Essential Research Toolkit for the Humanities

Week 8: LaTeX basics

Anna Pryslopska

May 30, 2022

Psycholinguistics and Cognitive Modeling Lab

Submit the assignment as an RMarkdown and an HTML file.

If you don't, at least include the entire code required:
```
Error in as.data.frame(x) : object '…' not found
Error: '…' does not exist in the current working
directory
```
etc.

Make at least one table and create one plot of the data. If you didn't then you failed the assignment.

Use scientific article structure

Unrelated code?

Use scripts vol. 3

```
> install.packages("psych")
installiere auch Abhängigkeiten 'tmvnsim', 'mnormt'

versuche URL
'https://cran.rstudio.com/bin/macosx/contrib/4.2/tmvnsim_1.0-2
Content type 'application/x-gzip' length 23313 bytes (22
KB)
==================================================
downloaded 22 KB
```
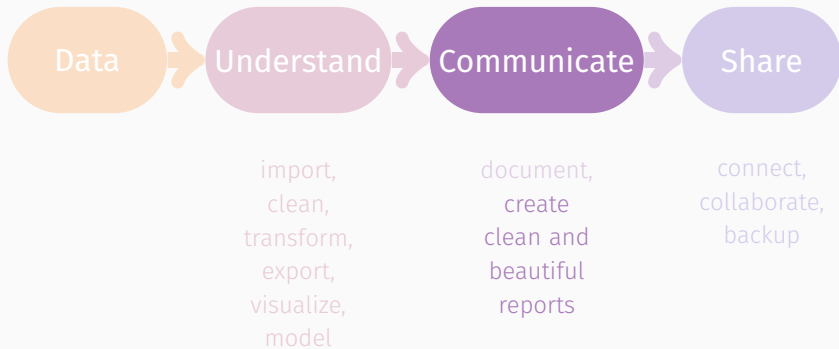
How many participants? Not everyone enrolled in the course completed the experiment!

Document options

```
---
title: "Moses illusion experiment"
author: "Anna Pryslopska"
date: "2022-05-23"
output:
  html_document:
    toc: yes
---
```

Questions?
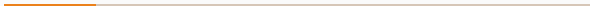
Table of contents

Beautiful Typesetting with LaTeX

Overfull \hbox (9.895pt too wide)
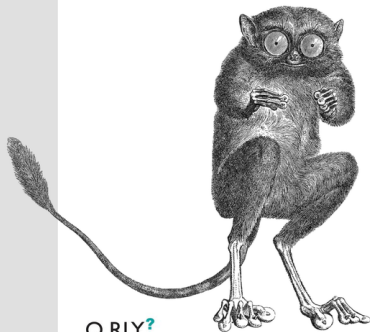
O RLY?

Name: ˈlɑːtɛx or ˈleɪtɛx but you can do whatever (e.g. ˈlatɛç) as long as it's not ˈleɪtɛks.

Originally: TeX was a computer program for typesetting text and mathematic formulae.

Aim: typeset and print at the highest typographical quality using a predefined, professional layout.

Installation: Base and packages (`https://ctan.org/`)

Author
You → Publisher
You, journal, etc. → Book designer
LaTeX → Typesetter
TeX

Moses illusion experiment

Anna Pryslopska

2022-05-21

Contents

Reporting with RMarkdown

Structure

Give your file structure. Use sections:

```
# Header 1
## Header 2
### Header 3
#### You get the idea
```

You can also include horizontal rules if you want to be fancy:

```
Just use 3+ asterisks ****** or dashes ------
```

Basic text formatting

You can make your text stand out by making it *italic* *italic* _italic_ or **bold** **bold** __bold__.
Spacing matters: " "this is broken"".

Blockquotes

Are made by starting a new line with >. In your last email, you said:

> Be kind. Rewind.

Reporting with RMarkdown

Anna Pryslopska

2022-05-23

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Line breaks

Manual line breaks are

made with two or more

spaces at the end of a line.

Superscript, subscript, and strikethrough

Aren't used often but can be made by ^, ~index~, and ~~redacted~~ respectively: May 23rd 2022 by redacted

	LaTeX	Word
Typesetting	program	user
Design	program	user
Changes	appear later (after compilation)	updated dynamically (interactively)
Output	abstract thinking	what you see is what you get
Focus	writing	writing, layout, design
Rights	free and OS	proprietary
Documents	literally anything	limited to most common formats

