typst für die Linguistik

Eine LaTeX Alternative

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Inhalte

Einführung

```
= Einführung
```

Was ist typst?

- Textsatzsystem
- wysiwym[1]
- hochkonfigurierbares Satzlayout mit Fokus auf wissenschaftliche Publikationen

Aber was ist anders?

1. *einfache* Anwendung durch **Markdown**
2. einheitliche Syntax und Kompatibilität
3. verständliche Fehlermeldungen

```
= Einführung

== Was ist #typst?
- Textsatzsystem
- wysiwym#footnote[what you see is what you mean]
- hochkonfigurierbares Satzlayout mit Fokus auf wissenschaftliche Publikationen

=== Aber was ist anders?
+ _einfache_ Anwendung durch *Markdown*
+ einheitliche Syntax und Kompatibilität
+ verständliche Fehlermeldungen
```

[1] what you see is what you mean

Formatierung

```
+ _einfache_ Anwendung durch *Markdown*
+ einheitliche Syntax und Kompatibilität
+ verständliche Fehlermeldungen
```

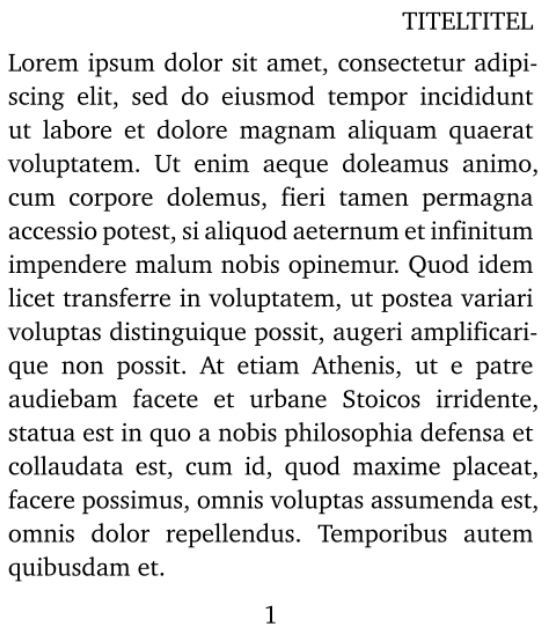
→

```
#show "Syntax": smallcaps
```

1. *einfache* Anwendung durch **Markdown**
2. einheitliche Syntax und Kompatibilität
3. verständliche Fehlermeldungen

Seitenformatierung

- `#set text(lang: "de", font: "Charter")`
- `#set par(justify: true)`
- ```
  #set page(
    header: align(right)[TITELTITEL],
    numbering: "1"
  )
  ```


  ```

Templates

- Typst Universe
- Papers
  - *cogsci-conference*
  - *athena-tu-darmstadt-thesis*
- CV
  - *basic-resume*
- Präsentationen
  - *touying*
  - *diatypst*
- Poster
  - *peace-of-posters*
  - *pollux*

Editoren

Web-Editor

- https://typst.app/
- **Live-Kompilierung**
- unbegrenzte Kollaboration
- Konverter von LaTeX, Word, Markdown
- Click-to-source

Typst File Edit View Help

ikaluk › poster-phases › main.typ

Share

```
#import "@preview/peace-of-posters:0.5.6" as pop
#set text(lang: "en")

//##########
#import "@preview/ilm:1.4.2": *
#import "@preview/arborly:0.3.2": *
#import "@preview/numbly:0.1.0": numbly
#import "@preview/derive-it:1.1.0": *
#import "@preview/cetz:0.3.4"
#import "@preview/fletcher:0.5.8" as fletcher: diagram, node, edge, shapes
#import "@preview/leipzig-glossing:0.5.0": *
#import abbreviations: *

//#set text(lang: "de")

#let doubleline(cols) = (
  table.hline(),
  table.cell(colspan: cols, inset: 0.12em, {}),
  table.hline(),
)

#let term(x) = $bracket.l.stroked bold(#x) bracket.r.stroked$
#let termi(x) = $bracket.l.stroked #x bracket.r.stroked$
#let terms(x) = $bracket.l.stroked bold(#x) bracket.r.stroked ^(s^*)$
#let termsi(x) = $bracket.l.stroked #x bracket.r.stroked ^(s^*)$
#let b(x) = strong[#x]
#let s(x) = strong(text(red)[#x])
#let v = $upright(nu)$

