

Latex for Linguistics Notes*

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*Acknowledgments: tons and tons of other latex for linguists websites and tutorials

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Abstract

This is an abstract of what this paper is about. This collection of latex source started in 2003 from reading a LaTeX for Everyone by Jane Hahn (published in 1993). Since then, a number of commands had changed in L^AT_EX 2_ε. This document contains the latest commands (to my knowledge) as of Feb 2008. This document is designed to contain tons of Latex examples that a linguist can copy and paste into their own documents, it should also help with a bit of theory so you can learn how to get the packages you need to run the code, and you can learn how to tweak the example code by looking up the documentation for those packages, or for LaTeX in general. It should get you up and running as a good mentor should. As you read the .pdf output of this .tex file you can bounce back and forth between the output (.pdf) and the source (.tex) to see how the output was coded. LaTeX is certainly one of the easiest programming languages you can learn. Essentially, almost all latex comands are 1 place predicates that start with a slash and take one obligatory argument in curly braces {arg} and perhaps optional (comma seperated) arguments in square brackets [arg1,arg2,arg3], take a look at the code to see some examples

Alternatively, you can make an abstract like this (see source). blah blah blah blah blah
 blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah blah
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Part I

Instalation

1 How to use LaTeX

You can use Latex on Windows, MacOS and Linux.

LaTeX is a type of programming language for formating scientific texts/books. It's not a Word Processor (like Microsoft Word, WordPad or WordPerfect). In fact, all word processors save their documents

in a code that is readable by that application. LaTeX is like this code, its a level deeper than what you view, and allows you more control over the document than a Word Processor.

LaTeX makes it very easy to draw uniform diagrams and write formulas using plain text. If you already know a bit about HTML or any other programming language this will be easy for you.

There are 3 steps to making a file in LaTeX.

- Edit a plain text file.
- run LaTeX to process the file.
- view the output (there are three formats for the output, dvi, ps, pdf. there are differences that will be discussed later).

After you are finished your document it will exist as a .pdf

LaTeX began on the Linux operating system. So the installation for Linux users is very common and there are plenty of explanations online. Similarly Mac OS X is actually based off of Linux, so its also common to install Latex on a Mac. Since running Latex on Microsoft Windows is the most complicated, I will explain a way to install LaTeX on a MS Windows machine. (If you have a Mac you can try <http://www.esm.psu.edu/mac-tex/>)

1.1 Windows instalation

Getting \LaTeX to run on windows can be annoying. As of March 2008 here is something that works:

- Download MikTeX (the distribution of LaTeX for windows, for linux its teTeX, for Mac its XeTeX or something like that),
 - download and open a file similar to setup-2.7.2904.exe This file is both for downloading, and for installing.
 - First choose the Download MiKTeX, then choose Basic (it takes less time to download) or choose Complete (this is better if you can do it, because you will have less problems installing packages later)
 - Choose a source to download from (the sources in the united states are not reliable and quit downloading in the middle, the sources from canada and austria work pretty well. if the source stops downloading in the middle you can just repeat the same process and it will skip the files that it has already sucessfully downloaded and continue to download where it left off.)
- Install MikTeX using the same file as before: setup-2.7.2904.exe
- Install an IDE (Integrated Development Environment) a centralized place to edit your LaTeX source, and view the output(s) in DVI, PS or PDF format. There are two options I know about: TeXnicCenter (a file named something like TXCSetup_1Beta7_01.exe) and TexMaker, but I've had far more errors and trouble using TexMaker, so I like TeXnicCenter better.
- Install Ghostscript and Ghostview (do an internet search for them and how to install them)
- Open a .tex file using the IDE (TeXnixCenter), browse around and try to latex it
- Install packages that you need (often if you need a package a box will pop up when you latex the file which will ask you to download the file. This might work. But, a surefire way to install packages is to go to *Start >> Programs >> MiKTeX >> BrowsePackages*)
- If you have packages that you want to use, but they aren't downloadable (ie, you made them or someone else made them) then you can go *Start >> Programs >> MiKTeX >> Settings* again you should browse around and become familiar with the options. Choose the Roots tab, this is a list of directories where the packages (.sty files) can be saved. Basically you can put your .sty files into C:
Local TeX Files , then go the General tab in the Settings box, and click on Refresh FNDB (this refreshes the database of packages, and it should find your new packages)
- Try editing your .tex document, and viewing it. You might have to explore around the IDE (TeXnicCenter) to find out how to do a spell check, how to latex the document, how to view the document, and how to change your output between DVI, PS and PDF.

(Note, this advice is old, from 2003 and might not be true anymore.) There are basically 4 stages to get from a .tex file to the .pdf that you can distribute.

- Latex the file into a DVI (Device Independent Format)
now the output is viewable with Yap
- dvips the file from dvi to ps (Post Script, a language that printers can read, the predecessor of pdf)
now the output is viewable with Ghost View
- distill/print the document from ps to pdf (Portable Document Format)
now the output is viewable with Adobe Reader/Professional

These extra stages have been recently bypassed using pdfTeX. This makes a better pdf using modern pdf features. But, linguists use a number of packages that use ps specials (specials are arrows and lines) that can only be displayed in ps, which are then converted into images when the document is made as a pdf.

So, for most linguistics papers we are forced to go through the 4 stages of output. If you ever have arrows and graphics that dont show up, (or error messages like “Non-PDF special ignored!”) chances are youre using pdfTeX, and you need to change some options in your IDE to get it to go through all the dvi and ps stages. You can still view the document, you will just be missing the fancy specials...

Part II

Using LaTeX

2 Here is a Section

In this section (Section 2) we will first see how to make sections (in 2), subsections (in 2.1) and subsubsections (in 2.1.1). In §2.2 we will see some more advanced tools for sectioning.

2.1 This is a subsection

‘Twas brillig, and the slithy toves Did gyre and gimble in the wabe: All mimsy were the borogoves, And the mome raths outgrabe.

“Beware the Jabberwock, my son! The jaws that bite, the claws that catch! Beware the Jubjub bird, and shun The frumious Bandersnatch!”

2.1.1 This is a subsubsection

He took his vorpal sword in hand: Long time the manxome foe he sought— So rested he by the Tumtum tree, And stood awhile in thought.

And, as in uffish thought he stood, The Jabberwock, with eyes of flame, Came whiffing through the tulgey wood, And burbled as it came!

One, two! One, two! And through and through The vorpal blade went snicker-snack! He left it dead, and with its head He went galumphing back.

2.1.2 Paragraphs and subparagraphs

This is just about the headings use of paragraphs. The spacing of paragraphs is discussed in §4.

This is a paragraph “And hast thou slain the Jabberwock? Come to my arms, my beamish boy! O frabjous day! Callooh! Callay!” He chortled in his joy.

This is a subparagraph ‘Twas brillig, and the slithy toves Did gyre and gimble in the wabe: All mimsy were the borogoves, And the mome raths outgrabe.

2.2 Advanced Sectioning: Section headings are automatically displayed in the table of contents

You must always tex a document twice in order to get a correct table of contents, and to get the references to be correctly evaluated.

The table of contents will be displayed where you use the command `\tableofcontents`.

Although sections are automatically put in the Table of Contents (TOC), there are three things you can do to change this.

- You can use section headings as just headings (that don't appear in the TOC and don't have a number) with `\section*{JustAHeading}`
- You can specify an optional argument for the section's TOC entry (to modify/shorten a section heading) with `\section[ShortVersion]{FullVersion}`
- You can add a non-numbered line¹ in the TOC (to indicate a new Part) with `\addcontentsline{toc}{section}{PartII:}`

But this subsection will have no number and serves as a heading

To make a simple heading you can add an asterisk in the code between the command and its argument (see code).

2.2.1 Long: Occams greatest Razor and Shaving Cream

This section's TOC entry is different from its heading in the text. The TOC entry is specified in an [optional argument] (see code).

3 Cross Referencs

References `\ref{}` (not to be confused with a bibliography) will take the number of the example or section that their corresponding `\label{}` command is located after (look for some examples in the code). You can also do `\pageref{}` For example, spacing is discussed on page 5.

Counters can be reset (counters: part, chapter, section, subsection, subsubsection, paragraph, page, equation, figure, table, footnote, enumi, enumii). See the source between the table of contents and document body, and between the body and the appendix.