Advantages and disadvantages: LaTeX

PROS	CONS
Free and portable	Less common
Professionally crafted layouts	Made by opinionated nerds
Beautiful documents with minimal effort	Changing the design requires patience & arcane knowledge
Pictures/tables appear where they should	
Typesetting of mathematical & semantic formulae, symbols, syntactic trees, automata, DRSs, IPA etc. is supported & convenient	
Footnotes, TOC, references, bibliographies are easy, dynamic, & automatic	
Free packages for all typographical needs	Some packages hate each other
Just text	Debugging is annoying
Fast once learned	Steep learning curve

| PROS	CONS
Minimal learning curve	Creating professional & beautiful documents takes time and effort
WYSIWYG	Math is difficult, slow, & often ugly
Known and ridiculously popular	Glosses, DRSs, syntactic trees are a pain to make
Easy-to-use reviewing tools	Bibliography is clunky
	(Cross)references are buggy & slow
	Repositioning elements creates chaos

https://xkcd.com/1301/
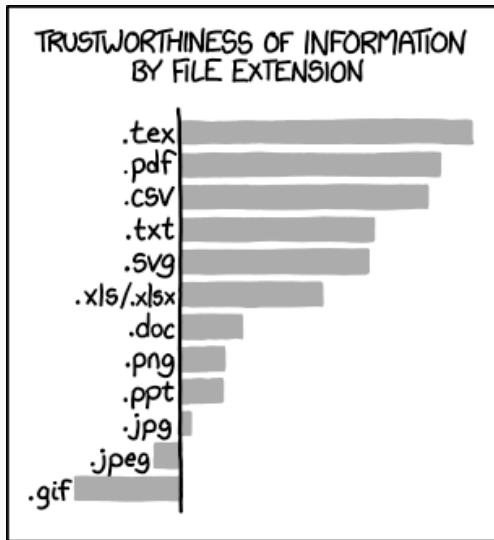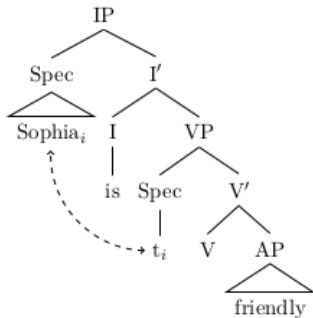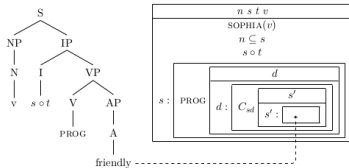
(52) Sophia is being friendly.

    a. $[\![\text{Sophia}]\!] \equiv \text{SOPHIA}_{+animate}$

    b. $[\![\text{be}_3]\!] \equiv \lambda P[P_{+active}]$

    c. $[\![\text{be}_3 \text{ friendly}]\!] \equiv \lambda P[P_{+active}](\text{FRIENDLY})$
      $\equiv \lambda x[\text{FRIENDLY}_{+active}(x)]$

    d. $[\![\text{Sophia is being friendly}]\!]$
      $\equiv \lambda x[\text{FRIENDLY}_{+active}(x)](\text{SOPHIA}_{+animate})$
      $\equiv \text{FRIENDLY}_{+active}(\text{SOPHIA}_{+animate})$

13

...ma con essi coerentemente orientati secondo le tre direzioni geografiche standard: Nord, Est e centro della Terra (Down).

1.7 Assi vento
(Wind Axes, W)

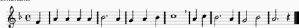La terna assi vento T_W è una terna intrelegata levogira con origine nel baricentro del velivolo (punto $G = C$) ed avente l'asse vento longitudinale x_W diretto secondo la direzione della velocità $V = V_C$ del velivolo, con verso positivo nel senso del moto (figura 1.13). L'asse vento z_W è definito dall'intersezione del piano verticale π_v contenente V e G con il piano π_v normale alla traiettoria in C, con verso positivo verso il basso. L'asse trasversale y_W è tale da completare la terna $\{G, x_W, y_W, z_W\}$.

Figura 1.13 Terna di assi vento $T_W = \{G, x_W, y_W, z_W\}$ con traiettoria. In questa particolare circostanza la traiettoria del baricentro è orizzontale e l'orientamento del velivolo non è simmetrico rispetto al piano verticale π_v.

Figura 1.14 Evoluzione del moto di un velivolo con traiettoria del baricentro. Sono rappresentati gli orientamenti nelle quattro posizioni successive. La terna di assi vento $T_W = \{G, x_W, y_W, z_W\}$ è mostrata in corrispondenza.

Si noti che, secondo la definizione data sopra, l'asse vento trasversale y_W è sempre orizzontale. Esso è la termine al piano $\{G, x_W, z_W\}$ che è, per definizione, coincidente verticale come si osserva dalle figure 1.13, 1.14 e 1.15.

