Titles and headings can be capitalized following two approaches (van Leunen).

- **Headline-style capitalization**: "Capitalize the first word, the first word after a colon, and all other words except articles, unstressed conjunctions, and unstressed prepositions"—e.g., *An Intermezzo: Jazzing Up the Data*.

- **Sentence-style capitalization**: "Capitalize the first word, the first word after a colon, and no other words except proper nouns and proper adjectives"—e.g., *An intermezzo: Jazzing up the data*.

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For the title of your document, use headline-style capitalization.
For chapter, section, and subsection headings, use either style, but be consistent.

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When introducing an acronym or initialism, there is no need to capitalize the unabbreviated expression unless it is a proper noun. Compare:

The framework fully supports Multiple-Document Interface (MDI).
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Numbers

Generally spell out numbers from **zero to ten** (or twelve),
unless this would look locally inconsistent—e.g.:

> *Below, we compare the performance of all eight configurations on our server.*
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Numbers with at least five (or four) digits should use the **thousands' separator**,
either a traditional comma or, following international standards, a small space——e.g.,
1,000,000 or *1 000 000*.

For years and page numbers, the thousands' separator is avoided——e.g., *1999*.

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There should be a space before units—e.g., *30 s*.
In compound expressions, there should be no hyphen—e.g., *a 30 s timeout*.

The percentage sign, the degree sign, and currencies have their own conventions—e.g., *3%*, *21°*, *$55*, *€50*.

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three **significant digits**—e.g., *89.7%*. Note that *90.0%* is more precise than *90%*.

There is an important distinction between percentages and **percentage points**.
Percentage points denote the difference between percentages. A value of 50% falling
by 10 percentage points becomes 40%. By contrast, a 10% fall would yield 45%.

Dates

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If the day or the year is omitted, no commas are needed—e.g., *January 1990*.

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Further examples:

We met on Sunday, February 14, 2021.
We met again on Sunday, 21 February 2021.
The semester lasts from October 2026 to March 2027.

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The conventions governing coinciding punctuation are **outlandish**.
For American English, they are spelled out in van Leunen, pages 60–73.

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Incidentally, you will rarely need to tell the reader to **see** a given section or page.

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"Organization is the most elusive of all qualities in writing. We recognize badly organized material when other people produce it, but spotting our own failures is more difficult. Heavy cross-reference is one of the few hints you'll ever have to guide you; heed its warning" (van Leunen).

Footnotes

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In English, the footnote call (e.g., [1] or *) generally comes **immediately after any punctuation sign**, even against logic. It is best when the call comes after the period that ends the sentence, where it does not interrupt the sentence's flow—e.g.:

> *Zipperposition's success inspired me to develop Jeha, a new theorem prover.[2]*
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Most readers will look at the footnote to see what it is. This will cause them to **lose context**. So there needs to be a good reason for the footnote to exist.

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Punctuation is tricky. Some authors punctuate each item, even if it is not a complete sentence. Others omit the punctuation. Compare:

• *Alnitak;*	• *Alnitak;*	• *Alnitak*
• *Alnilam; and*	• *Alnilam;*	• *Alnilam*
• *Mintaka.*	• *Mintaka.*	• *Mintaka*

Spacing

Two **fundamental rules** of spacing:

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The first principle applies especially to **mathematical operators**.
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The **beginning of paragraphs** should be clearly marked,
through either indentation or vertical space (but not both).
Exceptionally, the very first paragraph is usually not indented in English.

Justification

Most prose documents are justified, meaning that the whitespace between words **stretched** or **shrunk** so that the lines reach the right margin.

Ragged-right, whereby no stretching or shrinking takes place, can look better with short lines (e.g., in two-column format).

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Avoid breaking immediately before the **last item** of a short inline enumeration, as in

The results are summarized in Figures 3, 4, and 5.

Page Breaks

Page breaking is largely automated by modern text processors, but it sometimes requires **special attention**.

In particular, try to avoid these:

- ▶ A **widow** arises when a page break occurs right before the last line of a paragraph.
- ▶ An **orphan** arises when a page break occurs right after the first line of a paragraph.

Tables and Figures

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Tables and figures can be used

- ▶ as **displays**—integrated in the text;
- ▶ as **floats**—labeled with a (sentence-capitalized) caption.

Example of a Displayed Table

Another measure of MaSh and MeSh's power is the total number of problems solved. The following table gives the success rate in percent for various combinations of selectors and systems:

	CVC4	Epar	Vampire	Z3	Any system
MePo	38.2	40.8	41.3	40.5	48.5
MaSh-kNN	47.0	50.4	51.4	48.0	60.0
MaSh-NB	47.9	51.0	52.0	49.1	60.3
MeSh-kNN	46.7	48.9	50.8	50.2	59.6
MeSh-NB	46.8	49.0	51.0	51.3	60.2

We see that the success rate goes up substantially, from 48.5% with MePo to about 60% with the new selectors.

Example of a Floating Table

Table 7: Success rates in percent per selector and system

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Figures with boxes and arrows should have **clear semantics**.
What is the meaning of a dotted arrow? Of an ellipse? Your text should clarify this.