You can create your own counter with `newcounter`, do an internet search for more info.

It helps to name your labels with a prefix depending on what they are, ie a section as `sec:` or example as `ex:` (see code for examples).

4 How Spacing Works in LaTeX

4.1 Basic Spacing: spaces, paragraphs, tabs

\LaTeX ignores spacing in your source code, it handles all the spacing for you. Ignoring the spacing in code is actually useful, it means you can space your code so that it is easy to read.

(1) Summary of Spacing, and ways to force it

- Any number of blank lines will make a new paragraph (use `\\` force a paragraph)
- Indentation is handled automatically (use `\noindent` to force no indentation)
- Any number of spaces will make 1 space (use `~` to force a space)
- Tabs are completely ignored. (use `~~~~~` or `\hspace{.3in}` to force a tab)

¹The `addcontentsline` must appear on the same page as the unnumbered heading in order to have the right page number in the table of contents.

The tilda is also useful for things like § 1, Section 1, Generalization 1, Figure 1, Example 1 where you don't want the 'Example' and the '1' to be separated by a line break (see code).

You can get a single line break like this
and this.

4.2 Indentation: Using quote and quotation

The formatted output (3) was created with forced spacing. The unformatted output (2) is what it looks like with no forced spacing:

- (2) Here is what an unformatted 'Le Jabberwock' looks like:
- Il était grilheure; les slictueux toves Gyraient sur l'alloinde et vriblaient: Tout flivoreux allaient les borogoves; Les verchons fourgus bourniflaient.
- “Prends garde au Jabberwock, mon fils! A sa gueule qui mord, à ses griffes qui happent! Gare l'oiseau Jubjube, et laisse En paix le frumieux Bandersnatch!”
- Le jeune homme, ayant pris sa vorpaline épée, Cherchait longtemps l'ennemi manziquais... Puis, arrivé prs de l'Arbre Tépé, Pour réfléchir un instant s'arrêtait.
- Or, comme il ruminait de suffêches penses, Le Jabberwock, l'oeil flamboyant, Ruginiflant par le bois touffeté, Arrivait en barigoulant.
- Une, deux! Une, deux! D'outre en outre! Le glaive vorpalin virevolte, flac-vlan! Il terrasse le monstre, et, brandissant sa tête, Il s'en retourne galomphant.
- “Tu as donc tué le Jabberwock! Dans mes bras, mon fils rayonnois! O jour frabieux! Callouh! Callock!” Le vieux glouffait de joie.
- Il était grilheure; les slictueux toves Gyraient sur l'alloinde et vriblaient: Tout flivoreux allaient les borogoves; Les verchons fourgus bourniflaient.

- (3) Here is what 'Le Jabberwock' should look like.

'Le Jabberwock'
Translated by Henri Parisot:
<http://www.keithlim.com/jabberwocky/translations/index.html>

Il était grilheure; les slictueux toves
Gyraient sur l'alloinde et vriblaient:
Tout flivoreux allaient les borogoves;
Les verchons fourgus bourniflaient.

“Prends garde au Jabberwock, mon fils!
A sa gueule qui mord, à ses griffes qui happent!
Gare l'oiseau Jubjube, et laisse
En paix le frumieux Bandersnatch!”

Le jeune homme, ayant pris sa vorpaline épée,
Cherchait longtemps l'ennemi manziquais...
Puis, arrivé prs de l'Arbre Tépé,
Pour réfléchir un instant s'arrêtait.

Or, comme il ruminait de suffêches penses,
Le Jabberwock, l'oeil flamboyant,
Ruginiflant par le bois touffeté,
Arrivait en barigoulant.

Une, deux! Une, deux! D'outre en outre!
Le glaive vorpalin virevolte, flac-vlan!
Il terrasse le monstre, et, brandissant sa tête,
Il s'en retourne galomphant.

“Tu as donc tué le Jabberwock!
Dans mes bras, mon fils rayonnois!
O jour frabieux! Callouh! Callock!”
Le vieux glouffait de joie.

Il était grilheure; les slictueux toves
Gyraient sur l'alloinde et vriblaient:
Tout flivoreux allaient les borogoves;
Les verchons fourgus bourniflaient.

The formatted output (3) was created using quote. If you want to make a paragraph quotation you can use quotation

Unfortunately, within linguistics it has not been generally recognized how important such formal, theoretical work is; instead there is a feeling that too much concern for theoretical detail is a waste of time. . . [T]he attitude that formal, theoretical work is bound to be both ad-hoc and sterile is, I am convinced, fundamentally mistaken . . .

Morris Halle (1975:530)

4.3 Advanced Spacing: vspace and hspace

You can create vertical space

like this. You can create horizontal space like this. This can be useful in graphics, figures and examples. hspace can be useful in getting Trees to be smaller... but vspace and hspace are hacks that are best avoided and can have bad consequences.

5 Lists and Enumeration

5.1 Enumerated Lists

There are only four levels of list available. You can have an itemize list inside of an enumerated list and vice versa. See Item 1a, Item 1(a)i, Item 1(a)iA for examples of using references in lists.

Here is the automated way enumerated lists look

1. This is the first level
 - (a) This is the second level
 - i. This is the third level
 - A. This is the fourth level
 - (b) This is the second item in the second level
2. This is the second item in the first level

5.2 Itemized Lists

Here is the way that a normal itemized list looks. You change the bullet symbols to anything you want.

- here is a bunch of embedded items
- buy groceries
 - potatoes
 - * red
 - russet

- * yellow
- celery
- frying chicken
- milk
- o Here is a changed example pay bills
- ♡ Here is a changed example do laundry
- (a) Here is a changed example using a literal (a)
- OK Here is a changed example using the word ‘OK’

5.3 Descriptive Lists

Descriptive lists are good for glossaries, and can also be used as a quick solution for references/bibliography.

Dogs Dogs, with their friendly obedient nature, make excellent pets. There are many different sizes of dogs, ranging from a bundle you can hold in one hand to a 50–60 pound animal that begins to resemble a horse.

Cat etc Cats are ideal pets for people who are on-the-go. Independent and intelligent in nature, they do not require a great deal of attention. While being well able to entertain and take care of themselves, cats also offer warmth and affection to their owners.

Birds Birds add a splash of colour and a pleasant background music to the household. The patient bird owner can train his pet to talk and sit on his finger, and even ride around town on his shoulder.

Boersma, Paul & David Weenink 2003, *Praat: Doing Phonetics by Computer*. Version 4.0.43, <http://www.praat.org>.

Keating, Patricia A. 1988, “Underspecification in phonetics,” *Phonology* 5.2, pp. 275-292.

Ohala, John J. Draft 2001, “Aerodynamic Principles” (Chapter 2), “Acoustics”, (Chapter 3) *Phonology in Your Ear*, pp. 3-56.

Ohala, John J. & Manjari Ohala 1995, “Speech perception and lexical representation of vowel nasalization in Hindi and English”, *Phonology and Phonetic Evidence Papers in Laboratory Phonology IV*, Cambridge University Press, pp. 41-60.

6 Examples

6.1 Formating glossed examples

- (4) $k^h\text{əndala ke}_2$ $g^h\text{ət ke}_3$ $upəṛ$ $foto$ $k^h\text{intʃ ke}_4$ $ajē ge$
 Khandala=gen.pl? Ghat=obl above photo take=ke come.pl=fut
 ‘Up on the Khandala Ghat we’ll take a photo.’
 (*Ghulam*, lyrics from ‘Aati kya Khandala?’ 1998)

6.2 Formating using math mode

Equation numbers are usually on the right, but they can be put on the left using [leqno] in the documentclass command (see the preamble in the source)

$$x = y + z \tag{5}$$

That was Equation 5. (Number provided by the ref command.) And another paragraph may follow the equation. To produce the same equation without a number, type the following:

$$x = y + z$$

$$\int_0^\infty f(x) = g(x) \tag{6}$$

$$\sum_1^5 x = 15$$

Using the shorthand notation, \LaTeX will still create

$$x = y + z$$

the equation in the middle of the page even though the source has the equation in the middle of a block of text.

