Trees & Structures

(avm, forest, tikz)

Antonio Machicao y Priemer

https://hu.berlin/aMyP

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Contents

1 Notes

For this file you will need the following packages:

- Fontenc package with T1 and T3 option:
  `\usepackage[T3,T1]{fontenc}`
- Xcolor package for colored elements in trees:
  `\usepackage{xcolor}`
- Tipa package with no encoding and safe option:
  `\usepackage[noenc,safe]{tipa}`
- TikZ-qtree package with the positioning library:
  `\usepackage{tikz-qtree}`
  `\usetikzlibrary{positioning}`
- Forest package with linguistics option:
  `\usepackage[linguistics]{forest}`
- AVM package (the one in this folder[1])):
  `\usepackage{avm}`

If the settings (e.g. `forestset` or `tikzset`) are used outside of the forest or tikzpicture environment (see the code in the tex-file of this document) then they apply globally, i.e. for all following trees. If they are only used inside of an environment (i.e. after `\begin{forest}` or `\begin{tikzpicture}`), their effect only lasts until the environment is closed again (see code below).

For further information on LaTeX, forest, TikZ, and tipa, see Freitag and Machicao y Priemer (2015); Vanden Wyngaerd (2016); Živanović (2017); Crémer (2011); Tantau (2013); Rei (2004).

This file has been compiled with PDF-LaTeX.

2 AVM

2.1 Two examples with different commands

First example (see code):

$$\left[\text{SUBCAT}\left\langle \overset{\text{NP}}{\left[\begin{matrix}\text{CASE} & \textit{nom}\\ \text{IND} & \boxed{1}\end{matrix}\right]}, \overset{\text{NP}}{\left[\begin{matrix}\text{CASE} & \textit{acc}\\ \text{IND} & \boxed{2}\end{matrix}\right]}\right\rangle\right] \Longrightarrow \left[\text{SUBCAT}\left\langle \overset{\text{NP}}{\left[\begin{matrix}\text{CASE} & \textit{nom}\\ \text{IND} & \boxed{3}\end{matrix}\right]}, \overset{\text{NP}}{\left[\begin{matrix}\text{CASE} & \textit{dat}\\ \text{IND} & \boxed{1}\end{matrix}\right]}, \overset{\text{NP}}{\left[\begin{matrix}\text{CASE} & \textit{acc}\\ \text{IND} & \boxed{2}\end{matrix}\right]}\right\rangle\right]$$

[1] There are many different versions of the package avm on the internet. They have different settings but the same name. So if you are using a different avm package, it could be the case, that you get some errors.

Second example (see code):

$$\left[\text{SUBCAT}\left\langle\begin{bmatrix}\text{NP}\\ \text{CASE} & \textit{nom}\\ \text{IND} & \boxed{1}\end{bmatrix},\begin{bmatrix}\text{NP}\\ \text{CASE} & \textit{acc}\\ \text{IND} & \boxed{2}\end{bmatrix}\right\rangle\right]\Longrightarrow\left[\text{SUBCAT}\left\langle\begin{bmatrix}\text{NP}\\ \text{CASE} & \textit{nom}\\ \text{IND} & \boxed{3}\end{bmatrix},\begin{bmatrix}\text{NP}\\ \text{CASE} & \textit{dat}\\ \text{IND} & \boxed{1}\end{bmatrix},\begin{bmatrix}\text{NP}\\ \text{CASE} & \textit{acc}\\ \text{IND} & \boxed{2}\end{bmatrix}\right\rangle\right]$$

2.2 Lexical Rule

$$\begin{bmatrix}\text{CONT|RELS}\ \boxed{8} & \oplus\ \textit{nelist}\\ \textit{alt-psych-v-lxm}\end{bmatrix}\mapsto$$

$$\left[\begin{array}{l}\text{CAT|ARG-ST}\left\langle \text{NP}[\textit{str}]_{\boxed{5}}\ ,\ \text{NP}[\textit{str}]_{\boxed{1}}\right\rangle\\ \text{CONT}\left[\begin{array}{l}\text{IND}\ \boxed{4}\\ \text{RELS}\ \boxed{8}\left\langle\begin{bmatrix}\text{ARG0}\ \boxed{0}\\ \textit{pred}\end{bmatrix},\begin{bmatrix}\text{ARG0}\ \boxed{1}\\ \textit{exp}\end{bmatrix}\right\rangle\oplus\left\langle\begin{bmatrix}\text{ARG0}\ \boxed{4}\ \textit{hpng}\\ \text{ARG1}\ \boxed{0}\\ \textit{begin-pred}\end{bmatrix},\begin{bmatrix}\text{ARG0}\ \boxed{5}\\ \text{ARG1}\ \boxed{4}\\ \textit{csr}\end{bmatrix}\right\rangle\end{array}\right]\\ \textit{cause-psych-v-lxm}\end{array}\right]$$

Figure 1: LR for case alternation for *alt-psych-v-lxm* (Machicao y Priemer and Fritz-Huechante, 2018)

