LaTeX bootcamp for linguists

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Acknowledgements

- A lot of this presentation is borrowed and adapted (with permission) from Curt Anderson's (Heinrich-Heine-Universität Düsseldorf) LaTeX for Linguists workshop slides.
- Adam Liter (University of Maryland) also has an extremely comprehensive LaTeX guide for linguists.
- Alan Munn (Michigan State University) also has very useful resources for linguists using LaTeX. I learned a lot about LaTeX from him.
- Holla to all of my MSU peeps above

About this workshop

What you will learn in this workshop:

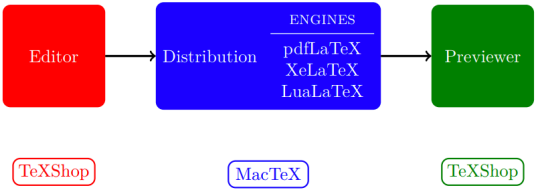
- What LaTeX is
- How to use it at the basic level
- What packages linguists use
- Enough tools to write a term paper in semantics

What will NOT be covered in this workshop:

- An extensive LaTeX tutorial

What is LaTeX?

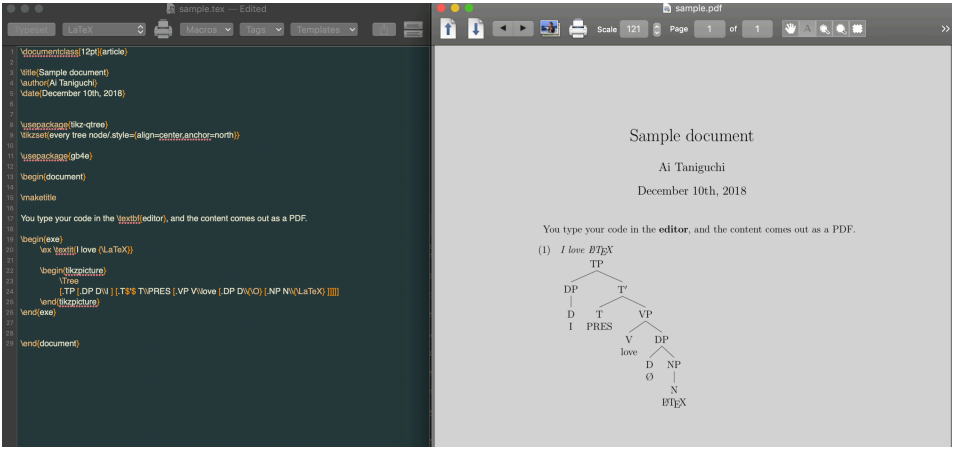
- ★ LaTeXis not a word processor (= Word)!
- Word: WYSIWYG
- LaTeX:



(from Alan's guide)

- Formatting is separated from content
- Formatting is associated with a semantics

What is LaTeX?



LaTeX: the pros

Why use LaTeX rather than Word, OpenOffice, or something else?

- It's free (free of charge and open source)
- .tex file written today can be compiled 20 years later
- Used a lot in linguistics: specialized tool for linguists!
- Makes content highly customizable
- The end result is beautiful :')
- It's fun!

LaTeX: the cons

Some conceivable disadvantages:

- Takes some effort to set up, depending on your OS
- Steep learning curve
- Not really worth it for short documents

Setting it up

How you set up LaTeX depends on what operating system you have.

- Windows: Install MikTeX (Use "Net Installer" instead of "Basic Installer")
- Mac: Install MacTeX

They both come with:

- Preconfigured packages
- An editor (place to type your code)

If you don't want to bother installing it, ShareLaTeX (now part of OverLeaf) is a pretty good online editor.