You can access math mode in the text using `\math{x=y+z}` or the short cut: dollar signs `$` around the text that should be formatted in math mode. $x = y + z$ $x = y + z$ this is useful for subscripts e_i or T_{past} and superscripts v^o or $v^{intrans}$. \LaTeX can have the sums and integrals taller or shorter depending on use of `htdisplaystyle` or `textstyle`. Here is an in-line integral: $\int_0^1 f(x) = g(x)$, and here is an in-line summation: $\sum_1^5 x = 15$. They look different from the displayed forms.

Here is a bunch of text to make a paragraph to see how the tall integral will look. Here is a *tall* in-line integral: $\int_0^1 f(x) = g(x)$. And here is a *short* displayed summation (See, they're not pretty when used in the opposite contexts. fortunately latex will take care of that.)

$$\sum_1^5 x = 15$$

$$x = i_{jk} \tag{7}$$

6.2.1 Tailored examples, axioms, theorems, derivations, rules etc

this uses the `covington` package

it makes an exercise numbered according to chapter, section, and subsection (suitable for use in a large book)

Exercise 6.2.1 (Type of exercise) *Prove that the above assertion is true.*

7 Languages and quick ways to make accents and diacritics

ò Ó ó ô õ ö ÷ ø Ò Ó ô õ ö ÷ ø ŧ ſ Q q Œ œ Æ æ Æ Æ Å å Ø ø ß ð ; © £ ¶ 75 § † ‡

¿ Como está usted?

Notre amour est chose légère.

Ein Vögelein fliegt über den Rhein.

A Code Samples

A.1 Phonology

A.1.1 Inventories

uses no special package

(8) Surface Inventory for Consonants

Stops	p,b	t,d	ɖ		k,g	ʔ
Fricatives		s				h
Affricates				č,ǰ		
Nasals	m	n	ɳ	ɲ	ŋ	
Liquids		l	r			
Glides				j	w	

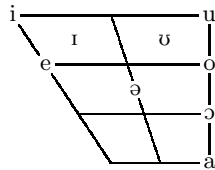
uses no special packages

(9) Romanian Surface Consonant Inventory

		Secondary Specifications					
		[-cont]	[-cont]	[+cont]	[+nas]	[+lat]	[+rotic]
		[-strid]	[+strid]	[+strid]			
Primary Articul	[labial]	p	b	f	v	m	
	[cor, +ant]	t	d	ts	dz	s	z
	[cor, -ant]			tʃ	dʒ	ʃ	ʒ
	[dorsal]	k	g	x		ŋ	
	[glottal]	h					

uses the vowel package

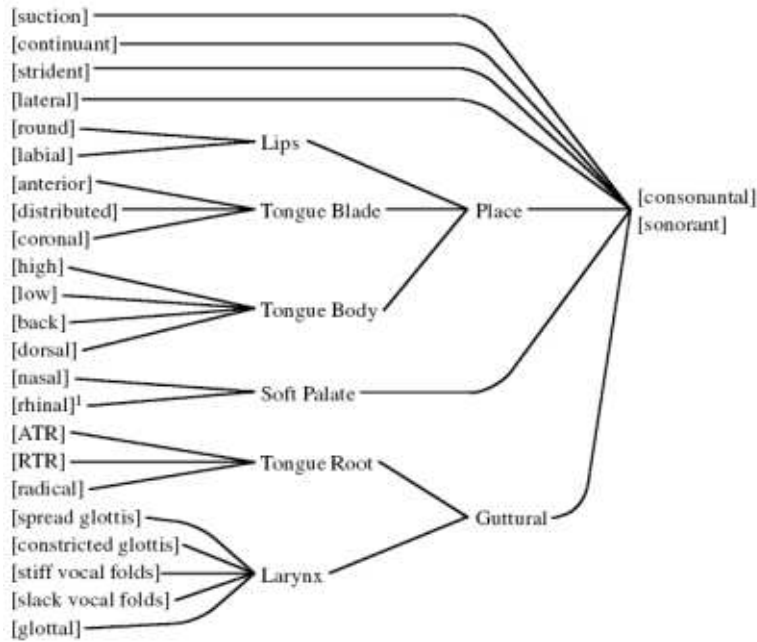
(10) Surface Inventory for Vowels



A.1.2 Feature Geometry

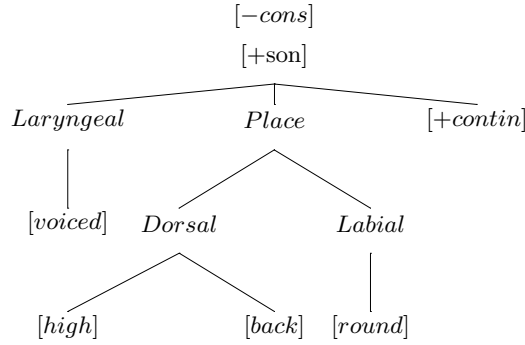
uses graphicx package

(11) Feature Specifications (Halle, Vaux, Wolf 2000)



uses xyling package

(12) Halle-Sagey Style Representation of Shared Features of *singular* /u/



uses no special packages

- (13) Obstruent+Stop clusters

$$[-son] \begin{bmatrix} -son \\ -cont \\ \alpha voice \end{bmatrix} \rightarrow \begin{bmatrix} -son \\ \alpha voice \end{bmatrix} \begin{bmatrix} -son \\ -cont \\ \alpha voice \end{bmatrix}$$

uses no special packages

- (14) Obstruent+Fricative clusters

$$[-son] \begin{bmatrix} -son \\ +cont \end{bmatrix} \rightarrow \begin{bmatrix} -son \\ -voice \end{bmatrix} \begin{bmatrix} -son \\ +cont \\ -voice \end{bmatrix}$$

uses mathmode but no special package

- (15) What is the relationship between [a] and [ɔ] ?

Full Specification Approach

Change : +low → -low, -round → +round

$$[a] : \begin{bmatrix} +syl \\ +voiced \\ -high \\ +back \\ -ATR \\ +low \\ -round \end{bmatrix} \quad [ɔ] : \begin{bmatrix} +syl \\ +voiced \\ -high \\ +back \\ -ATR \\ -low \\ +round \end{bmatrix}$$

Contrastive Specification Approach

Change : +low → -low

Fill : Øhigh → -high, Øback → +back, ØATR → -ATR, Øround → +round

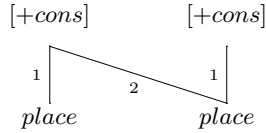
$$[a] : \begin{bmatrix} +syl \\ +low \end{bmatrix} \quad [ɔ] : \begin{bmatrix} +syl \\ -high \\ +back \\ -ATR \\ -low \\ +round \end{bmatrix}$$

A.1.3 Assimilation, Spreading and Feature Specification

uses xyling package

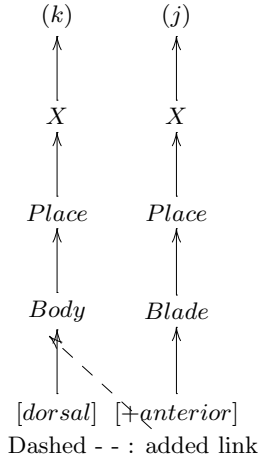
- (16) Place Agreement

Place of articulation spreads from left to right (indicated by (2)).



