Tree drawing and LaTeX Tutorial

LING 253: Syntax I section

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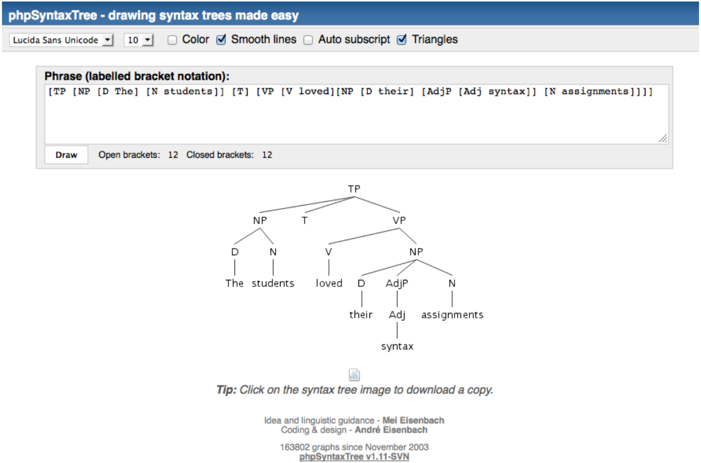
Drawing Syntactic Trees

We begin by looking at two online applications and one program you can download before learning how to use LaTeX. We will look at:

- phpSyntaxTree
- LaTeX Previewer
- TreeForm

phpSyntaxTree



phpSyntaxTree - drawing syntax trees made easy

Phrase (labelled bracket notation):

```
[TP [NP [D The] [N students]] [T] [VP [V loved][NP [D their] [AdjP [Adj syntax]] [N assignments]]]]
```

Open brackets: 12 Closed brackets: 12

***Tip:** Click on the syntax tree image to download a copy.*

Idea and linguistic guidance - **Mei Eisenbach**
Coding & design - **André Eisenbach**

163802 graphs since November 2003
phpSyntaxTree v1.11-SVN

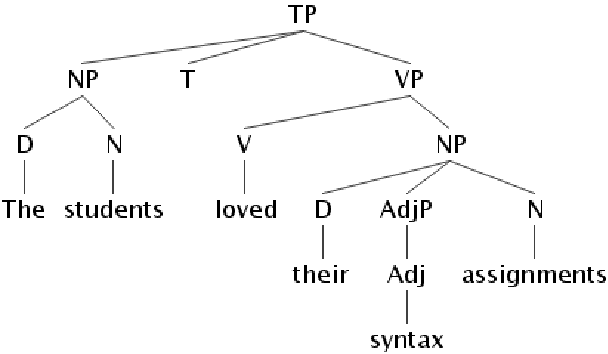
`http://ironcreek.net/phpsyntaxtree/`

phpSyntaxTree

phpSyntaxTree code:

```
[TP [NP [D The] [N students]] [T] [VP [V loved][NP [D their]
[AdjP [Adj syntax]] [N assignments]]]]
```

Output:



phpSyntaxTree

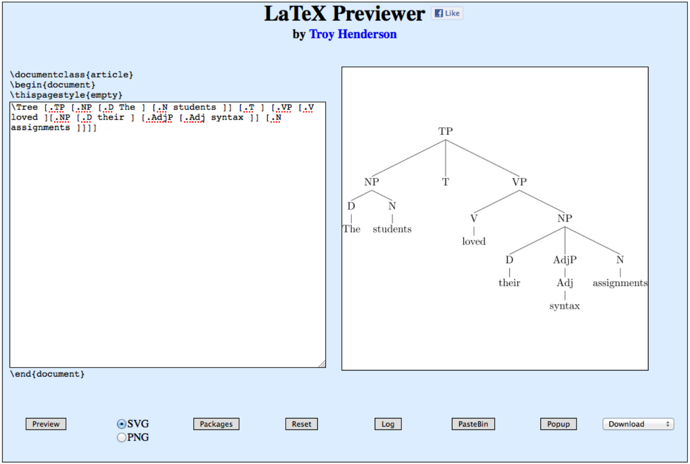
Advantages:

- Online, nothing to download
- Makes trees out of bracketed diagrams
- Allows you to download the result and insert the image in a document

Disadvantage:

- If you need to make a change to your tree, you need to write the code over unless you save it somewhere else