Nella figura 1.15 è rappresentato il caso particolare in cui la traiettoria del baricentro è orizzontale. Si osserva che, anche per un orientamento del velivolo non simmetrico rispetto al piano verticale π_v, l'asse z_W è sempre verticale e giace nel piano...

Doamne milu - ie - şte.

Credincioşii: Doamne miluieşte.
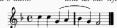
People: Lord, have mercy.

Preotul: Pe Preasfânta, curata, preabinecu-vântata, mărita stăpâna noastră, de Dumnezeu Născătoarea şi pururea Fecioara Maria, cu toţi sfinţii să o pomenim.

Priest: Let us remember our most holy, pure, blessed, and glorious Lady, the Mother of God and ever virgin Mary, with all the saints.

Prea Sfântă Născă - toa - re de Dum - ne - zeu, milu - ie - şte - ne pe noi.

Credincioşii: Preasfântă Născătoare de Dumnezeu, miluieşte-ne pe noi.

People: Most holy Mother of God, have mercy upon us.

Preotul: Pe noi înşine şi unii pe alţii şi toată viaţa noastră, lui Hristos, Dumnezeu să o dăm.

Priest: Let us commit ourselves and one another and all our life to Christ our God.

Ţi - e Doam - ne.

Credincioşii: Ţie, Doamne.

People: To You, O Lord.

Preotul: Că Ţie se cuvine toată slava, cinstea şi închinăciunea, Tatălui şi Fiului şi Sfântului Duh, acum şi pururea şi în vecii vecilor.

Priest: For to You belong all glory, honor, and worship to the Father and the Son and the Holy Spirit, now and forever and to the ages of ages.

A - min.

Credincioşii: Amin.

People: Amen.

ANTIFONUL ÎNTÂI[2]

THE FIRST ANTIPHON[2]

Mă - ri - re Ta - tă - lui şi Fi - u - lui şi Sfân - tu - lui Duh, şi a - cum şi pu - ru - rea şi în ve - ci - lor, A - min. Bi - ne - cu - vin - tea........ ză, su - fle - te al meu pe Dom - nul. Şi toa - te ce - le din - lă - un - trul meu, nu - me - le cel Sfânt al lui. Bi - ne - cu - vân - tat........ eşti Doam........ ne.
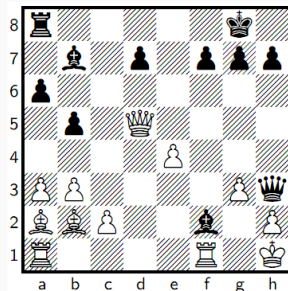
Credincioşii: Mărire Tatălui şi Fiului şi Sfântului Duh, şi acum şi pururea şi în vecii vecilor. Amin. Binecuvintează, suflete al meu pe Domnul. Şi toate cele dinlăuntrul meu, numele cel Sfânt al lui. Binecuvântat eşti Doamne.

People: Glory to the Father, and to the Son, and to the Holy Spirit, now and ever, and to the ages of ages. Amen. Bless the Lord, O my soul. And all that is within me, bless His holy Name. Blessed are You, O Lord.

---

[2]Cuvântul «antifon» vine din limba greacă şi înseamnă «reaşră». Antifonul Întâi cuprinde începul Psalmului 102 şi este o cântare de slăvire a lui Dumnezeu.

[2]The word «antiphon» comes from Greek, meaning «step». The First Antiphon encompasses the beginning of Psalm 102, and it is a song of praise to God.
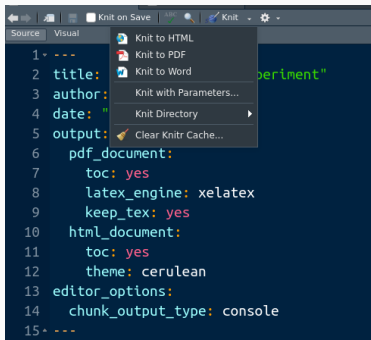
Others: knitting patterns, poetry, witches, snowmen, chemistry, recipes, slides, etc.