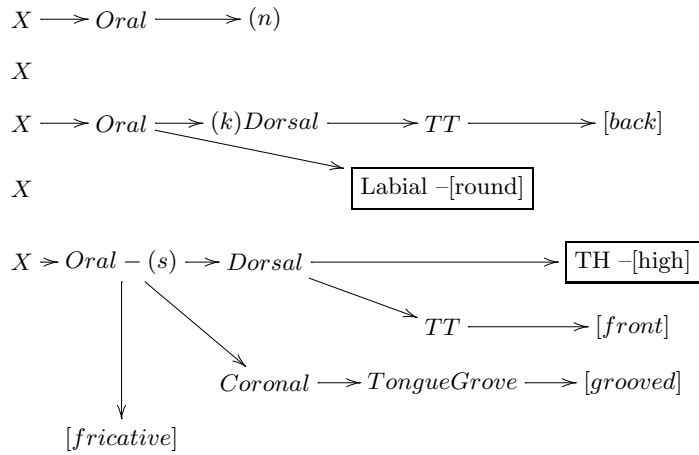
uses xyling package

(17) Anterior Assimilation Rule: Velars



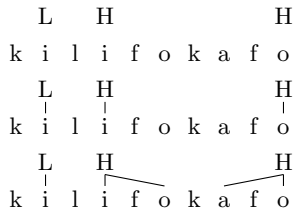
uses xyling package

(18) $næk^w æs^j$ floating Labial [round] and final TH [high] associate



uses pst-autoseg package

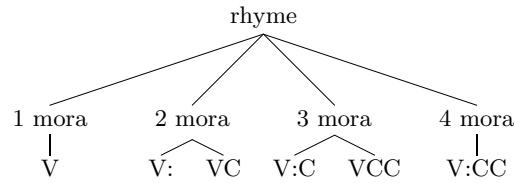
(19) Derivation, association, cyclic spreading inwards



A.1.4 Prosodic Structures

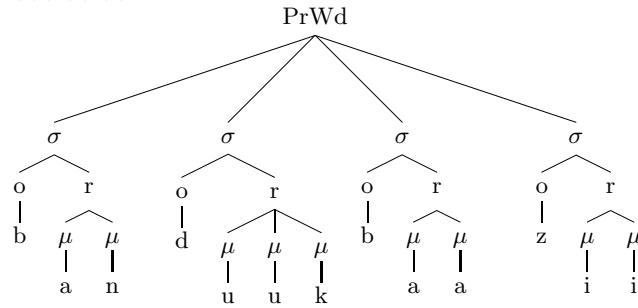
uses qtreegina package

(20) Hindi Rhyme configurations (Shukla, 2000)



uses qtreenina package

(21) $\mu.\mu\mu\mu.\mu\mu.\mu\mu$: ban'du:kba:zi: 'marksmanship'



A.1.5 Stress projection and Tone association

uses xyling

(22) 1. Project vowels

L *H* *L* *L* *L*
t *a* *n* *e* *p* *w* *a* *t* *i* *n* *a*

2. Insert L bracket to the L of H

L (*H* *L* *L* *L*
t *a* *n* *e* *p* *w* *a* *t* *i* *n* *a*

3. Iterate: Insert L bracket to the L of pairs

L (*H* *L* (*L* *L*
t *a* *n* *e* *p* *w* *a* *t* *i* *n* *a*

4. Head: Left, project head

X *X*
L (*H* *L* (*L* *L*
t *a* *n* *e* *p* *w* *a* *t* *i* *n* *a*

5. Edge: R bracket to the R of the R most element

X *X*)
L (*H* *L* (*L* *L*
t *a* *n* *e* *p* *w* *a* *t* *i* *n* *a*

6. Head: Right, project head

X *X*)
L (*H* *L* (*L* *L*
t *a* *n* *e* *p* *w* *a* *t* *i* *n* *a*

A.1.6 Optimality Theory

uses pifont package the hand defined in preamble

as well as color and colortab packages, and the lightgrey defined in the preamble
as well as the ranking comands fg and og defined in the preamble

Input:	/kat+z/	*	-son avoice	-son -avoice	IDENT-IO(voice)	*	-son +voice
(23)	☞ [kats]				*		
	[kadz]				*	*!	*
	[gats]				* *!		*
	[katz]		*!				*
	[kads]		*!		* *		*

uses pifont package the hand defined in preamble
as well as the ranking comands fg and og defined in the preamble

	tanepwtina	*Clash	WSP	Ft Bin	Right most	NonFin Stress	Parse Syl	All FtR	Non Fin
(24)	☞ ta(nèpwa)(tína)						*	**	*
	(tanèp)wa(tína)						*	***!	*
	ta(nèpwa)(tiná)					*!	*	**	*
	ta(nèpwa)(tìna)				*!		*	**	*
	(tanèp)(watína)				*!		*	****	
	(ta)(nèpwa)(tína)			*!				*****	*
	(tànep)wa(tína)		*!				*	**	*

uses pifont package the hand defined in preamble
as well as the ranking comands fg and og defined in the preamble

(25) H Deletion

		*[_σ h	Max IO	Onset	No Coda
	/butuh/				
MostFaith	☞ bu.tuh				*
LeastMark	MaxIO ≧ NoCoda			*	
	/butuh/+e/				
	☞ bu.tu.e			*	*
MostFaith,LeastMark	*[_σ h ≧ MaxIO,Onset			*	

uses supertabular package
as well as the ranking comands fg and og defined in the preamble

(26) A factorial typology of reduplication systems - Kager Ch5,Ex5

Five factorial (!5) is $5*4*3*2*1 = 120$ different rankings

1	ALIGN-RED-L	≧MAX-BR	≧NO-CODA	≧ONSET	≧RED-σ
2	ALIGN-RED-L	≧MAX-BR	≧NO-CODA	≧RED-σ	≧ONSET
3	ALIGN-RED-L	≧MAX-BR	≧ONSET	≧NO-CODA	≧RED-σ
4	ALIGN-RED-L	≧MAX-BR	≧ONSET	≧RED-σ	≧NO-CODA
5	ALIGN-RED-L	≧MAX-BR	≧RED-σ	≧ONSET	≧NO-CODA
6	ALIGN-RED-L	≧MAX-BR	≧RED-σ	≧NO-CODA	≧ONSET
7	ALIGN-RED-L	≧NO-CODA	≧MAX-BR	≧ONSET	≧RED-σ
8	ALIGN-RED-L	≧NO-CODA	≧MAX-BR	≧RED-σ	≧ONSET
9	ALIGN-RED-L	≧NO-CODA	≧ONSET	≧MAX-BR	≧RED-σ
10	ALIGN-RED-L	≧NO-CODA	≧ONSET	≧RED-σ	≧MAX-BR
11	ALIGN-RED-L	≧NO-CODA	≧RED-σ	≧ONSET	≧MAX-BR
12	ALIGN-RED-L	≧NO-CODA	≧RED-σ	≧MAX-BR	≧ONSET
13	ALIGN-RED-L	≧ONSET	≧NO-CODA	≧MAX-BR	≧RED-σ
14	ALIGN-RED-L	≧ONSET	≧NO-CODA	≧RED-σ	≧MAX-BR
15	ALIGN-RED-L	≧ONSET	≧MAX-BR	≧NO-CODA	≧RED-σ
16	ALIGN-RED-L	≧ONSET	≧MAX-BR	≧RED-σ	≧NO-CODA