2.3 Forest-Tree with AVM

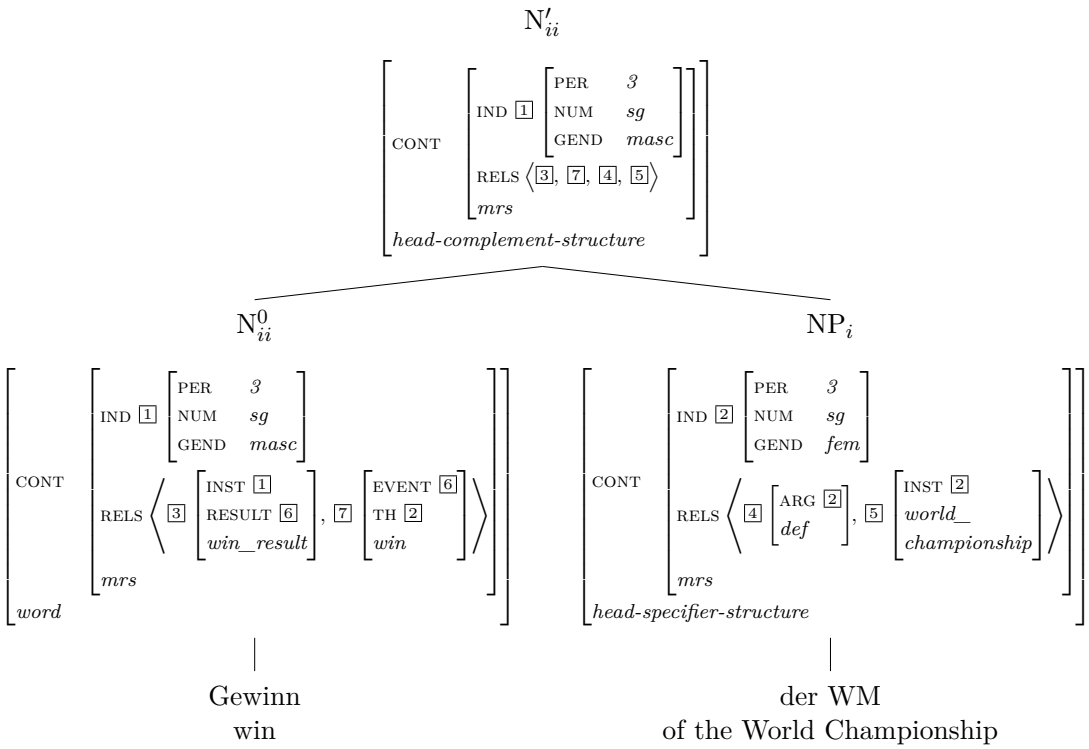
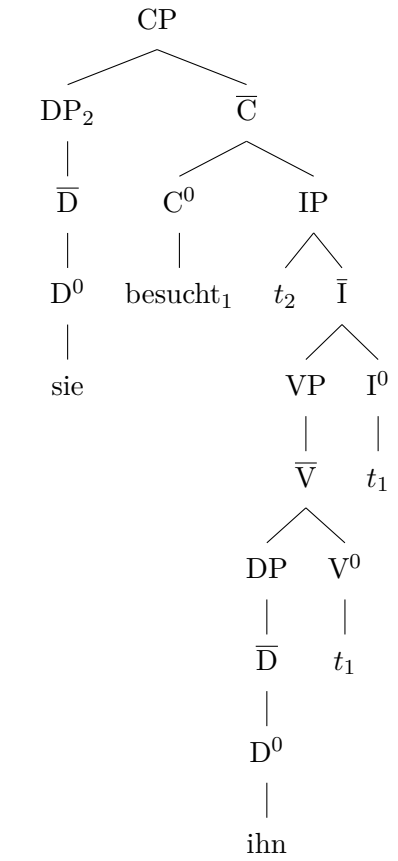


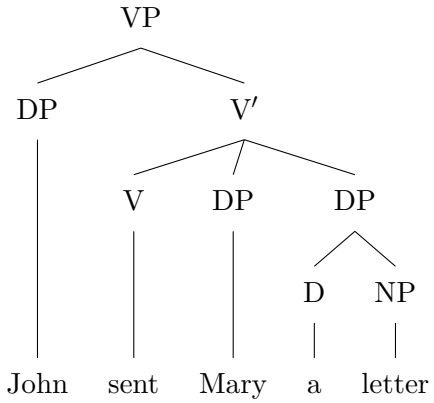
Figure 2: Illustration of the Semantics Principle (Machicao y Priemer, 2017)

3 Forest-Trees (Basics)

3.1 Simple small tree with bar over X, no bottom alignment



3.2 Trinary branching, prime instead of bar, bottom alignment



3.3 Bottom alignment, roof, traces

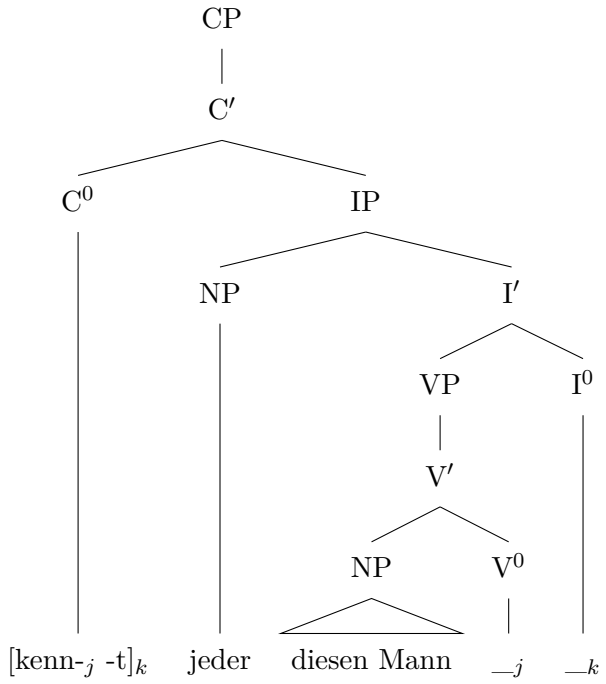
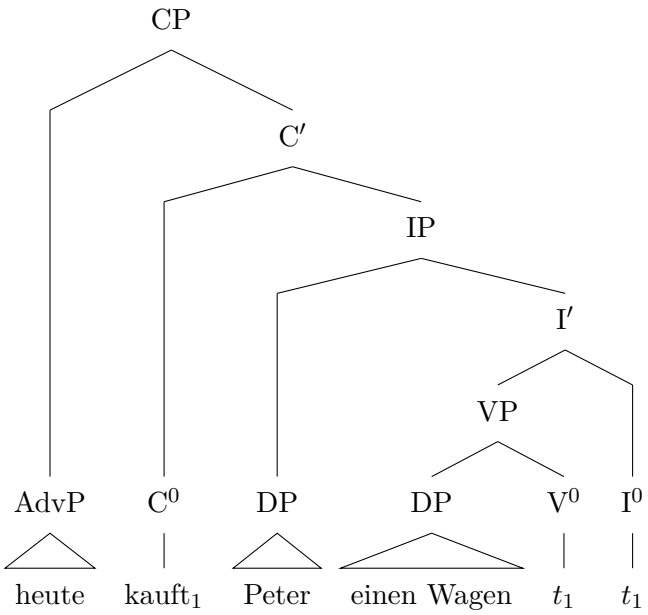