#set enum(full: true, numbering: numbly("{1:(i.)}", "{2:i.}"))
#set heading(numbering: "1.1")
#set par(justify: true)


#let agree(start, end, depth) = {
  cetz.draw.set-style(mark: (end: ">", start: ">"))
  cetz.draw.bezier(
    start+".south", end+".south",
    (rel: (-90deg, depth*1cm), to: (start, 0%, end)),
    (rel: (-90deg, (depth+3)*1cm), to: (start, 100%, end))
  )
}
//##############################

#let rot = rgb("#C70E4F")
#set page("a0", margin: 1cm)
```

Wordhood of Noun incorporation by phase in Inuit and Hindi

Merlin Jonathan Fischer

Seminar "Wissenschaftliches Arbeiten für die Linguistik", WiSe 25/26

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

Noun incorporation, Phase, Wordhood, Inuit, Hindi

Definitions

Noun incorporation	"Noun combining with a verb to form a single morphological unit." (Mohanan 1995: 75)
Phase	"Syntactic object whose parts […] can be inspected for convergence." (Hornstein, Nunes & Grohmann 2005: 388)
Convergence of a derivation	"[PF] and [LF] are legitimate objects (i.e. they satisfy Full Interpretation)" (Hornstein, Nunes & Grohmann 2005: 26)

Inuit

Wordhood & NI (Compton & Pittman 2010: 1–3)

"Inuit [Eskimo-Languages] has been argued to require more morphological machinery than is commonly assumed for more isolating languages." Example for **noun incorporation**:

(1) iglu-jjuu-llu-laaq-tuq
house-big-make-PST-DEC.3SG
'He/she made a big house.'

- Word order is free
- Morpheme order is strictly compositional → syntactic positioning.

Hypothesis: **wordhood in Inuit ≙ syntactical phases**
Any D°CP forms a word.

Identification of words (Sadock 1980: 303)

Within words …
- "obligatory sandhi processes operate",
- "the order of the elements is entirely fixed by semantics",
- "explicit conjunction never occurs",
- "it is impossible to interrupt a word with pauses or parenthetical material",
- error correction cannot take place.

Prosody (Arnhold, Compton & Elfner 2018: 6–7)

"The correspondence between prosodic and orthographic words equally appeared for cases of noun incorporation […] carrying H and L tones."

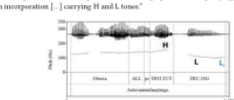
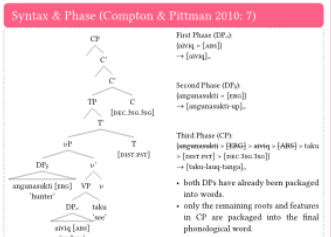


Figure 1: Utterance with incorporated noun 'I will be going to Ottawa'.

Syntax & Phase (Compton & Pittman 2010: 7)



Bibliography

Arnhold, Anja, Richard Compton & Emily Elfner 2018. Prosody and wordhood in Inuktitut dialects. In *Proceedings of the 51st Workshop on Structure and Constituency in Languages of the Americas*, 30–39.

Chomsky, Noam 2014. *The minimalist program*. MIT press.

Compton, Richard & Christine Pittman 2010. Word-formation by phase in Inuit. *Lingua* Elsevier 120(9). 2167–2192.

Hornstein, Norbert, Jairo Nunes & Kleanthes K. Grohmann. 2005. *Understanding minimalism*. Cambridge University Press.

Mohanan, Tara. 1995. Wordhood and lexicality: Noun incorporation in Hindi. *Natural Language & Linguistic Theory* Springer. 13(1). 75–134.

Sadock, Jerrold M. 1980. Noun incorporation in Greenlandic: A case of syntactic word formation. *Language*. LSA. 56(2). 300–319.

Hindi

Noun incorporation (Mohanan 1995: 76f.)

"Animate [and inanimate definite] primary objects in Hindi bear the accusative case clitic *-ko*".

(2) (Mohanan 1995: 77–78)

(a) ilaa bacco-ko khoj-rahii hai
Ila.NOM children-ACC search.HAB PROG be.PRS
Ila keeps searching for the/some children.

(b) ilaa bacce khoj-rahii hai
Ila.NOM children.NOM search.HAB PROG be.PRS
Ila keeps children-searching (i.e. performing the act of searching for children).

"The only visible difference between example 2a and example 2b is the case marking on the object. Yet, their interpretations as indicated in the sentence glosses are different. […] [Another difference is,] when an animate object is nominative (2b), it cannot be separated from the verb, *modified, questioned, or conjoined*. Nor can the *verb be conjoined*."

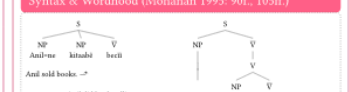
As Mohanan (1995) states, the above facts point to an analysis of noun incorporation, i.e. V+N being treated as one lexical category.

Prosody (Mohanan 1995: 95)

(3) (a) g^{h}oɖe becnaa
horse.PL sell.INF
to sell horses

(b) g^{h}oɖe=̃becnaa
horse.PL sell.INF
to horse-sell

Syntax & Wordhood (Mohanan 1995: 90f., 105ff.)



Mohanan (1995: 105–106) analyses two distinct dimensions of syntactic information: Grammatical **F**unction **STR**ucture and Grammatical Category **STR**ucture (Figure 2).

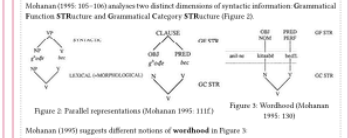


Figure 2: Parallel representations (Mohanan 1995: 111f.)

Figure 3: Wordhood (Mohanan 1995: 130)

Mohanan (1995) suggests different notions of **wordhood** in Figure 3:

• (syntactic) GF-wordhood	Noun Incorporation ✓
• (lexical / morphological) GC-wordhood	Noun Incorporation ✗

Hypothesis

Mohanan (1995) runs into problems describing the syntax of Hindi Noun Incorporation due to contradictory behaviour in terms of syntactical, morphological and phonological analysis. She resolves the problem through different notions of wordhood (see above).

This proposal assumes an alternative analysis following the minimalist program (Chomsky 2014).

The wordhood of Hindi noun incorporation can be described through phase applied to specific internal forms (just like in Inuit).

Further research might also lead to a universal description of wordhood of Noun Incorporation by phase.

Editoren

Web-Editor

- https://typst.app/
- Live-Kompilierung
- unbegrenzte Kollaboration
- Konverter von LaTeX, Word, Markdown
- Click-to-source

vscode/vscodium + tinymist

- alles wie in der WebApp
- lokal, offline, selbst konfigurierbar
- keine Rechtschreibprüfung
- keine Package-Vorschläge

File Edit Selection View Go Run Terminal Help

typst-vortrag

EXPLORER

TYPST-VORTRAG

- assets
- cogsci.png
- example-resume.png
- functions.typ
- Logo-Goethe-University-Frankfurt-am-...
- tudapub_prev-01.png
- typst-vs-latex.pdf
- typst-vs-latex.typ

OUTLINE

TIMELINE

typst-vs-latex.typ | vortrag-tschaikowski-6-1.typ | functions.typ

typst-vs-latex.typ > ...