17	ALIGN-RED-L	»ONSET	»RED- σ	»MAX-BR	»No-CODA
18	ALIGN-RED-L	»ONSET	»RED- σ	»No-CODA	»MAX-BR
19	ALIGN-RED-L	»RED- σ	»No-CODA	»ONSET	»MAX-BR
20	ALIGN-RED-L	»RED- σ	»No-CODA	»MAX-BR	»ONSET
21	ALIGN-RED-L	»RED- σ	»ONSET	»No-CODA	»MAX-BR
22	ALIGN-RED-L	»RED- σ	»ONSET	»MAX-BR	»No-CODA
23	ALIGN-RED-L	»RED- σ	»MAX-BR	»ONSET	»No-CODA
24	ALIGN-RED-L	»RED- σ	»MAX-BR	»No-CODA	»ONSET
25	MAX-BR	»ALIGN-RED-L	»No-CODA	»ONSET	»RED- σ
26	MAX-BR	»ALIGN-RED-L	»No-CODA	»RED- σ	»ONSET
27	MAX-BR	»ALIGN-RED-L	»ONSET	»No-CODA	»RED- σ
28	MAX-BR	»ALIGN-RED-L	»ONSET	»RED- σ	»No-CODA
29	MAX-BR	»ALIGN-RED-L	»RED- σ	»ONSET	»No-CODA
30	MAX-BR	»ALIGN-RED-L	»RED- σ	»No-CODA	»ONSET
31	MAX-BR	»No-CODA	»ALIGN-RED-L	»ONSET	»RED- σ
32	MAX-BR	»No-CODA	»ALIGN-RED-L	»RED- σ	»ONSET
33	MAX-BR	»No-CODA	»ONSET	»ALIGN-RED-L	»RED- σ
34	MAX-BR	»No-CODA	»ONSET	»RED- σ	»ALIGN-RED-L
35	MAX-BR	»No-CODA	»RED- σ	»ONSET	»ALIGN-RED-L
36	MAX-BR	»No-CODA	»RED- σ	»ALIGN-RED-L	»ONSET
37	MAX-BR	»ONSET	»No-CODA	»ALIGN-RED-L	»RED- σ
38	MAX-BR	»ONSET	»No-CODA	»RED- σ	»ALIGN-RED-L
39	MAX-BR	»ONSET	»ALIGN-RED-L	»No-CODA	»RED- σ
40	MAX-BR	»ONSET	»ALIGN-RED-L	»RED- σ	»No-CODA
41	MAX-BR	»ONSET	»RED- σ	»ALIGN-RED-L	»No-CODA
42	MAX-BR	»ONSET	»RED- σ	»No-CODA	»ALIGN-RED-L
43	MAX-BR	»RED- σ	»No-CODA	»ONSET	»ALIGN-RED-L
44	MAX-BR	»RED- σ	»No-CODA	»ALIGN-RED-L	»ONSET
45	MAX-BR	»RED- σ	»ONSET	»No-CODA	»ALIGN-RED-L
46	MAX-BR	»RED- σ	»ONSET	»ALIGN-RED-L	»No-CODA
47	MAX-BR	»RED- σ	»ALIGN-RED-L	»ONSET	»No-CODA
48	MAX-BR	»RED- σ	»ALIGN-RED-L	»No-CODA	»ONSET
49	No-CODA	»MAX-BR	»ALIGN-RED-L	»ONSET	»RED- σ
50	No-CODA	»MAX-BR	»ALIGN-RED-L	»RED- σ	»ONSET
51	No-CODA	»MAX-BR	»ONSET	»ALIGN-RED-L	»RED- σ
52	No-CODA	»MAX-BR	»ONSET	»RED- σ	»ALIGN-RED-L
53	No-CODA	»MAX-BR	»RED- σ	»ONSET	»ALIGN-RED-L
54	No-CODA	»MAX-BR	»RED- σ	»ALIGN-RED-L	»ONSET
55	No-CODA	»ALIGN-RED-L	»MAX-BR	»ONSET	»RED- σ
56	No-CODA	»ALIGN-RED-L	»MAX-BR	»RED- σ	»ONSET
57	No-CODA	»ALIGN-RED-L	»ONSET	»MAX-BR	»RED- σ
58	No-CODA	»ALIGN-RED-L	»ONSET	»RED- σ	»MAX-BR
59	No-CODA	»ALIGN-RED-L	»RED- σ	»ONSET	»MAX-BR
60	No-CODA	»ALIGN-RED-L	»RED- σ	»MAX-BR	»ONSET
61	No-CODA	»ONSET	»ALIGN-RED-L	»MAX-BR	»RED- σ
62	No-CODA	»ONSET	»ALIGN-RED-L	»RED- σ	»MAX-BR
63	No-CODA	»ONSET	»MAX-BR	»ALIGN-RED-L	»RED- σ
64	No-CODA	»ONSET	»MAX-BR	»RED- σ	»ALIGN-RED-L
65	No-CODA	»ONSET	»RED- σ	»MAX-BR	»ALIGN-RED-L
66	No-CODA	»ONSET	»RED- σ	»ALIGN-RED-L	»MAX-BR

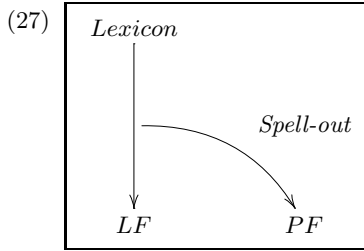
67	NO-CODA	»RED- σ	»ALIGN-RED-L	»ONSET	»MAX-BR
68	NO-CODA	»RED- σ	»ALIGN-RED-L	»MAX-BR	»ONSET
69	NO-CODA	»RED- σ	»ONSET	»ALIGN-RED-L	»MAX-BR
70	NO-CODA	»RED- σ	»ONSET	»MAX-BR	»ALIGN-RED-L
71	NO-CODA	»RED- σ	»MAX-BR	»ONSET	»ALIGN-RED-L
72	NO-CODA	»RED- σ	»MAX-BR	»ALIGN-RED-L	»ONSET
73	ONSET	»MAX-BR	»NO-CODA	»ALIGN-RED-L	»RED- σ
74	ONSET	»MAX-BR	»NO-CODA	»RED- σ	»ALIGN-RED-L
75	ONSET	»MAX-BR	»ALIGN-RED-L	»NO-CODA	»RED- σ
76	ONSET	»MAX-BR	»ALIGN-RED-L	»RED- σ	»NO-CODA
77	ONSET	»MAX-BR	»RED- σ	»ALIGN-RED-L	»NO-CODA
78	ONSET	»MAX-BR	»RED- σ	»NO-CODA	»ALIGN-RED-L
79	ONSET	»NO-CODA	»MAX-BR	»ALIGN-RED-L	»RED- σ
80	ONSET	»NO-CODA	»MAX-BR	»RED- σ	»ALIGN-RED-L
81	ONSET	»NO-CODA	»ALIGN-RED-L	»MAX-BR	»RED- σ
82	ONSET	»NO-CODA	»ALIGN-RED-L	»RED- σ	»MAX-BR
83	ONSET	»NO-CODA	»RED- σ	»ALIGN-RED-L	»MAX-BR
84	ONSET	»NO-CODA	»RED- σ	»MAX-BR	»ALIGN-RED-L
85	ONSET	»ALIGN-RED-L	»NO-CODA	»MAX-BR	»RED- σ
86	ONSET	»ALIGN-RED-L	»NO-CODA	»RED- σ	»MAX-BR
87	ONSET	»ALIGN-RED-L	»MAX-BR	»NO-CODA	»RED- σ
88	ONSET	»ALIGN-RED-L	»MAX-BR	»RED- σ	»NO-CODA
89	ONSET	»ALIGN-RED-L	»RED- σ	»MAX-BR	»NO-CODA
90	ONSET	»ALIGN-RED-L	»RED- σ	»NO-CODA	»MAX-BR
91	ONSET	»RED- σ	»NO-CODA	»ALIGN-RED-L	»MAX-BR
92	ONSET	»RED- σ	»NO-CODA	»MAX-BR	»ALIGN-RED-L
93	ONSET	»RED- σ	»ALIGN-RED-L	»NO-CODA	»MAX-BR
94	ONSET	»RED- σ	»ALIGN-RED-L	»MAX-BR	»NO-CODA
95	ONSET	»RED- σ	»MAX-BR	»ALIGN-RED-L	»NO-CODA
96	ONSET	»RED- σ	»MAX-BR	»NO-CODA	»ALIGN-RED-L
97	RED- σ	»MAX-BR	»NO-CODA	»ONSET	»ALIGN-RED-L
98	RED- σ	»MAX-BR	»NO-CODA	»ALIGN-RED-L	»ONSET
99	RED- σ	»MAX-BR	»ONSET	»NO-CODA	»ALIGN-RED-L
100	RED- σ	»MAX-BR	»ONSET	»ALIGN-RED-L	»NO-CODA
101	RED- σ	»MAX-BR	»ALIGN-RED-L	»ONSET	»NO-CODA
102	RED- σ	»MAX-BR	»ALIGN-RED-L	»NO-CODA	»ONSET
103	RED- σ	»NO-CODA	»MAX-BR	»ONSET	»ALIGN-RED-L
104	RED- σ	»NO-CODA	»MAX-BR	»ALIGN-RED-L	»ONSET
105	RED- σ	»NO-CODA	»ONSET	»MAX-BR	»ALIGN-RED-L
106	RED- σ	»NO-CODA	»ONSET	»ALIGN-RED-L	»MAX-BR
107	RED- σ	»NO-CODA	»ALIGN-RED-L	»ONSET	»MAX-BR
108	RED- σ	»NO-CODA	»ALIGN-RED-L	»MAX-BR	»ONSET
109	RED- σ	»ONSET	»NO-CODA	»MAX-BR	»ALIGN-RED-L
110	RED- σ	»ONSET	»NO-CODA	»ALIGN-RED-L	»MAX-BR
111	RED- σ	»ONSET	»MAX-BR	»NO-CODA	»ALIGN-RED-L
112	RED- σ	»ONSET	»MAX-BR	»ALIGN-RED-L	»NO-CODA
113	RED- σ	»ONSET	»ALIGN-RED-L	»MAX-BR	»NO-CODA
114	RED- σ	»ONSET	»ALIGN-RED-L	»NO-CODA	»MAX-BR
115	RED- σ	»ALIGN-RED-L	»NO-CODA	»ONSET	»MAX-BR
116	RED- σ	»ALIGN-RED-L	»NO-CODA	»MAX-BR	»ONSET