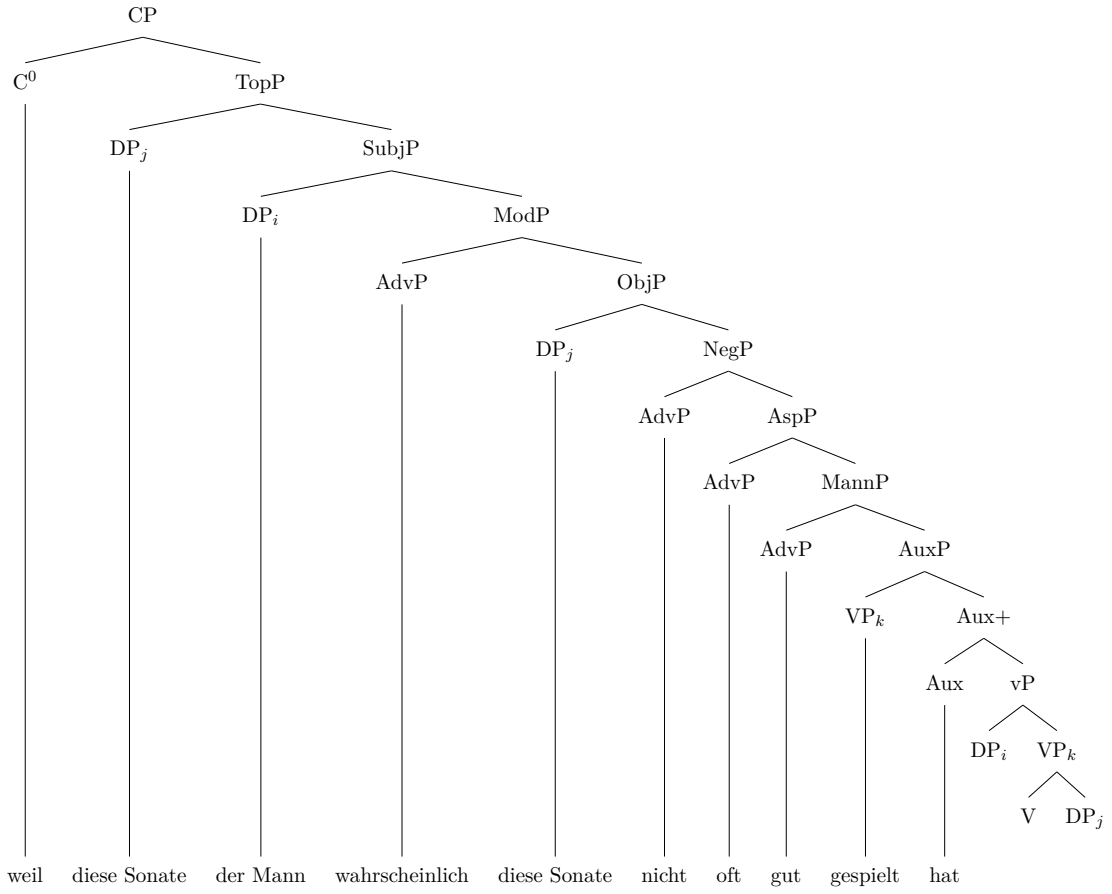
Figure 3: CP Structure in Müller (2019: 107)

3.4 Bottom alignment with `tier=word` and empty nodes

The command `, tier=word` aligns every node with this command to the lowest node that has the command.



3.5 Big tree – resized, with phantom nodes



3.6 Two trees and arrow

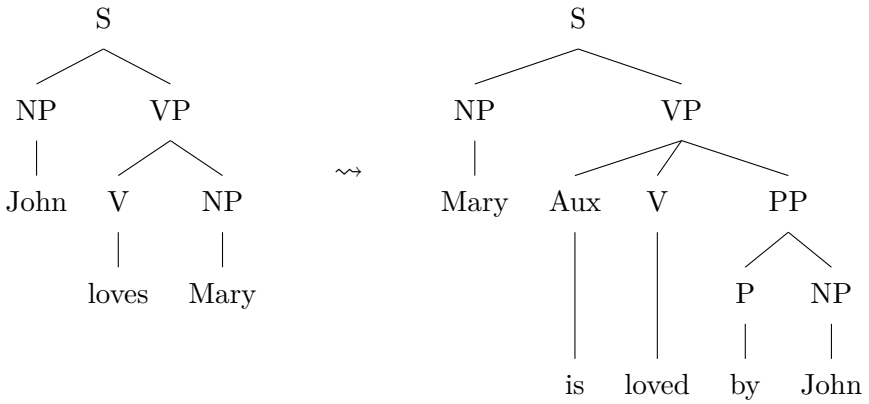
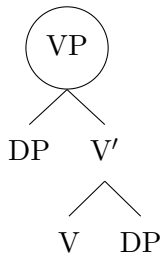


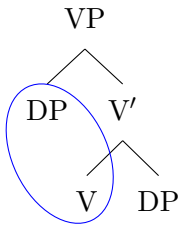
Figure 4: Transformation (Müller, 2019: 149, 85)

3.7 Node with circle



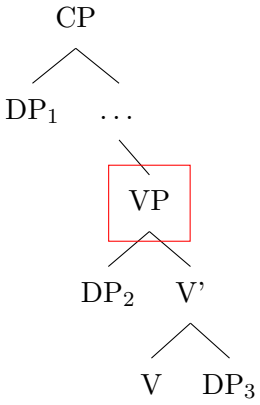
3.8 Two nodes marked with ellipse

Change the parameters in `node` to fit the nodes inside the ellipse.