TeX	The Original*TM* but basic and outputs DVI
LaTeX	TeX extended and includes packages
pdfTeX	TeX improved and outputs PDF
pdfLaTeX	LaTeX improved and outputs PDF
XeTeX	TeX expanded beyond English + fonts
XeLaTeX	file format for XeTeX engine
LuaTeX	TeX + Lua (good for macros)
LuaLaTeX	file format for LuaTeX engine
ConTeXt	TeX + interface for advanced typography features
AMSTeX	† TeX extension by American Mathematical Society

Typesetting documents
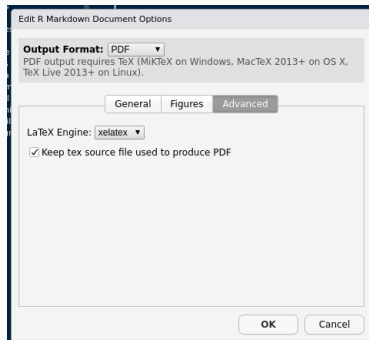
Output

RMarkdown_report.pdf

RMarkdown_report.Rmd

RMarkdown_report.tex

RMarkdown_report_files

week8.aux

week8.bcf

week8.log

week8.nav

week8.out

week8.pdf

week8.snm

week8.tex

week8.toc

week8.vrb

week8.run.xml

week8.synctex.gz

AUX	mostly reference information
BBL	prepared bibliography data
BCF	citations for PDF
BIB	your list of citations
BLG	bibliography log
LOF	list of figures
LOG	compilation log
LOT	list of tables
NAV	navgation
OUT	bookmarks
PDF	PDF file
RUN.XML	bibliography XML file
SNM	information used by `pgfimage` for slides
SYNTEX.GZ	correspondence between PDF and TEX
TEX	LaTeX file
TOC	table of contents
VRB	verbatim material for fragile slides

Output

```
% Options for packages loaded elsewhere
\PassOptionsToPackage{unicode}{hyperref}
\PassOptionsToPackage{hyphens}{url}
%
\documentclass[
]{article}
\usepackage{amsmath,amssymb}
\usepackage{lmodern}
\usepackage{iftex}
\ifPDFTeX
  \usepackage[T1]{fontenc}
  \usepackage[utf8]{inputenc}
  \usepackage{textcomp} % provide euro and other symbols
\else % if luatex or xetex
  \usepackage{unicode-math}
  \defaultfontfeatures{Scale=MatchLowercase}
  \defaultfontfeatures[\rmfamily]{Ligatures=TeX,Scale=1}
\fi
% Use upquote if available, for straight quotes in verbatim environments
\IfFileExists{upquote.sty}{\usepackage{upquote}}{}
\IfFileExists{microtype.sty}{% use microtype if available
  \usepackage[]{microtype}
  \UseMicrotypeSet[protrusion]{basicmath} % disable protrusion for tt fonts
}{}
\makeatletter
\@ifundefined{KOMAClassName}{% if non-KOMA class
  \IfFileExists{parskip.sty}{%
    \usepackage{parskip}
  }{% else
    \setlength{\parindent}{0pt}
    \setlength{\parskip}{6pt plus 2pt minus 1pt}}
}{% if KOMA class
  \KOMAoptions{parskip=half}}
\makeatother
```

Workflow

1. **Input:** text file = text + commands that tell LaTeX how to typeset the text
2. **Compilation:** run `xelatex myfile.tex` × 1–2, maybe bibliography, then X⅃LaTeX again 1–2
3. **Output:** PDF + LOG + AUX + …

Texmaker

https://www.xm1math.net/texmaker/
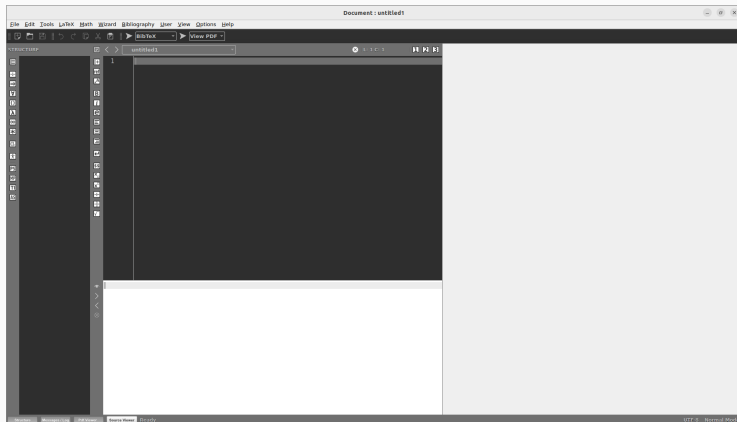
You can also use Overleaf: https://www.overleaf.com

Basic document structure

1. Document class   `\documentclass[options]{…}`
2. Preamble
   - Packages   `\usepackage[options]{…}`
   - Commands   `\newcommand{\xmark}{\ding{55}}`
   - Default settings   `\graphicspath{{./images/}}`
   - Title   `\title{…}`
   - Author   `\author{…}`
   - Date   `\date{…}`
   - …
3. Start of document   `\begin{document}`
4. Document   In a hole in the ground there lived a hobbit.
5. End of document   `\end{document}`