117	RED- σ	»ALIGN-RED-L	»ONSET	»NO-CODA	»MAX-BR
118	RED- σ	»ALIGN-RED-L	»ONSET	»MAX-BR	»NO-CODA
119	RED- σ	»ALIGN-RED-L	»MAX-BR	»ONSET	»NO-CODA
120	RED- σ	»ALIGN-RED-L	»MAX-BR	»NO-CODA	»ONSET

A.2 Morphology

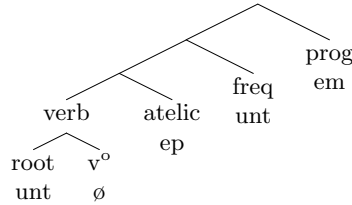
A.2.1 Architecture of the grammar

uses xyling package



uses qtreegina package

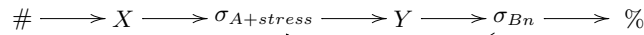
(28) Arrernte Frequentive Forms
verb + ep + finalsyllable + em



A.2.2 Precedence Theory Phonology-Morphology Interface

uses xyling package

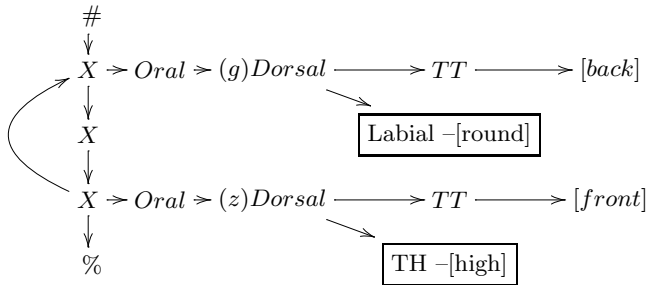
(29) Final syllable precedes stressed syllable



(Where X and Y represent a sequence of 0+ atoms.)

uses xyling package

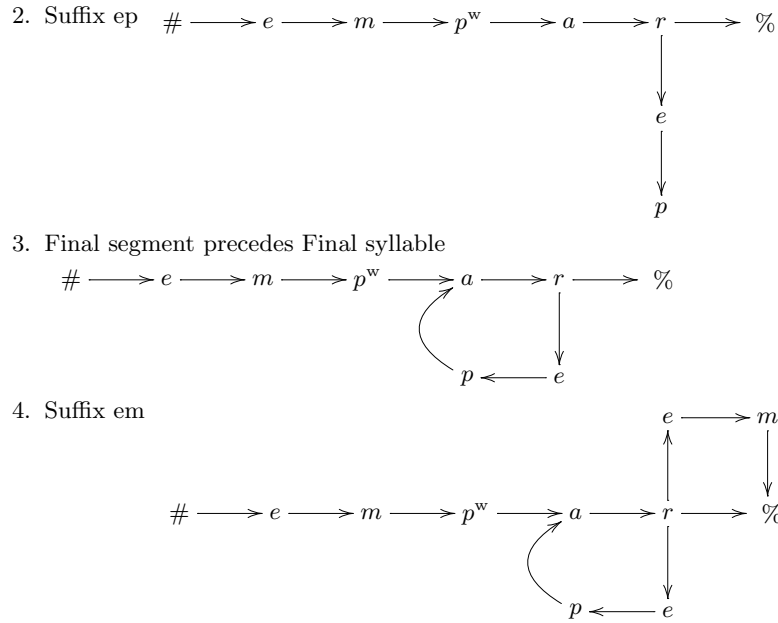
(30) $g^w \partial z^i / g z /$ ‘cut ...’, Labial [round] & TH [high] ‘feminine’, reduplicated



uses xyling

(31) Derivation of Frequentive Forms

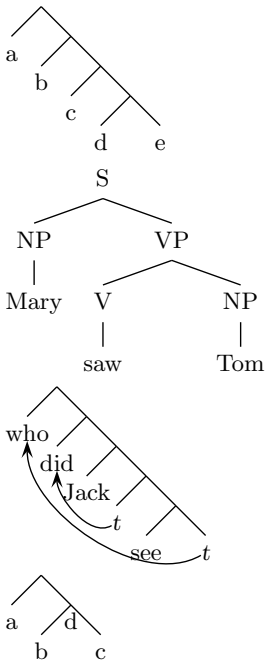
1. Verb $\# \longrightarrow e \longrightarrow m \longrightarrow p^w \longrightarrow a \longrightarrow r \longrightarrow \%$

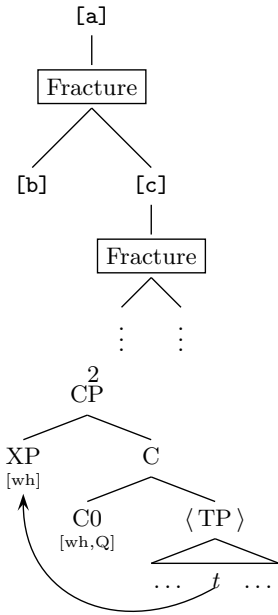


A.3 Syntax

A.3.1 John Frampton's trees

uses pst-jtree, pst-xkey and pstricks packages
 see jtree documentation

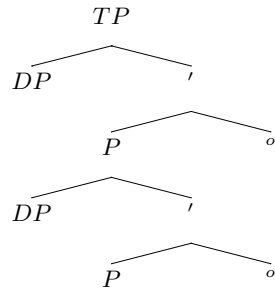




A.3.2 xyling tree templates for copying

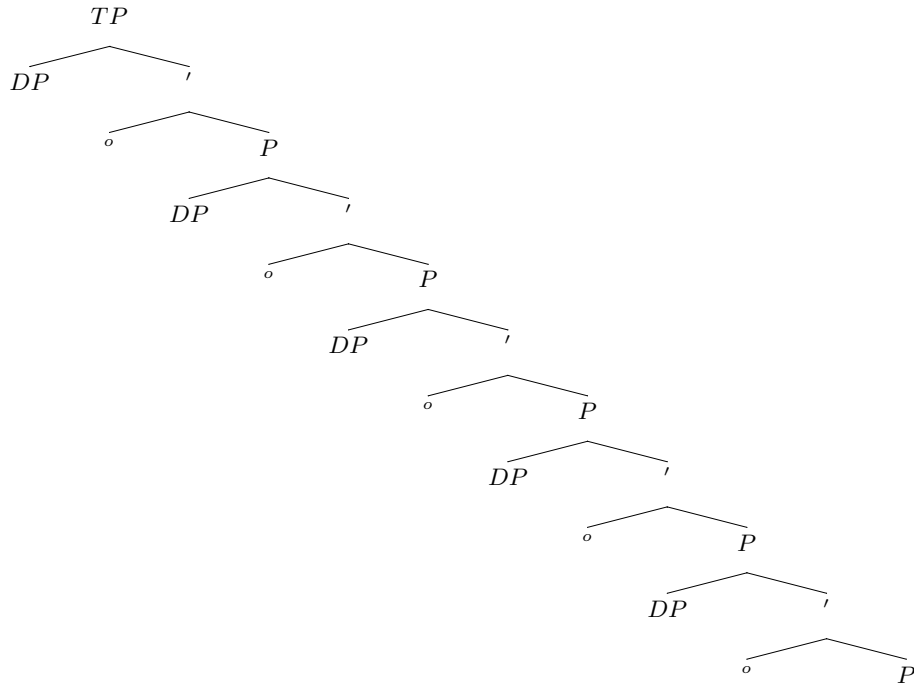
uses xyling package

(32) Head Final Structure for copying



uses xyling package

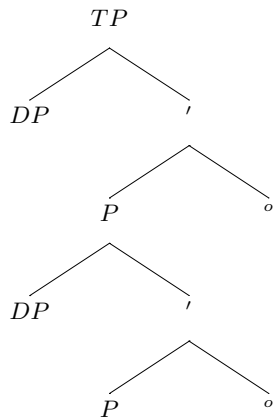
(33) Head Initial Structure for copying



A.3.3 Changing spacing in the tree

uses xyling package

(34) Default space

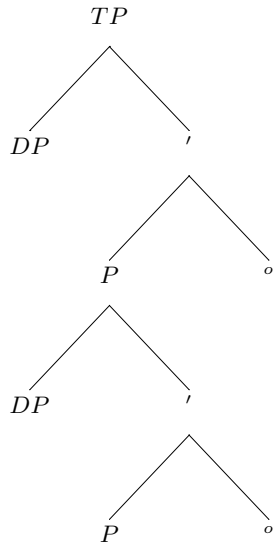


You can use Treek to change the vertical spacing, put its argument in curly braces