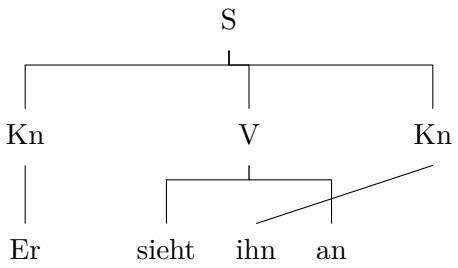


Code taken from: https://tex.stackexchange.com/questions/355365/drawing-an-ellipse-around-an-edge-in-forest

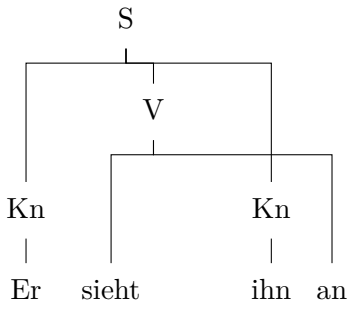
3.9 Coloured rectangle



3.10 Forest-Trees with edges and crossing edges



Lengthening the edges:



4 Forest-Trees with arrows

4.1 Movement and advice, with phantom node

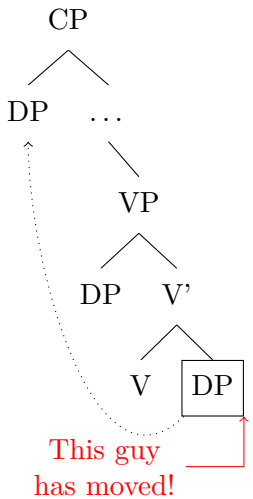


Figure 5: CP with arrows (Živanović, 2017: 6, 8)

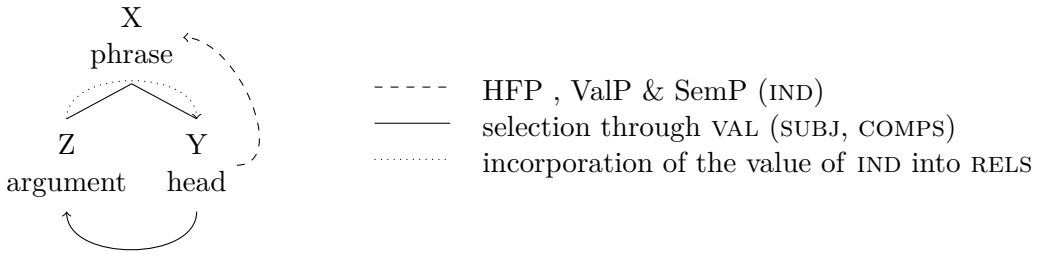


Figure 6: Head-argument relation (Machicao y Priemer, 2017)

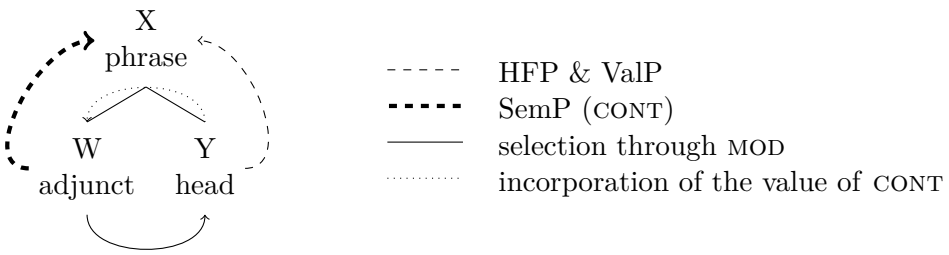


Figure 7: Head-adjunct relation (Machicao y Priemer, 2017)

4.2 With different arrows

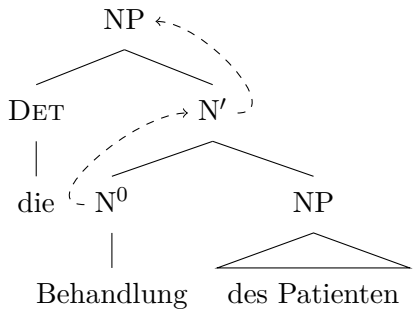
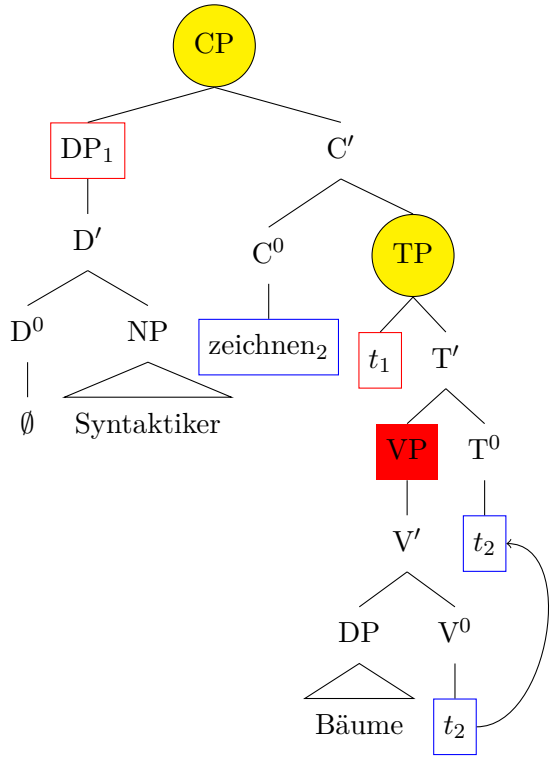