Structure of a LaTeX document

Every document has two sections: a preamble and a document body

- **Preamble**
  - Document type (book, article, and other types)
  - Commands that set up the overall look of the document
  - Specify packages for specialized things you need to do
- **Body**: everything you want to say

Sample document

A sample document

```
\documentclass[12pt,letterpaper]{article}
\usepackage{times} % This says use the Times New Roman font
\usepackage[margin=1in]{geometry} % This says use 1in margins
\usepackage{setspace} %This lets us control line spacing
\doublespace %this says double spaced

    \title{My awesome semantics paper}
    \author{My Name  \\ LING4055 (Taniguchi)}
    \date{February 11, 1990}

\begin{document}

    \maketitle

    \section{My first section}

        \subsection{Subsection one}

        This is a subsection. \textbf{This is bold.}

        \subsection{Subsection two}

        Here's another one. \textit{This is italics.}

    \section{Another section}

        More stuff here

\end{document}
```

Do this now! LaTeX basics

If you installed a TeX distribution on your computer before coming:

1. Create a folder called "LaTeX bootcamp" on your Desktop or wherever.
2. Open TeXShop 

. This is your editor.
3. File → Save → save as "bootcamp". Save it in the "LaTeX bootcamp" folder.
4. Go to the workshop Google Doc and copy/paste **Code 1** (everything in blue) into your editor.
5. Click "Typeset" at the upper lefthand corner

If you didn't:

1. Go to ShareLaTeX
2. Register if you haven't. Sign in.
3. Click "New Project". Call it "bootcamp".
4. Delete everything that is in the editor by default.
5. Go to the workshop Google Doc and copy/paste **Code 1** (everything in blue) into your editor.
6. Click "Re-compile".

How the code works

Different types of code:

- **Commands** start with a backslash and then some name of a command.
  - May need other information (arguments) via {..}, or have options set via [..]
  - Example: `\textbf{blah}` has output **blah**
- **Environments** start with `\begin{`*`identifier`*`}`, end with `\end{`*`identifier`*`}`, and have some code in the middle.
  - Enclose chunks of code.
  - May also have arguments or options.
  - Used when a bunch of stuff is related (numbers in a table, for instance, or items in a list)
  - Example: `\begin{document}` ... `\end{document}`, which defines where the contentful bits of a document are.

Paragraphs

- A blank line between paragraphs lets the compiler know that you have a paragraph
- \\ is a forced line break; don't use it to separate paragraphs.

A sample document

```
\documentclass[12pt, letterpaper]{article}

\begin{document}

This is a paragraph.

This is another paragraph. You can tell because there's a blank line between this
one and the paragraph right before it.

And finally, here's yet another paragraph. All you have to do is have a blank line.

Do you see this?
Not having a space above this sentence says that this sentence is a part of the
previous paragraph.
This one too.

Again, have a blank line to create a new paragraph.

\end{document}
```

Paragraphs

Output of previous code:

Output

This is a paragraph.
This is another paragraph. You can tell because there's a blank line between this one and the paragraph right before it.
And finally, here's yet another paragraph. All you have to do is have a blank line.
Do you see this? Not having a space above this sentence says that this sentence is a part of the previous paragraph. This one too.
Again, have a blank line to create a new paragraph.

Do this now! `itemize`

Using your editor, type this code (on the left) in the body of your document. `itemize` lets you create a bullet-point list.

`itemize` example

```
\begin{itemize}
    \item item a
    \item item b
    \item item c
        \begin{itemize}
        \item nested 1
        \item nested 2
        \end{itemize}
    \item item d
\end{itemize}
```

- item a
- item b
- item c
  - nested 1
  - nested 2
- item d

Do this now! `enumerate`

Now try this code. `enumerate` lets you create a numbered list.

`itemize` example

```
\begin{enumerate}
    \item item 1
    \item item 2
        \begin{enumerate}
            \item nested a
            \item nested b
        \end{enumerate}
\end{enumerate}

Hello World.

\begin{enumerate}
    \item The numbering
    \item Starts over again
\end{enumerate}
```

Do this now! The `gb4e` package

Now, we're going to add the `gb4e` package to the preamble. This package allows us to use numbered linguistic examples throughout your document.

1. In the **preamble**, type `\usepackage{gb4e}`
   - Make sure this is always the last package loaded in the preamble
2. Go to the workshop Google Doc. Copy/paste **Code 2** (all of it in red) in the **body** of your document somewhere.
3. Click "Typeset"/"Recompile" TWICE.