`\Treek{3}`

uses xyling package

(35) 3 space

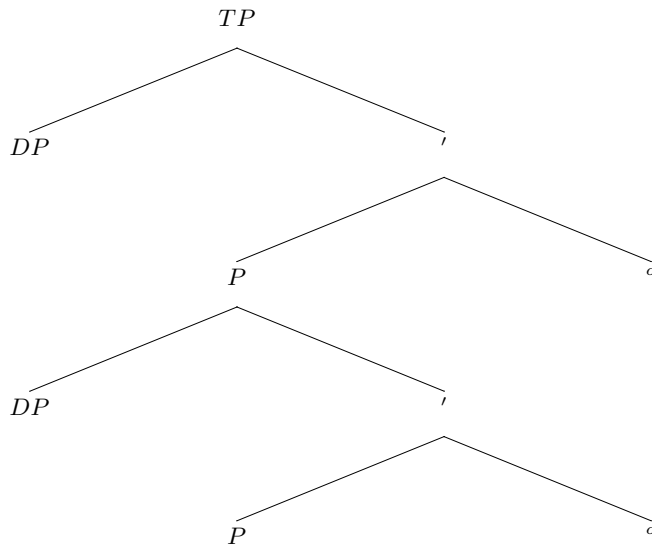


You can also change the horizontal spacing with an optional argument in square brackets in either `Tree` (the default vertical spacing) or `Treek` (a specified vertical spacing)

`\Treek[4]{3}` or `\Tree[4]`

uses `xyling` package

(36) 3 space, with 4 wide



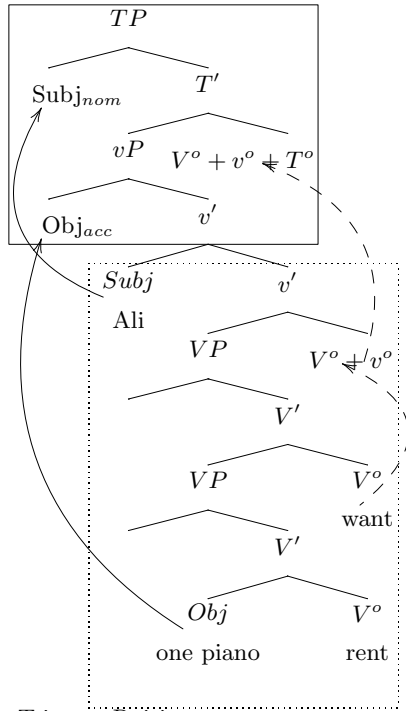
A.3.4 Complicated tree samples

These examples were made from looking at the `xyling` documentation.

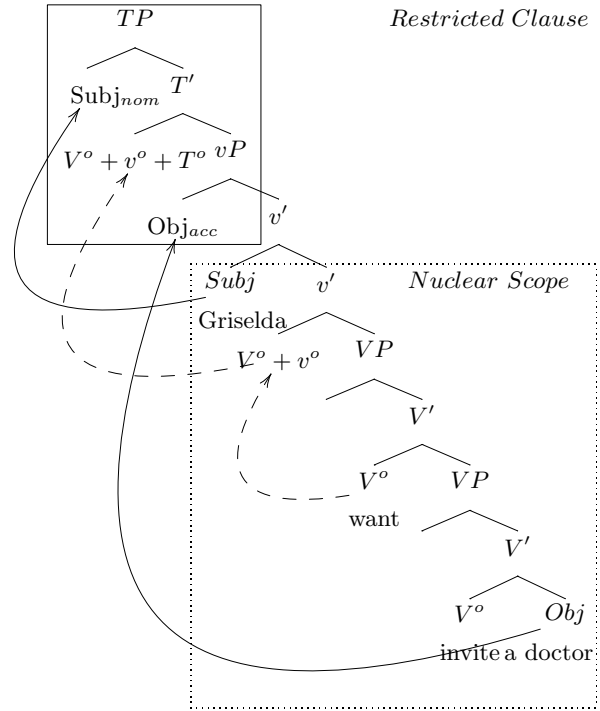
uses `xyling` package

(37) Raising for Case

a) Turkish

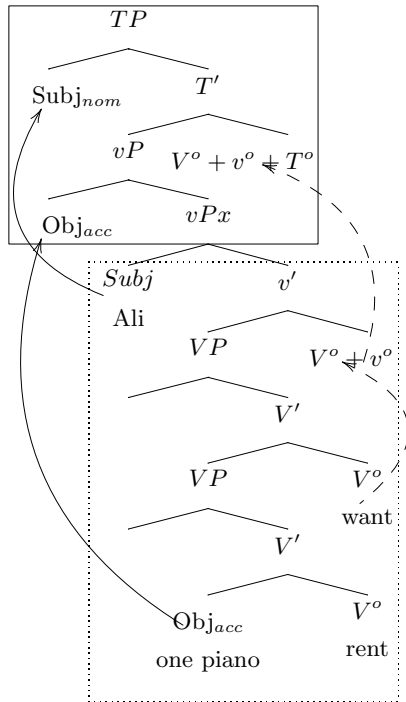


b) Spanish

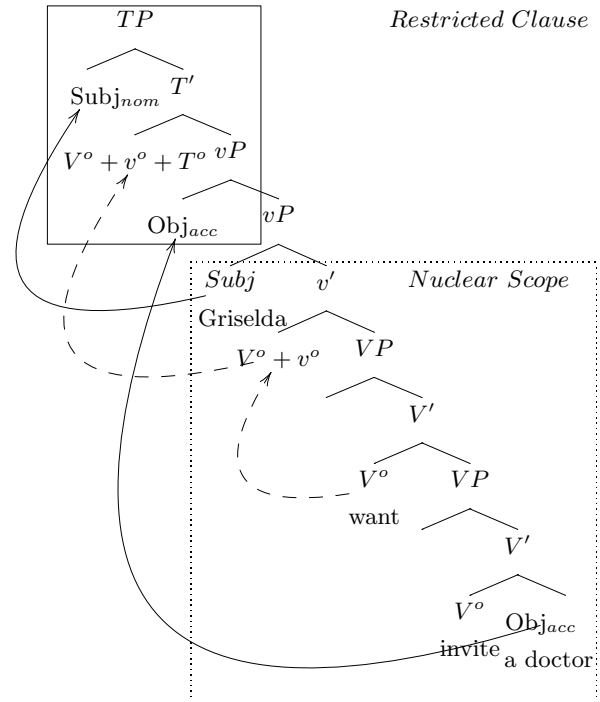


(38) Case Triggers Raising

a) Turkish

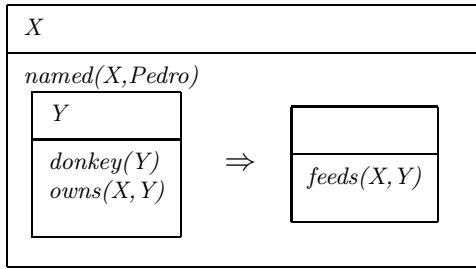


b) Spanish



A.3.5 Discourse representation theory

uses covington package



A.4 Semantics

uses the denotation brackets that are in the preamble (some people use the `stmarysrd` package, but this definition makes the denotation bold, and is simpler to declare)

uses the `qtreegina` package

(39) Sample denotation brackets

$$\left[\left[\begin{array}{c} \diagup \quad \diagdown \\ \text{Ann} \quad \text{walks} \end{array} \right] \right] = ([\mathbf{Ann}])[\mathbf{walks}]$$

uses the `xyling` package

(40) Semantic Combination under Functional Application (FA)

$$\begin{array}{c} \llbracket \gamma \rrbracket \\ \text{FA} \\ \begin{array}{cc} \llbracket \alpha \rrbracket & \llbracket \beta \rrbracket \end{array} \end{array} = \llbracket \alpha \rrbracket (\llbracket \beta \rrbracket)$$

uses the `xyling` package

(41) Typical example of Functional Application (FA)