Mathematics

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Let the notations work for you.

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Let the notations work for you.

But be careful: Compact notations that are useful for readers who are immersed in the topic may be overwhelming for readers who are new to the ideas.

Mathematical Prose

Fundamentally, mathematical prose is prose. There may be lots of notations, displayed formulas, and other layouts that introduce additional complexity, but the **basic rules** of style, grammar, and punctuation apply.

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For example, the reverse of a word is alternatively written $\overline{w}$, $rev(w)$, and $w_n, \ldots, w_1$.
Which is best?

Mathematical Symbols

Three fine points:

▶ Denote **multiplication** of x and y by xy or $x \cdot y$ or even $c \times y$, but not $x * y$.

▶ Denote **minus** by a minus sign ($-$), which is not the same as a hyphen (-), a short dash ($-$), or a long dash (—).

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Logical symbols belong in logical formulas and should generally be avoided elsewhere. Thus, write *for all*, *for each*, or *for every* instead of $\forall$, *for some* or *there exists* instead of $\exists$, *not* instead of $\neg$, *and* instead of $\wedge$, *or* instead of $\vee$, etc. Avoid *for any*, since it can mean both *for all* and *there exists*.

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When you use English for complex logical formulas, make sure that your phrasing suggests the **intended precedence** of *and*'s and *or*'s.

Mathematical Variables

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Try to avoid multiple **layers of subscripts**.
Given a sequence $t_1, \ldots, t_m$, a subsequence would usually be written as $t_{i_1}, \ldots, t_{i_n}$.
Two strategies to avoid the double subscripts:

▶ Avoid introducing the original sequence as $t_1, \ldots, t_m$ in the first place.
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Avoid introducing variables you **use only once**. This is wrong:
A node n *is internal if it has one or more children.*

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Your text should read smoothly even if you read all formulas aloud as "**blah**," which is essentially what many readers will do, especially on a first reading. Introduce redundancy if it helps—e.g., *the equation* $n = m^2$ instead of $n = m^2$.

Mathematical Environments

Environments such as "Definition," "Lemma," "Theorem," "Example," and "Remark" **emphasize** important material and ease **cross-referencing**. Traditionally, the statement of lemmas and theorems is italicized—e.g.:

Theorem 3.1. If n is an even natural number, then n/2 is a natural number.

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Lemmas and theorems need **proofs**. These start with the label "Proof." usually typeset in italics, and end with the box symbol (□) or "QED."

Computer Science

Algorithms

Algorithms can be used to present the main idea of your code abstractly.
Some advice:

- ▶ Explain the algorithm **informally** first.
- ▶ State its **inputs**, **outputs**, and **specification** clearly.
- ▶ Present it in **pseudocode** in a modular fashion.
  The pseudocode can be displayed or put in a float.
  Use the imperative mood.
- ▶ Explain how it works using an **example**.
- ▶ State its **properties** (e.g., partial correctness, termination,
  asymptotic complexity) as rigorously as possible.

Example of an Algorithm

Input: A grammar $G = (V, \Sigma, P, S)$ in Chomsky normal form
Output: A set $W \subseteq V$ of all variables that do not generate the empty language

$W := \{A \in V \mid A \to a \in P, a \in \Sigma\};$
repeat
   $W_{old} := W;$
   $W := W_{old} \cup \{A \mid A \to BC \in P, B \in W_{old}, C \in W_{old}\};$
until $W = W_{old};$
return $W;$

Code Excerpts

Small code excepts, of up to one line, can be **inlined** in your text.

Larger code excepts can be **displayed** or put in a **float**.

Make sure to use a special font (usually monospace) to make the code stand out, whether it is inlined, displayed, or floating.

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Unless you are writing software documentation, do not show much code, if any. You will probably struggle to explain the code, and chances are that the reader will not understand it anyway. It is usually better to **keep things abstract**.

Typesetting Software

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Word processors such as Microsoft Word, LibreOffice Writer, and Google Docs can be used to write theses and papers, and **presentation software** such as Microsoft PowerPoint and Apple Keynote can be used to prepare slides and posters.

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Two variants of LaTeX are particularly useful:

▶ **Overleaf** is an online interface for LaTeX. It is convenient and simplifies using LaTeX because you do not need to install any packages.

▶ **LyX** is a "what you see is what you mean" graphical interface on top of LaTeX. It encourages you to focus on the structure of your documents, as opposed to their appearance.

LATEX Example

```
\documentclass{letter}

\begin{document}
To the editors of the \emph{Bulletin of the AMS},

We are writing to report that a direct search on the CDC~6600 yielded
\[27^5 + 84^5 + 110^5 + 133^5 = 144^5\]
as the \textbf{smallest instance} in which four fifth powers sum to a fifth
power. This is a counterexample to a conjecture by Euler that at least $n$
$n$th powers are required to sum to an $n$th power, $n > 2$.

Yours truly,

L. J. Lander and T. R. Parkin
\end{document}
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