Figure 8: Projection of head features (Machicao y Priemer, 2018)

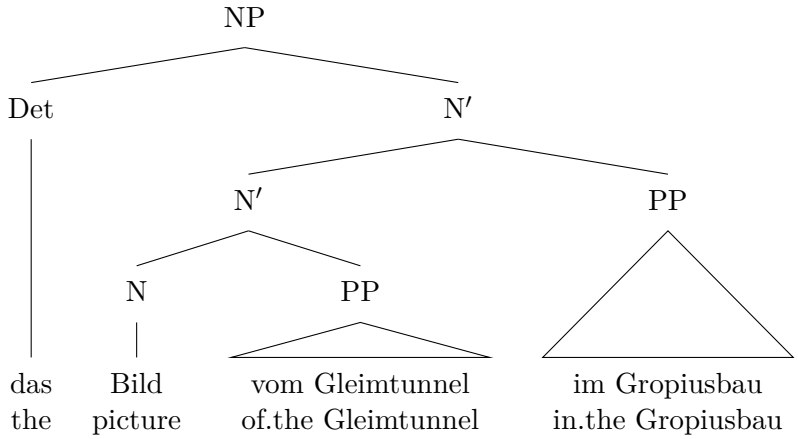
4.3 Tree with different arrows and coloured boxes



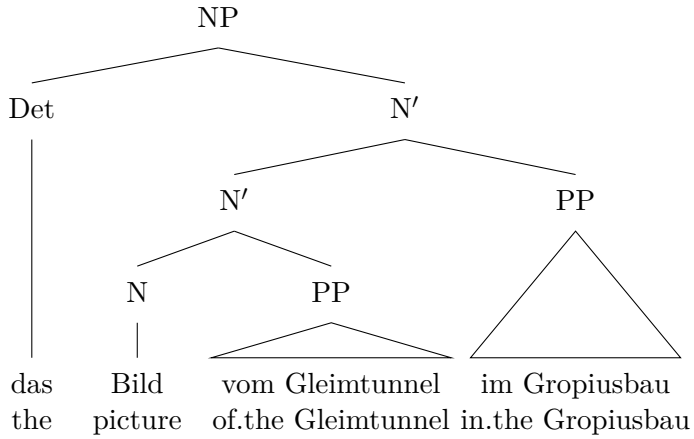
5 Forest-Trees with adjusted roofs for glosses and bottom alignment

Taken from: `http://tex.stackexchange.com/questions/167978/smaller-roofs-for-forest`

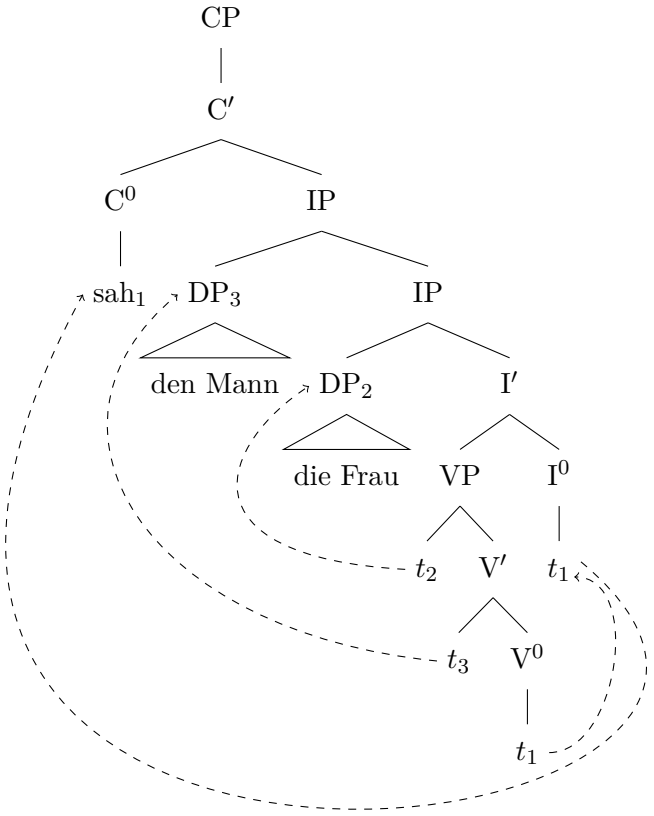
5.1 The default behaviour



5.2 Hiding the wider text

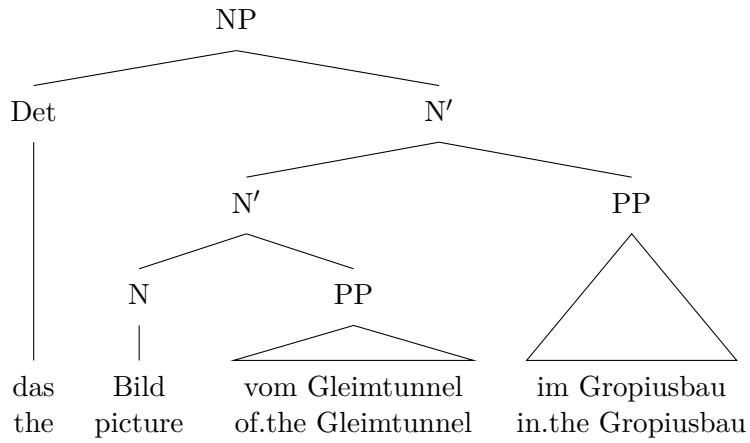


5.3 Tree with arrows avoiding nodes (with corrections)



Check also:
https://tex.stackexchange.com/questions/352873/drawing-lines-or-arrows-along-node-pathes-with-forest/353341#353341

5.4 Hiding the wider text and correcting the separation



6 Some other trees for linguistics

6.1 Language architecture

This tree uses the forest styles `bottom word` and `edgy` defined in the preamble of this document.