LaTeX Previewer



LaTeX Previewer

by Troy Henderson

```
\documentclass{article}
\begin{document}
\thispagestyle{empty}
\Tree [.TP [.NP [.D The ] [.N students ]] [.T ] [.VP [.V
loved ][.NP [.D their ] [.AdjP [.Adj syntax ]] [.N
assignments ]]]]
\end{document}
```

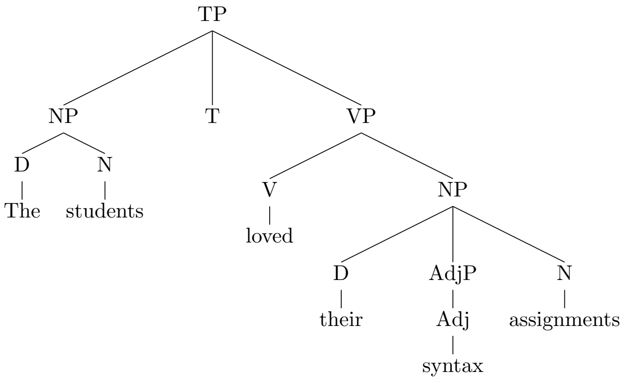
http://www.tlhiv.org/ltxpreview/

LaTeX Previewer

LaTeX Previewer code:

```
\Tree [.TP [.NP [.D The ] [.N students ]] [.T ] [.VP [.V loved ]
[.NP [.D their ] [.AdjP [.Adj syntax ]] [.N assignments ]]]]
```

Output:

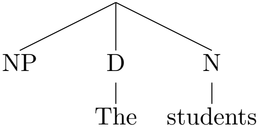


LATEX Previewer

Same advantages and disadvantages as phpSyntaxTree, and in addition, LATEX Previewer makes nicer trees and allows you to download in various formats. But LATEX Previewer is fussier about how the bracketed diagrams are structured:

- There must be a dot preceding the non-terminal and root node labels

```
\Tree [NP [.D The ] [.N students ]]
```



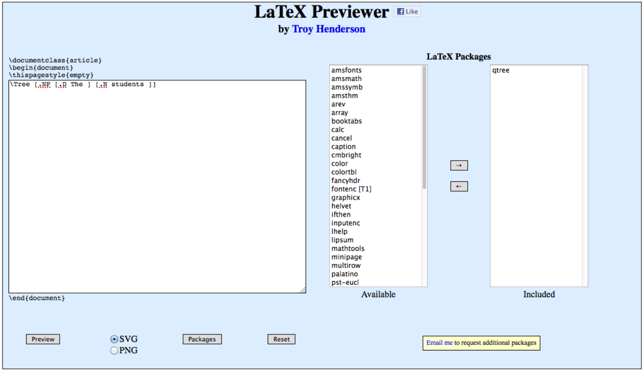
- There must be a space between a terminal node and the closing bracket] otherwise it does not compile:

```
\Tree [.NP [.D The ] [.N students]]
```

```
LaTeX Error: \begin{tabular} on input line 6 ended by
\end{document}.
```

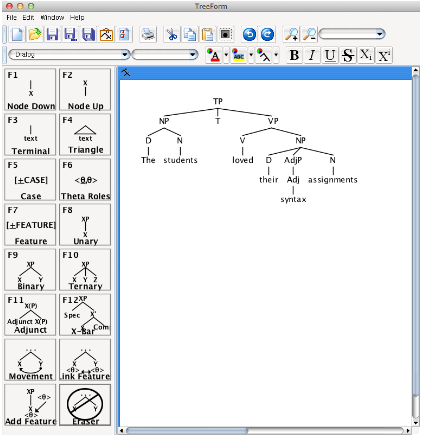
LaTeX Previewer

There is also a step before you can start making the diagrams. You need to click on the ‘Packages’ button at the bottom, select ’qtree’ from the left-hand column and add it to the right-hand column:



```
\documentclass{article}
\begin{document}
\thispagestyle{empty}
\Tree [.NP [.D The ] [.N students ]]
\end{document}
```