```
    height: 2cm),
  ),
)

#set heading(numbering: none)

#set raw(lang: "typ")
#show link: it => if type(it.dest) == str { underline(it) } else { it }



//////////////////////


#title-slide()

#outline-slide()

= Einführung
== <touying:hidden>
#grid(
  columns: (1fr, 1fr),
  gutter: 8pt,
  [],
  move(dy: -2.4em, text(size:18pt, raw("= Einführung")))
)
== Was ist #typst?
#grid(
  columns: (1fr, 1fr),
  gutter: 8pt,
  [
    #pause
    - Textsatzsystem
    #pause
    - wysiwym#footnote[what you see is what you mean]
    #pause
    - hochkonfigurierbares Satzlayout mit Fokus auf wissenschaftliche
    Publikationen
    #pause
    === Aber was ist anders?
    #pause
    + _einfache_ Anwendung durch *Markdown*
    #pause
    + einheitliche Syntax und Kompatibilität
    #pause
    + verständliche Fehlermeldungen
  ],
  move(dy: -2.5em, block[
    #set par(justify: false)
```

typst-vs-latex.typ (Preview)

Aber was ist anders?

1. *einfache* Anwendung durch **Markdown**
2. einheitliche Syntax und Kompatibilität

auf wissenschaftliche Publikationen

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=== Aber was ist anders?
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[1] what you see is what you mean

typst für die Linguistik 4 / 17

Einführung Vergleich zu LaTeX Packages

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[1] what you see is what you mean

typst für die Linguistik 4 / 17

Einführung Vergleich zu LaTeX Packages

Formatierung

Ln 81, Col 17 Spaces: 2 UTF-8 LF { } Typst 899 Words [typst-vs-latex]

Vergleich zu LaTeX

Präambel

typst