Do this now! The gb4e package

Output

(1) Here is an example

(2) * Here another.

(3) Subexamples

a. No good

b. ?? Marginal

Here is a paragraph interrupting the examples.

(4) a. I squeezed the lemon

b. # I squeezed the hospitality

Here's a reference to example (1). Here's a reference to (3b) now. (4) too.

★ NOTE: Make sure gb4e is always the last package loaded!

Do this now! The gb4e package

Glosses for foreign language examples with gb4e:

Gloss with gb4e

```
\begin{exe}
    \ex[]{\gll  un chat gris \\
    a cat grey \\
    \trans ‘a grey cat’}
\end{exe}
```

(5) un chat gris
a cat grey
‘a grey cat’

- Open single quote: ` (left of the 1 key on your keyboard)
- Close single quote: ' (left of RETURN key)
- Quotation marks are: `` (open) and '' (close)

Do this now! Adding images

1. Go to Google Images. Search for "pusheen".
2. Save the first image as "pusheen" (it's a PNG file). Save it in your "LaTeX bootcamp" folder (where your .tex file is). If you're on ShareLaTeX, go to "New File" → "Upload" then upload pusheen.png.

3. Add this to the **preamble**: `\usepackage{graphicx}`
4. Type this in the **body** somewhere: `\includegraphics{pusheen.png}`
5. Click "Typeset"/"Recompile".
6. Now change what you just typed to this: `\includegraphics[scale=0.5]{pusheen.png}`
7. Click "Typeset"/"Recompile".

Do this now! Figures

No special package required for figures. Make your code look like this and click "Typeset"/"Recompile" TWICE:

Example with `figure`

```
\begin{figure}
\begin{center}
    \includegraphics[scale=0.5]{pusheen.png}
\end{center}
\caption{Pusheen the cat}
\label{fig:pusheen}
\end{figure}

Now you can reference Figure \ref{fig:pusheen}.
```

Math symbols

No need for additional packages! LaTeX has the ability natively to typeset math (it was made for it).

- Two typesetting modes in LaTeX: mathmode and textmode
- Textmode is the default mode. You write most of your document in textmode.
- In mathmode, you get access to special notation and symbols for typesetting mathematics.

Math symbols

Surround mathmode code with `$...$`.

Some semantics

```
% Some simple stuff
Consider the formula $\exists x [f(x) \wedge g(x)]$.

% Can be wrapped in an example.
\begin{exe}
    \ex $\forall x [f(x) \rightarrow g(x)]$
\end{exe}
```

Consider the formula $\exists x[f(x) \wedge g(x)]$.

(6) $\forall x[f(x) \rightarrow g(x)]$

Do this now! Math mode

Type this somewhere in the **body** and compile.

Example in mathmode

```
$\exists x [f(x) \wedge \neg g(x)]$
```

Math stuff

Some useful symbols (but there's many more):

- Existential quantifier: $\exists$ — `\exists`
- Universal quantifier: $\forall$ — `\forall`
- Negation and lambda: $\neg$ and λ — `\neg` and `\lambda`
- Denotation brackets: $[\![$ and $]\!]$ — `\llbracket` and `\rrbracket` (These require the `stmaryrd` package)
- Conjunction and disjunction: $\wedge$ and $\vee$ — `\wedge` and `\vee`
- Angle brackets (for types): $\langle$ and $\rangle$ — `\langle` and `\rangle`
- Set theory symbols:
  - Curly brackets: {} — `\{`, `\{`
  - Union and intersection: $\cup$ and $\cap$ — `\cup` and `\cap`
  - Subset and proper subset: $\subseteq$ and $\subset$ — `\subseteq` and `\subset`
  - Element of: $\in$ — `\in`
- Greek letters usually go by their names (α, `\alpha`).

If there's something you need, you can find it by drawing it in the square on DeTeXify.