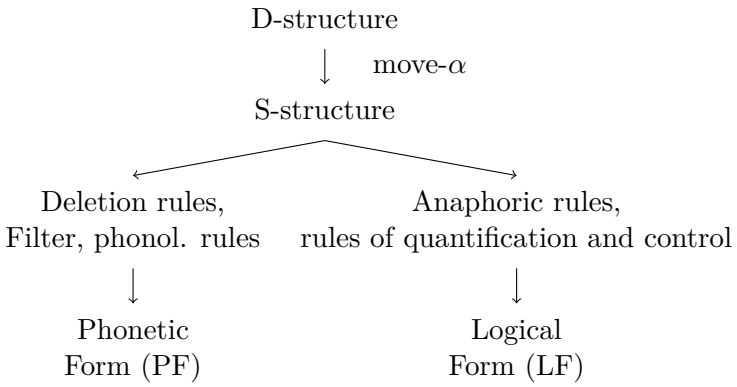


Figure 9: T-Modell (Müller, 2019: 88)

6.2 Structures of complex words

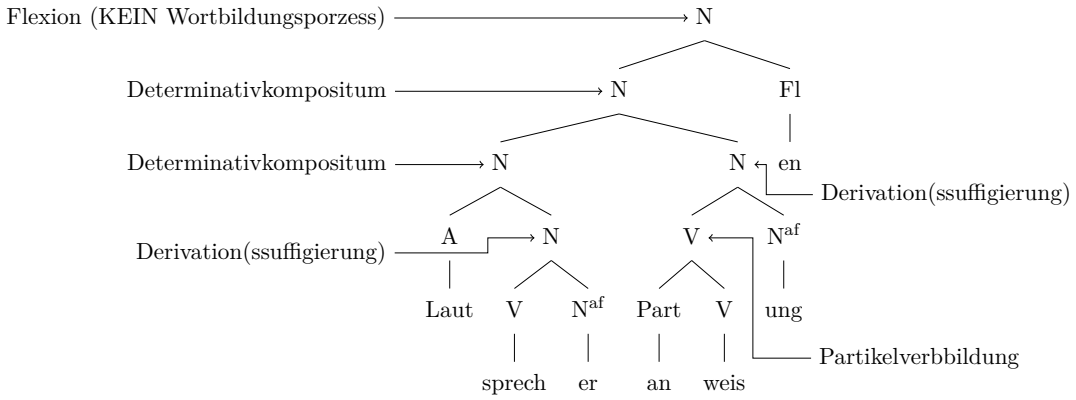


Figure 10: Word structure (Machicao y Priemer, 2019)

6.3 Structures of syllables

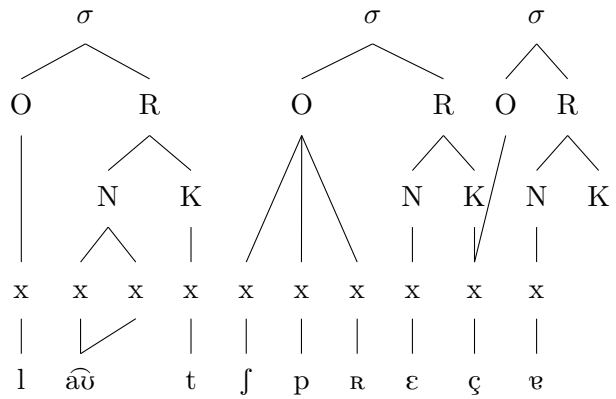


Figure 11: Phonetic structure (Machicao y Priemer, 2019)

The following style can be obtained using the forestset "GP1" which is already provided by the linguistics option of `forest`.

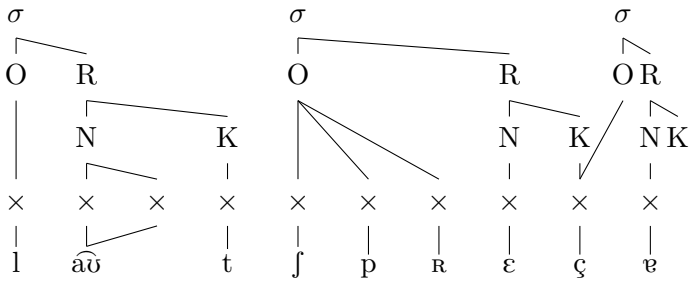


Figure 12: Phonetic structure (Machicao y Priemer, 2019)