TreeForm

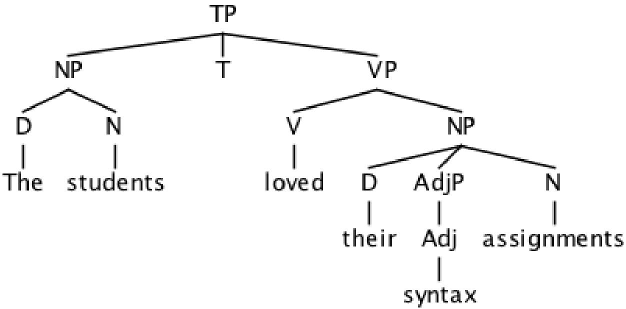


`http://sourceforge.net/projects/treeform/`

Tutorial: `http://www.ece.ubc.ca/~donaldd/treeform.htm`

TreeForm

No coding required!
Output:



TreeForm

Advantages:

- Allows you to drag and drop nodes to construct your tree
- You can save your file so you can go back to it later if you need to make any changes
- You can download the result and insert the image in a document

Disadvantage:

- You need to download it, but it’s only 3.4 MB

Next up!

Aren’t LaTeX Previewer trees the prettiest? Don’t you wish there was a simple way to generate multiple trees and to keep track of the code that generated them?
Of course you do!
LaTeX will allow you to generate all trees using just one document. If you need to make any changes to any trees, all you have to do is go back to your document!

LaTeX

LaTeX is based on the idea that authors should be able to ***focus on the meaning of what they are writing*** *without being distracted by the visual presentation of the information. In preparing a LaTeX document,* ***the author specifies the logical structure*** *using familiar concepts such as chapter, section, table, figure, etc., and lets the LaTeX system worry about the presentation of these structures.*

It therefore encourages the separation of layout from content while still allowing manual typesetting adjustments where needed.

Structure of a LaTeXdocument

```
\documentclass[11pt]{article}
\usepackage{some_package}

\author{}
\title{}
\date{}

\begin{document}
\maketitle
...
\end{document}
```

Class options

Documents can be `articles`, books, `reports`, etc.
The classes all take the options, for example:

Font size	10pt | 11pt | 12pt...
Paper size	a4paper | legalpaper...
style	article | amsart
columns	onecolumn | twocolumn

Input characters

Some characters have special meaning in TeX, if you need them they have to be entered as TeX-commands:

\	start command	\textbackslash
		note: \\ = newline
$	toggle math modus	\$
&	tabulator	\&
#		\#
~		\textasciitilde
|	vert. lines in table	\textbar
_	start subscript	_
^	start superscript	\textasciicircum
{ }	command delimiter	\{ \}
[ ]	command delimiter	$[ ]$
“ ”	quotation marks	‘‘ ’’

Sectioning commands

- \section{}
- \subsection{}
- \subsubsection{}
- \paragraph{}

Environments

- Everything that falls between begin and end;
- Examples:
  - `\begin{itemize} ...\end{itemize}`
  - `\begin{enumerate} ...\end{enumerate}`
  - `\begin{tabular} ...\end{tabular}`

Emphasizing

- \textit{} italics, used for foreign words, species names etc: *Staph. aureus*
- \textsl{} *slanted*
- \emph{} used for emphasizing: this is not the case
- \textsc{} small caps, used for names of persons: Neil Armstrong was the first man on the moon.
- \textbf{} bold face: used to make something really **stick out**.
- \textsf{} sans serif, often used as base font on slides.
- \texttt{} typewriter, used for computer related material like code or URLs: `http://www.rossmed.edu.dm/`

Note: Slides use sanserif font: No small caps, slanted instead of italics!

Font sizes

`\tiny`	microscopic font
`\scriptsize`	very tiny font (subscripts)
`\footnotesize`	tiny font (footnotes)
`\small`	small font
`\normalsize`	normal font
`\large`	large font
`\Large`	larger font
`\LARGE`	very large font
`\huge`	huge font
`\Huge`	very huge font

Note: not a command: `{\small foo bar}`

Simple lists

Please believe me:

- Few swallows can turn winter into summer.
- Inside it’s colder than in the night.
  - In the morning it pulls.
  - At noon he pushes.
  - In the evening she goes.
- Every nonsense must find an end.

```
Please believe me:
\begin{itemize}
    \item Few swallows can turn winter into summer.
    \item Inside it’s colder than in the night.
        \begin{itemize}
            \item In the morning it pulls.
            \item At noon he pushes.
            \item In the evening she goes.
        \end{itemize}
    \item Every nonsense must find an end.
\end{itemize}
```