Mathmode

Math and text can be mixed together. Use `\text` to briefly jump back into textmode. `\mathbf` and `\mathit` can be used for boldface and italics in mathmode.

Some more semantics

```
$\llbracket \text{dog} \rrbracket = \lambda x [\text{$x$
    is a dog}]$

$\llbracket\textit{every dog}\rrbracket^{w,g} = \lambda
    P_{\langle e,t\rangle} \forall x [\mathbf{dog}(x)
    \rightarrow P(x)]$
```

$[\![\text{dog}]\!] = \lambda x[x \text{ is a dog}]$

$[\![\textit{every dog}]\!]^{w,g} = \lambda P_{\langle e,t \rangle} \forall x[\mathbf{dog}(x) \rightarrow P(x)]$

Do this now! GL-style AVM's using mathmode

You can create your own commands for sequences that are used often. These are called **macros**. I've defined macros to produce an AVM for you, if you'd like to use it for your paper.

1. Go to the workshop Google Doc. Copy/paste **Code 3** (all of it in green) in the **preamble** of your document.
2. Go back to the Google Doc. Copy/paste **Code 4** (all of it in purple) in the **body** of your document.
3. Click "Typeset"/"Recompile".

(I also learned today that there's an AVM package! Never used it before.)

Other LaTeX packages for linguists

Other useful packages for linguists:

- OT tableaux: `ot-tableau`
- Tree structures: `tikz-qtree`

See other resources from the beginning for more info (Curt's slides are a nice introduction).

Bibliographies

Possibly one of the best things about LaTeX is the fact that it lets you automatically format bibliographies ...

- BibTeX is a system for managing bibliographies. Separate from LaTeX but often used it with it.
- You have a database (a .bib file) with all the information for each reference, including author(s), paper title, year, etc.
- Each reference has a citekey, e.g., `pustejovsky1995`
- Use command + citekey (e.g., `\cite{pustejovsky1995}`) to cite things in your document

Do this now! Bibliographies

1. Go to the workshop Google Doc.
2. Scroll down to "LING4055 bibliography". Click link and download this .bib file. Save this file in your "LaTeX bootcamp" folder (same place where your .tex file is)
3. If you're on ShareLaTeX, upload this .bib file to your page, like you did with Pusheen earlier.
4. Put this in your **preamble**:

Preamble

```
\usepackage{natbib}
\bibliographystyle{apalike}
```

Do this now! Bibliographies

5. Put `\bibliography{ling4055bibliography}` before `\end{document}`.
6. Type `\cite{pustejovsky1995}` and `\citep{pustejovsky1995}` somewhere in the body.
7. Click “Typeset”/“Recompile”.
8. If you’re NOT on ShareLaTeX, to the right of “Typeset”, scroll and select “BibTeX”. Click “Typeset” TWICE.

Bibliographies

Commands in `natbib`:

- `\cite{}` Pustejovsky (1995)
- `\citep{}` (Pustejovsky, 1995)
- `\bibliography{}` tells the BibTeX compiler where to look for references (`ling4055bibliography.bib` for us)

Where to Go From Here

Important:

- Practice makes perfect
- It'll take some time
- Practice with class assignments and class papers

Where to get help:

- Google.
- Documentation for packages
- StackExchange: Community of experts on LaTeX
- People in the department (Ai, Lev, others maybe?)

Packages Mentioned

If you want to know how a particular package works, you can check CTAN for its documentation.

- `gb4e`: http://www.ctan.org/pkg/gb4e
- `linguex`: http://www.ctan.org/pkg/linguex
- `covington`: http://www.ctan.org/pkg/covington
- `ot-tableau`: http://www.ctan.org/pkg/ot-tableau
- `OTtablx`: http://sanders.phonologist.org/OTtablx/
- `tikz-qtree`: http://www.ctan.org/pkg/tikz-qtree
- `forest`: http://www.ctan.org/pkg/forest
- `booktabs`: http://www.ctan.org/pkg/booktabs
- `enumitem`: http://www.ctan.org/pkg/enumitem
- `natbib`: http://www.ctan.org/pkg/natbib