(a) English

(b) Turkish

$$\begin{array}{cc} VP_{\langle e,t \rangle} = [\mathbf{hug}]([\mathbf{NP}]) & VP_{\langle e,t \rangle} = ([\mathbf{NP} - e])[\mathbf{sardil - di}] \\ \text{FA} & \text{FA} \\ \begin{array}{cc} V_{\langle e, \langle e,t \rangle \rangle} & NP_e \\ [\mathbf{hug}] & [\mathbf{Mary}] \end{array} & \begin{array}{cc} NP_e & V_{\langle e, \langle e,t \rangle \rangle} \\ [\mathbf{Mary-e}] & [\mathbf{sarid-di}] \end{array} \end{array}$$

uses the `xyling` package

(42) Semantic Combination under Intersection (a.k.a. Predicate Modification)

$$\begin{array}{c} \llbracket \gamma \rrbracket \\ \cap \\ \begin{array}{cc} \llbracket \alpha \rrbracket & \llbracket \beta \rrbracket \end{array} \end{array} = \llbracket \alpha \rrbracket \cap \llbracket \beta \rrbracket$$

uses the `xyling` package

(43) Typical example of Intersection/Predicate Modification (\cap /PM)

$$\begin{array}{c} NP_{\langle e,t \rangle} = [\mathbf{Adj}] \cap [\mathbf{NP}] \\ \cap \\ \begin{array}{cc} AdjP_{\langle e,t \rangle} & NP_{\langle e,t \rangle} \\ [\mathbf{blue}] & [\mathbf{ball}] \end{array} \end{array}$$

uses the PStricks and pst-grad packages

(44) The Intersection Generalization: Adjectives

(i) English Example:

Assumption: γ is an Individual

If γ is a wuggy ball (where wuggy stands for any adjective), then

it is necessarily the case that γ is wuggy and,

it is necessarily the case that γ is a ball.

(ii) This can be modelled logically as:

Assumption: $\gamma \in D_{individuals}$

$\gamma \in ([\mathbf{Adjective}] \cap [\mathbf{Noun}])$

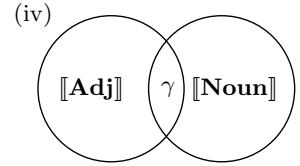
$\models \gamma \in [\mathbf{Adjective}]$

$\models \gamma \in [\mathbf{Noun}]$

(iii) In words: If γ is a member of the intersection of sets $[\mathbf{Adjective}]$ and $[\mathbf{Noun}]$, then

it is necessarily the case that γ is a member of $[\mathbf{Adjective}]$ and

it is necessarily the case that γ is a member of $[\mathbf{Noun}]$.

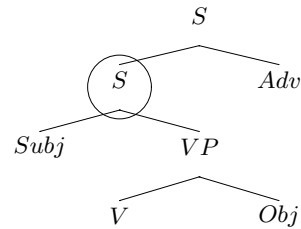
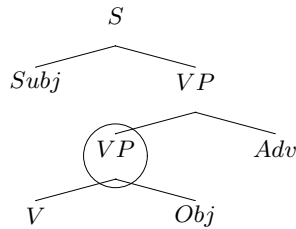


uses xyling package

(45) Adverbs have two possible places of attachment

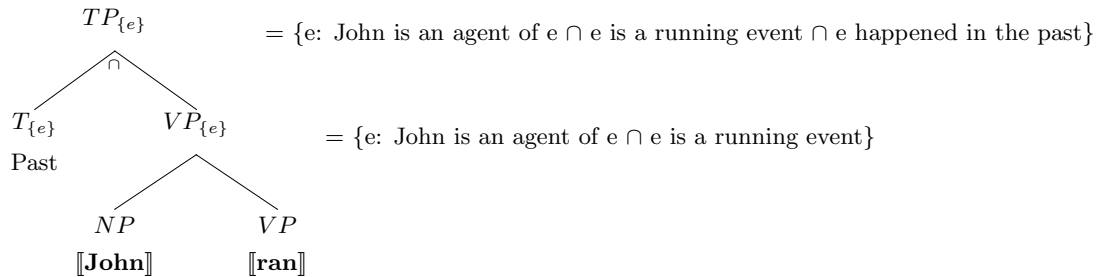
(a) Attached to VP

(b) Attached to S



uses xyling package

(46) Tense is easy to add via Intersection



uses the PStricks and pst-grad packages

(47) Extra-Linguistic Solution: A sentence is true if the sets of events is non-empty

(i) Situation:

$D = \{e_1, e_2, e_3, e_4, e_5, e_6\}$

John is an agent = $\{e_1, e_4, e_5\}$

run = $\{e_1, e_3, e_5\}$

quickly = $\{e_1, e_2, e_5\}$

swim = $\{e_6\}$

(ii) Derivation

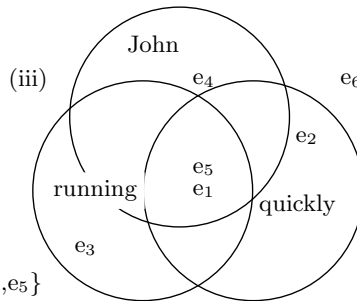
$[\mathbf{John\ ran\ quickly}]$

= $John \cap run \cap quick$

= $\{e_1, e_4, e_5\} \cap \{e_1, e_3, e_5\} \cap \{e_1, e_2, e_5\}$

= $\{e_1, e_5\}$

(= True)



uses xyling package

(48) Again can also attach to a VP

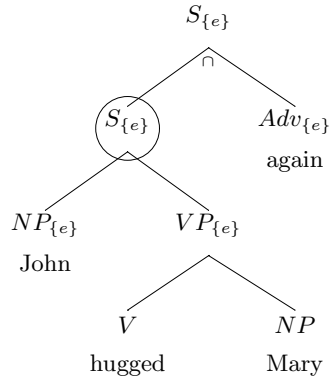
Normal Example

John hugged Mary because she looked sad,
She still looked sad so

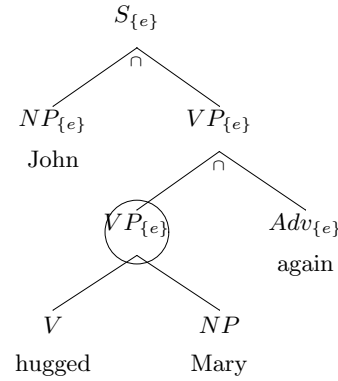
Context Driven Example

John's wife hugged Mary because she looked sad,
She still looked sad so

(a) [John hugged Mary] again.



(b) John [hugged Mary] again.



B Some examples of how to site from a bibtex bibliography

- Ormazabal and Romero (2007)
 Diesing (1992, Chap. 3)
 Diesing (1992, : 78)
 Epstein et al. (1996)
 Epstein, Thráinsson, and Zwart (1996)
 (Lasnik and Kupin, 1977)

References

- Diesing, Molly. 1992. Bare plural subjects and the derivation of logical representations. *Linguistic Inquiry* 23:353–380.
- Epstein, Samuel David, Hóskuldur Thráinsson, and C. Jan-Wouter Zwart. 1996. Introduction. In *Minimal ideas*, ed. Werner Abraham, Samuel David Epstein, Hóskuldur Thráinsson, and C. Jan-Wouter Zwart, 1–66. Amsterdam: John Benjamins Publishing Company.
- Lasnik, Howard, and J. Kupin. 1977. A restrictive theory of transformational grammar. *Theoretical Linguistics* 4:173–196.
- Ormazabal, Javier, and Juan Romero. 2007. The object areement constraint. *Natural Language and Linguistic Theory* 25:315–347.

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