6.4 Sonority Profiles with TikZ

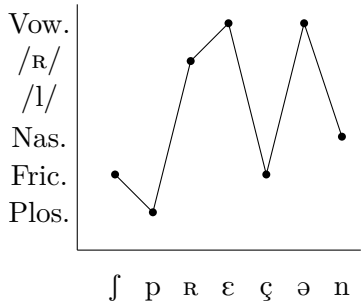
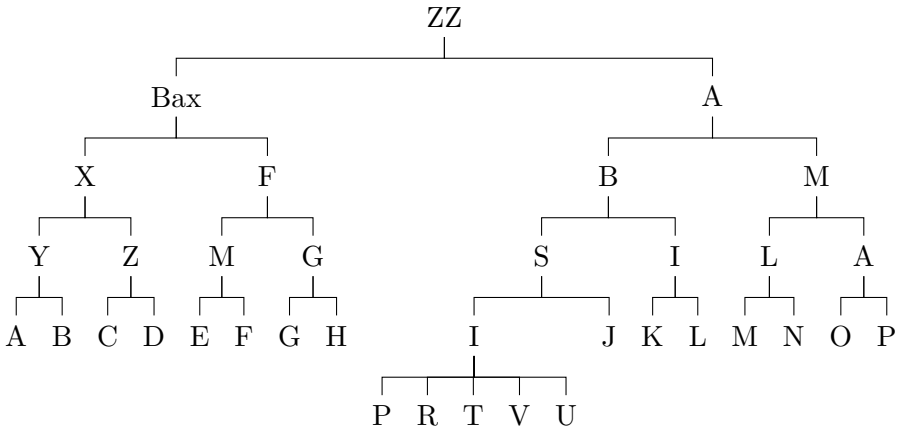
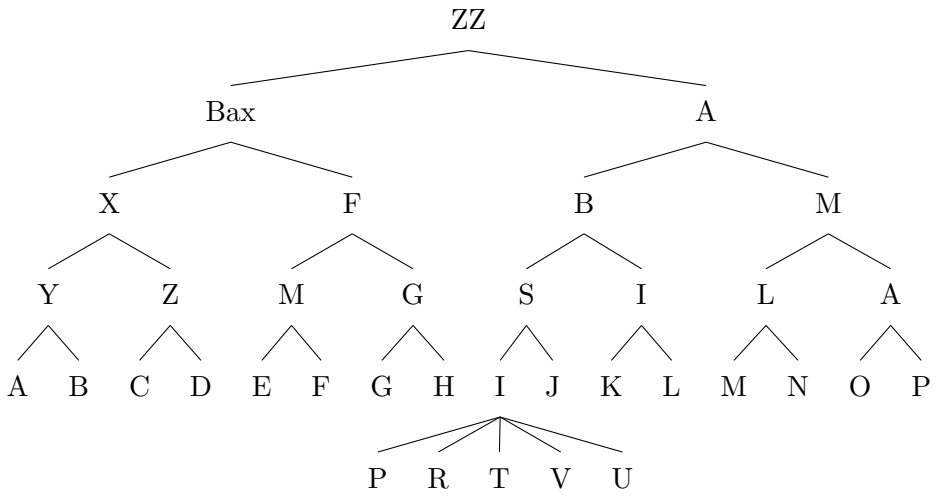


Figure 13: Sonority profile (Machicao y Priemer, 2019)