Descriptive lists

Three animals you should know about are:

gnat: A small animal, found in the North Woods, that causes no end of trouble.

gnu: A large animal, found in crossword puzzles, that causes no end of trouble.

armadillo: A medium-sized animal, named after a medium-sized Texas city which causes no end of trouble.

```
\begin{description}
    \item[gnat:] A small animal, found in the North
        Woods, that causes no end of trouble.
    \item[gnu:] A large animal, found in crossword
        puzzles, that causes no end of trouble.
    \item[armadillo:] A medium-sized animal, named
        after a medium-sized Texas city which causes
        no end of trouble.
\end{description}
```

Enumerated lists

These are the main points:

1. first item
2. second item
3. third item
    1. first sub-item
    2. second sub-item

```
These are the main points:
\begin{enumerate}
    \item first item
    \item second item
    \item third item
       \begin{enumerate}
         \item first sub-item
         \item second sub-item
       \end{enumerate}
\end{enumerate}
```

The ‘enumerate’ package

Requires \usepackage{enumerate} in the preamble

(a) first item

(b) second item

(c) third item

    (i) first sub-item

    (ii) second sub-item

```
\begin{enumerate}[(a)]
    \item first item
    \item second item
    \item third item
       \begin{enumerate}[(i)]
         \item first sub-item
         \item second sub-item
       \end{enumerate}
\end{enumerate}
```

Centering text

In
the
middle I don’t
feel
so marginalized

```
\begin{center}
    In\\
    the\\
    middle I don’t\\
    feel\\
    so marginalized\\
\end{center}
```

Why are linguists excited about it?

- Typesetting trees and glosses can be painful;
- Aligning these graphics and matrices yourself is quite a task.
- LaTeX makes these tasks easier. Let's see how.

Drawing Trees using the ‘qtree’ package

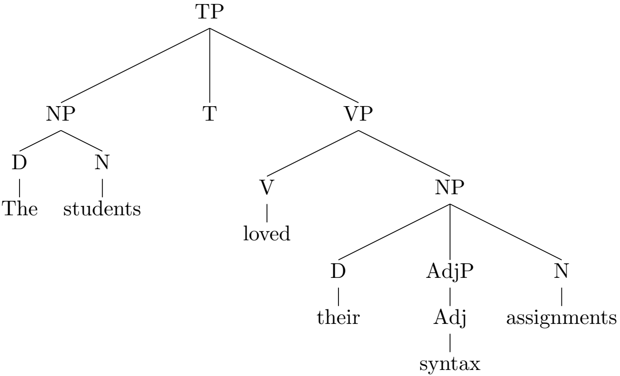
I already gave away most of the story when we looked at LATEX Previewer.
Remember how we had to add a ’qtree’ package? We will need to do that here, too, by adding `\usepackage{qtree}` to the preamble.

Drawing Trees using the ‘qtree’ package

`\usepackage{qtree}` in the preamble, the following code in the text:

```
\Tree [.TP [.NP [.D The ] [.N students ]] [.T ] [.VP [.V loved ]
[.NP [.D their ] [.AdjP [.Adj syntax ]] [.N assignments ]]]]
```

Output:

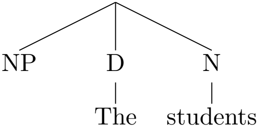


Drawing Trees using the ‘qtree’ package

Yay! No more saving individual files and inputting them into a document, and no more worrying about having to make changes to our trees later! But don’t forget:

- There must be a dot preceding the non-terminal and root node labels

  ```
  \Tree [NP [.D The ] [.N students ]]
  ```

- There must be a space between a terminal node and the closing bracket] otherwise it does not compile:

  ```
  \Tree [.NP [.D The ] [.N students]]
  ```

  ```
      LaTeX Error: \begin{tabular} on input line 6 ended by
      \end{document}.
  ```

Drawing Trees using the ‘qtree’ package

What about foreign language examples? First, we might need to use IPA symbols, like in the Hixkaryana example from the homework:

- kuraha yonyhoryeno bɨyekomo ‘The boy made a bow.’