First document
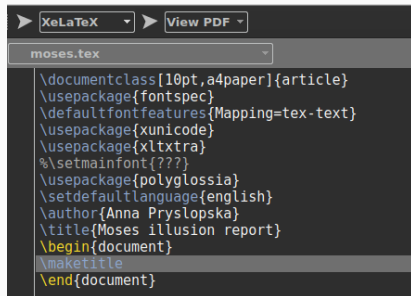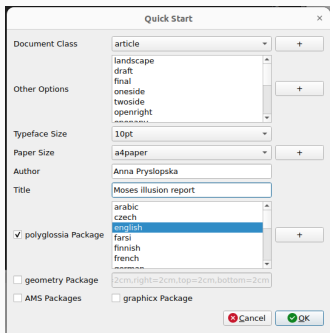
1. Create new file
2. Wizard → Quick X∃L∀T∃X document
3. Save file
4. Run X∃L∀T∃X
5. Run View PDF
6. Profit!

First document

\maketitle	Creates title
\section{…}	Creates section
\subsection{…}	Creates subsection
\subsection{…}	Creates subsubsection

```
moses.tex
\documentclass[10pt,a4paper]{article}
\usepackage{fontspec}
\defaultfontfeatures{Mapping=tex-text}
\usepackage{xunicode}
\usepackage{xltxtra}
%\setmainfont{???}
\usepackage{polyglossia}
\setdefaultlanguage{english}
\author{Anna Pryslopska}
\title{Moses illusion report}
\begin{document}
\maketitle

\section{Background}
\section{Methods}

\subsection{Design and materials}
\subsection{Participants}
\subsection{Procedure}
\subsection{Predictions}

\section{Results and discussion}
\end{document}
```

Moses illusion report

Anna Pryslopska

May 27, 2022

1 Background

2 Methods

2.1 Design and materials

2.2 Participants

2.3 Procedure

2.4 Predictions

3 Results and discussion

Document classes

`\document{…}`

- `article` articles in scientific journals, presentations, short reports, program documentation, etc.
- `minimal` minimal document, mainly used for debugging (see also `standalone`)
- `report` longer reports with several chapters, small books, thesis, etc.
- `book` books
- `memoir` similar to `book` and `report` but supports more design-related options; for poetry, fiction, non-fiction, and mathematical works etc.
- `letter` letters
- `beamer` presentations

(Almost) complete list: `https://ctan.org/topic/class`

`\document[…]{report}`

- `10pt, 11pt, 12pt` main font size (default is 10pt)
- `a4paper, letterpaper, b5paper, …` paper size
- `titlepage, notitlepage` put the title on a separate page or not
- `twocolumn` typeset the document in 2 columns
- `twoside, oneside` typeset as double or single sided output (affects e.g. margins, not the printer)
- `landscape` typeset in landscape mode
- `openright, openany` chapters begin either only on right hand pages or on the next page available
- `draft` highlights hyphenation and justification problems, shows placeholders instead of included images

Packages

Declared **only** in the preamble

Sometimes the **order** matters

Not all packages are **compatible** with each other or your TeX distribution

`\usepackage{…}`

- `inputenc` accept different input encodings
- `babel` multilingual support (see also `polyglossia`)
- `csquotes` simplified quotation marks
- `amsmath` mathematic equations
- `fontawesome` neat symbols
- `xcolor` defining colors
- `hyperref` crossreferencing and links
- `graphicx` including pictures
- `biblatex` bibliography
- `tikz` making fancy/complicated plots and pictures

`\usepackage{…}`

- gb4e or Covington glosses and example numbering
- tipa IPA symbols (in X∃LATEX you can input them directly)
- OTtablx OT Tableaux
- qtree & tree-dvips syntactic trees (many other alternatives)
- stmaryrd semantic brackets
- drs Discourse Representation Structures
- phonrule phonological rules

See also
`https://cl.indiana.edu/~md7/08/latex/slides.pdf`
`https://en.wikibooks.org/wiki/LaTeX/Linguistics`

`\usepackage[…]{ }`

\usepackage[utf8]{inputenc}

\usepackage[english]{babel}

\usepackage[backend=biber, sorting=nyt, sortcites=true, indexing=cite, useprefix=false, maxcitenames=2, style=authoryear-comp]{biblatex}

Questions?

Homework assignment

Install Texmaker or make an Overleaf account

Read chapter 2 of "The Not So Short Introduction to $\LaTeX 2_\varepsilon$"
`https://tobi.oetiker.ch/lshort/lshort.pdf`

Create a basic X$_\exists$LATEX document for the Moses experiment (as on page 25–26). Upload the resulting files to ILIAS.

Next week is Pfingstferien!