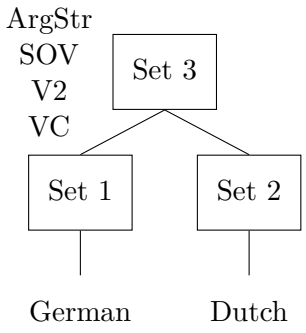
6.5 Tikz-tree: Typology

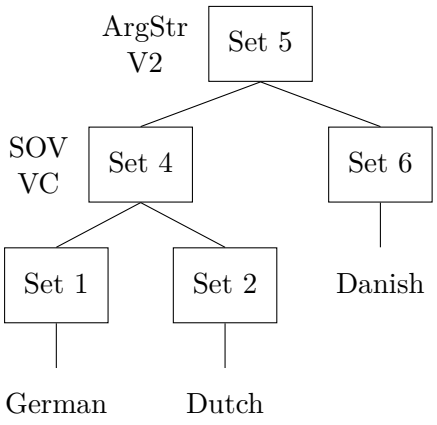


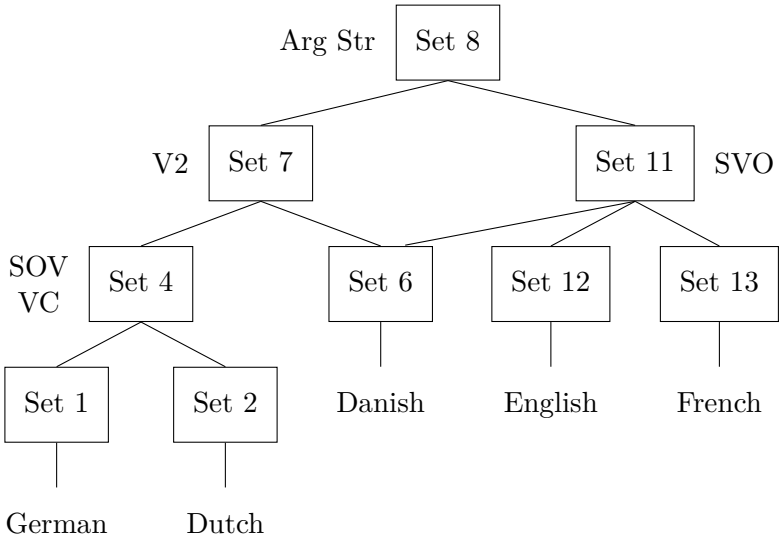
6.6 Forest-tree: Typology



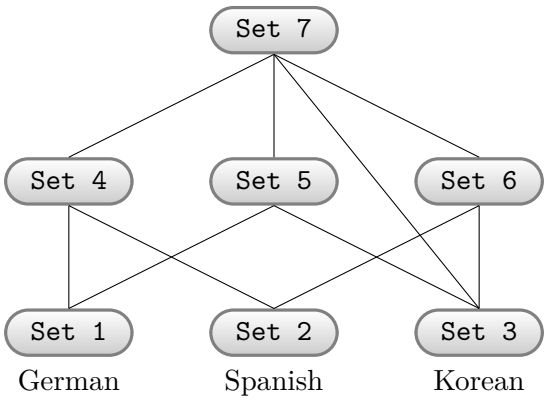
6.7 Forest Sets: rectangles



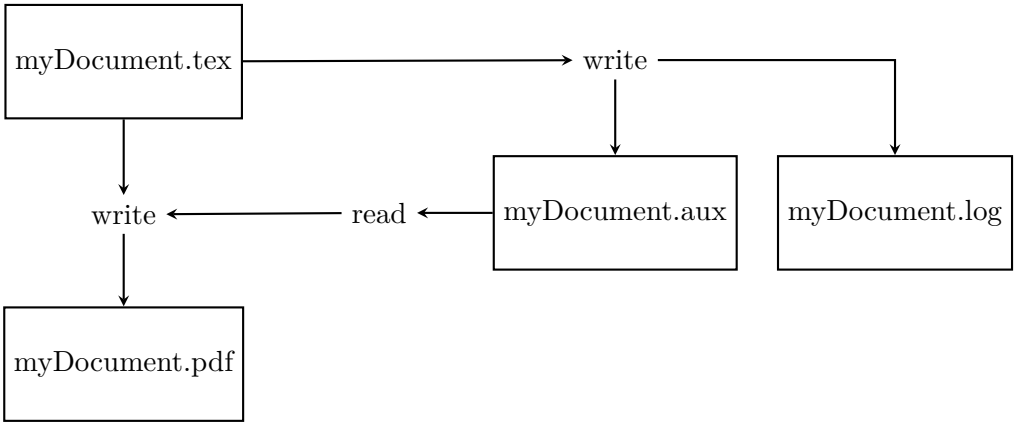




6.8 Forest Sets: rounded corners and labels



6.9 Tikz Flowchart



6.10 Tikz-qtree Sets

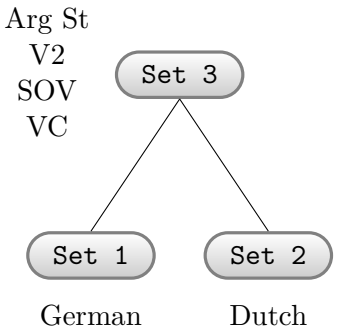


Figure 14: Common properties in German & Dutch (Müller, 2014)

6.11 Type hierarchy, multiple inheritance, and scalebox

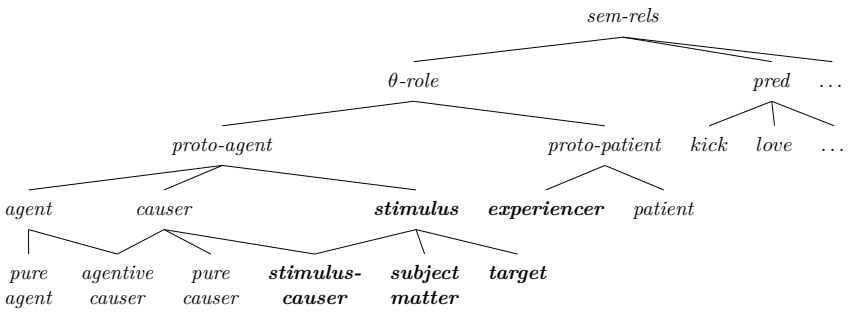


Figure 15: Type hierarchy for *semantic-relations* (Machicao y Priemer and Fritz-Huechante, 2018)

References

Crémer, Jacques (2011). A very minimal introduction to TikZ. *CTAN: Comprehensive TeX Archive Network*. URL `http://www.ctan.org/pkg/pgf`, Access: 04/09/2019.

Freitag, Constantin and Antonio Machicao y Priemer (2015). LaTeX-Einführung für Linguisten. Manuscript. URL `https://www.researchgate.net/publication/279514740_LATEX-Einfuhrung_fur_Linguisten`, Access: 12/04/2015.

Machicao y Priemer, Antonio (2017). *NP-Arguments in NPs: An Analysis of German and Spanish Noun Phrases in Head-Driven Phrase Structure Grammar*. PhD thesis, Humboldt-Universität zu Berlin.

Machicao y Priemer, Antonio (2018). Kopf. In Stefan Schierholz and Pál Uzonyi (Eds.), *Grammatik: Syntax*, Number 1.2 in Wörterbücher zur Sprach- und Kommunikationswissenschaft (Online). Berlin: De Gruyter. URL `https://www.researchgate.net/publication/325046855_Kopf_Pre-Print`, Access: 14/08/2018.

Machicao y Priemer, Antonio (2019). Materialien zum GK Linguistik. Script.

Machicao y Priemer, Antonio and Paola Fritz-Huechante (2018). Korean and Spanish psych-verbs: Interaction of case, theta-roles, linearization, and event structure in HPSG. In Stefan Müller and Frank Richter (Eds.), *The 25th International Conference on Head-Driven Phrase Structure Grammar (HPSG 2018)*, University of Tokyo, pp. 155–175. CSLI Publications. URL `http://web.stanford.edu/group/cslipublications/cslipublications/HPSG/2018/hpsg2018-machicaoypriemer-fritz-huechante.pdf`, Access: 30/10/2018.

Müller, Stefan (2014). Kernigkeit: Anmerkungen zur Kern-Peripherie-Unterscheidung. In Antonio Machicao y Priemer, Andreas Nolda, and Athina Sioupi (Eds.), *Zwischen Kern und Peripherie: Untersuchungen zu Randbereichen in Sprache und Grammatik*, pp. 25–39. Berlin: De Gruyter.

Müller, Stefan (2019). *Grammatical Theory: From Transformational Grammar to Constraint-Based Approaches*. Number 3 in Textbooks in Language Science. Berlin: Language Science Press. URL `http://langsci-press.org/catalog/book/255`, Access: 26/08/2019.

Rei, Fukui (2004). Tipa manual – version 1.3. *CTAN: Comprehensive TeX Archive Network*. URL `http://www.ctan.org/tex-archive/fonts/tipa/tipa`, Access: 06/06/2013.

Tantau, Till (2013). TikZ & PGF: Manual for version 3.0.0. *CTAN: Comprehensive TeX Archive Network*. URL `http://www.ctan.org/pkg/pgf`, Access: 24/02/2015.

Vanden Wyngaerd, Guido (2016). Forest quickstart guide for linguists. Manuscript. URL `https://ling.auf.net/lingbuzz/003391`, Access: 30/11/2017.

Živanović, Sašo (2017). Forest: a PGF/TikZ-based package for drawing linguistic trees v2.1.5. *CTAN: Comprehensive TeX Archive Network*. URL `https://ctan.org/pkg/forest`, Access: 30/11/2017.