The ‘tipa’ package for IPA fonts

There’s a package for that!

```
\usepackage{tipa}
```

ɨ can be made in two ways:

- `\textbari`
- `\textipa{1}`

Hint for finding symbols

- Look in the package documentation for ‘tipa’
- Draw it:
  `http://detexify.kirelabs.org/classify.html`
- Comprehensive LaTeX Symbol List
- The Long Introduction to LaTeX
- Google if you know the name: `latex schwa symbol`

Defining your own commands

That’s a bit long if you want to repeat a symbol multiple times, but you can write a new command!
Put in the preamble or anywhere in the text:

```
\newcommand{\bari}{\textbari}
\newcommand{\be}{\begin{enumerate}}
\newcommand{\ee}{\end{enumerate}}
```

What if we were to try?

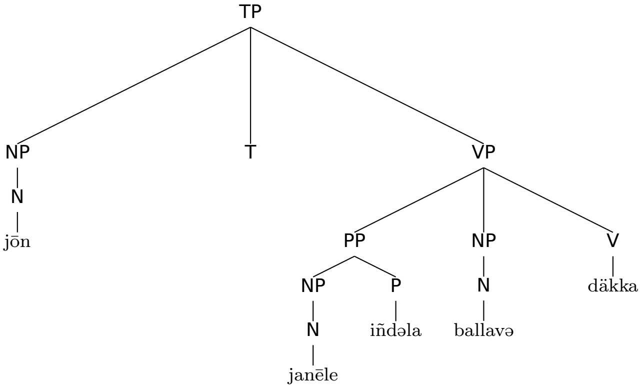
```
\newcommand{\i}{\textbari}
```

```
LaTeX Error: Command \i already defined.
```

Sometimes the name you choose will already be defined. In this case, you can rename the command, but you might want to check and see what symbol you are renaming.

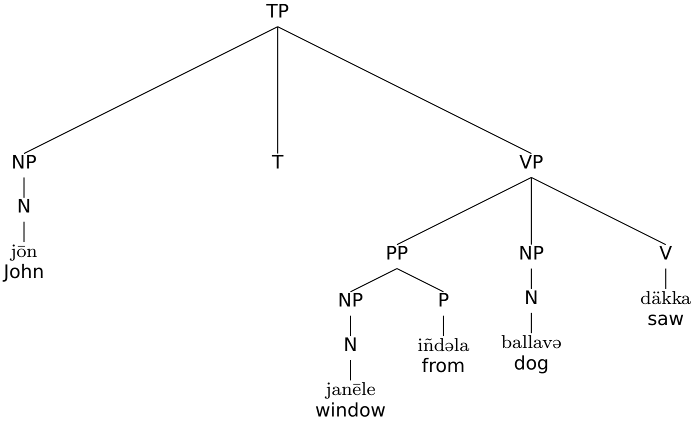
```
\renewcommand{\i}{\textbari}
```

Back to drawing foreign language trees



```
\Tree [.TP [.NP [.N j\=on ]] T [.VP [.PP [.NP [.N jan\=ele ]]
[.P i\~nd\sh{}la ]] [.NP [.N ballav\sh{} ]] [.V d\"akka ]]]
```

Back to drawing foreign language trees



```
\Tree [.TP [.NP [.N {j\=on \\ John} ]] T [.VP [.PP [.NP
[.N {jan\=ele \\ window} ]] [.P {i\~nd\sh{}la \\ from} ] ] [.NP
[.N {ballav\sh{} \\ dog} ]] [.V {d\"akka \\ saw} ]]]
```

Bracketed Diagrams

Bracketed diagrams are easy with the linguex package if you made your trees using qtree; you just take the dots away.

(1) [$_{\text{TP}}$ [$_{\text{NP}}$ [$_{\text{D}}$ The] [$_{\text{N}}$ students]] [$_{\text{T}}$] [$_{\text{VP}}$ [$_{\text{V}}$ loved] [$_{\text{NP}}$ [$_{\text{D}}$ their] [$_{\text{AdjP}}$ [$_{\text{Adj}}$ syntax]] [$_{\text{N}}$ assignments]]]]

```
\exi. [TP [NP [D The ] [N students ]] [T ] [VP [V loved
[NP [D their ] [AdjP [Adj syntax ]] [N assignments ]]]]
```

Glosses

```
\usepackage{linguex}
```

(2) kuraha yonyhoryeno bɨyekomo.
bow made boy
‘The boy made a bow.’

```
\exg. Kuraha yonyhoryeno b\i{}yekomo.\\
bow made boy\\
‘The boy made a bow.’
```

Glosses

(3) Dit is een voorbeeldje in het Nederlands.
This is a little example in Dutch.
‘The boy made a bow.’

```
\exg. Dit is een voorbeeldje in het Nederlands.\\
This is a {little example} in {} Dutch.\\
‘This is a little example in Dutch.’
```

Phrase Structure Rules

TP → {NP/CP} T VP

```
TP $\to$ \{NP/CP\} T VP
```

Cross-referencing

Give something a label name `\label{ex1}`
and reference to it later using `\ref{ex1}`

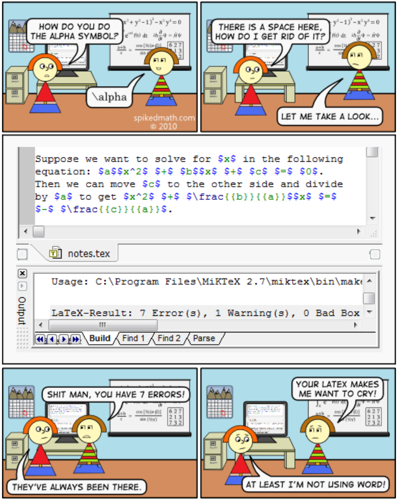
1. first item
2. second item

In the item in (1)... while in the item in (2)...

```
\begin{enumerate}
    \item \label{ex1} first item
    \item \label{ex2} second item
\end{enumerate}

In the item in (\ref{ex1})... while in the item
in (\ref{ex2})...
```

Graphics

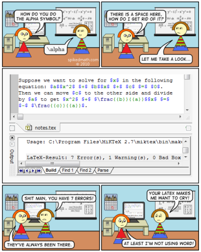

HOW DO YOU DO THE ALPHA SYMBOL?
\alpha
spikedmath.com © 2010
THERE IS A SPACE HERE, HOW DO I GET RID OF IT?
LET ME TAKE A LOOK...
notes.tex
Output
Build
Find 1
Find 2
Parse
SHIT MAN, YOU HAVE 7 ERRORS!
THEY'VE ALWAYS BEEN THERE.
YOUR LATEX MAKES ME WANT TO CRY!
AT LEAST I'M NOT USING WORD!

```
Suppose we want to solve for $x$ in the following
equation: $a$$x^2$ $+$ $b$$x$ $+$ $c$ $=$ $0$.
Then we can move $c$ to the other side and divide
by $a$ to get $x^2$ $+$ $\frac{{b}}{{a}}$$x$ $=$
$-$ $\frac{{c}}{{a}}$.
```

```
Usage: C:\Program Files\MiKTeX 2.7\miktex\bin\make

LaTeX-Result: 7 Error(s), 1 Warning(s), 0 Bad Box
```

Graphics



HOW DO YOU DO THE ALPHA SYMBOL?
\alpha
spikedmath.com © 2010
THERE IS A SPACE HERE, HOW DO I GET RID OF IT?
LET ME TAKE A LOOK...

```
Suppose we want to solve for $x$ in the following
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Then we can move $c$ to the other side and divide
by $a$ to get $x^2$ $+$ $\frac{{b}}{{a}}$$x$ $=$
$-$ $\frac{{c}}{{a}}$.
```

```
Usage: C:\Program Files\MiKTeX 2.7\miktex\bin\make

LaTeX-Result: 7 Error(s), 1 Warning(s), 0 Bad Box
```

Build
Find 1
Find 2
Parse
SHIT MAN, YOU HAVE 7 ERRORS!
THEY'VE ALWAYS BEEN THERE.
YOUR LATEX MAKES ME WANT TO CRY!
AT LEAST I'M NOT USING WORD!

```
\includegraphics[height=0.4\textheight]{Graphics/comic.png}
```

- Requires `\usepackage{graphicx}` in the preamble
- Several file formats possible depending on dvi-driver. For pdfLaTeX pdf, png, jpg.
- other optional arguments like width, angle, size