```
Hallo Welt!
```

LaTeX

```
\documentclass{article}
\usepackage[utf8]{inputenc}
\usepackage[T1]{fontenc}
\usepackage{geometry} % edit margins of paper
\usepackage{setspace} % edit line spacing
\usepackage{fancyhdr} % header, footer
\usepackage{titlesec} % edit format of titles
\usepackage[dvipsnames]{xcolor} % colors
\usepackage{amsmath} % math tools
\usepackage{amssymb} % math symbols
\usepackage{amsthm} % thereoms
\usepackage{mathtools} % math tools
\usepackage{nameref}
\usepackage{hyperref}
\usepackage{cleveref}
\usepackage[shortlabels]{enumitem} % enumerations
\usepackage{lastpage} % get number of last page
\begin{document}
Hallo Welt!
\end{document}
```

Syntax

typst	LaTeX

Drei Modi:
1. Markup `[...]` `#let n = [*Typst!*]`
2. Code `#...` `#(1 + 2)`
3. Math `$...$` `$sqrt(-1)$ is $i$`
	Diverse Umgebungen & Makros für alles.
	`\begin{minipage}{...}...\end{minipage}`
	`\newcommand{\cmd}{def}`

einheitliche, auf diese Modi basierende Syntax & Package-Kompatibilität	variierende Syntax in verschiedenen Paketen, unübersichtliche Argumente in `{}[]{}{}`
echte Programmiersprache: `#if`, `#for`, `#let`	benötigt Pakete (`expl3`) für Scripting

Grundfunktionen

typst	LaTeX
`*strong*` or `#strong[strong]`	`\textbf{strong}`
`_emphasis_` or `#emph[emphasis]`	`\textit{emphasis}` or `\emph{emphasis}`
`` `print(1)` `` or `#raw("print(1)")`	`\texttt{print(1)}`
`https://typst.app/`	`\url{https://typst.app/}`
`<intro>`	`\label{intro}`
`@intro`	`\ref{intro}`
`@key`	`\cite{key}`
`= Heading`	`\section{Heading}`
`== Heading`	`\subsection{Heading}`
`=== Heading`	`\subsubsection{Heading}`
`- item`	`\begin{itemize}\item...\end{itemize}`
`+ item`	`\begin{enumerate}\item...\end{enumerate}`

typst	LaTeX
`$x^2$`	`$x^2$` (inline)
`$ x^2 $`	`\[x^2\]` or `\begin{equation}`
`~`	`~` (non-breaking space)
`---`	`---`
`--`	`--`
`\`	`\\`
`// line comment`	`% comment`
`/* block comment */`	(no equivalent)
`#outline()`	`\tableofcontents`
`#footnote[...]`	`\footnote{...}`
`#bibliography("file.bib", style: "ieee")`	`\bibliography{file}\bibliographystyle{plain}`
`#underline[...]`	`\underline{...}`
`#upper[...]`	`\uppercase{...}`
`#text(fill: red)[...]`	`\textcolor{red}{...}`

typst	LaTeX
`#highlight(fill: yellow)[...]`	`\colorbox{yellow}{...}`
`#set par(first-line-indent: 0pt)`	`\noindent`
`#pagebreak()`	`\newpage`
`#h(1cm)`	`\hspace{1cm}`
`#v(1cm)`	`\vspace{1cm}`
`#h(1fr)`	`\hfill`
`#v(1fr)`	`\vfill`
`#line(length: 100%)`	`\hrule`
`#quote[...]`	`\begin{quote}...\end{quote}`
` ```...``` `	`\begin{verbatim}...\end{verbatim}`
`#figure(table(..))`	`\begin{table}...\end{table}`
`#figure(image(..))`	`\begin{figure}...\end{figure}`
`#image("img.png", width: 5cm)`	`\includegraphics[width=5cm]{img}`
`#box[...]`	`\begin{minipage}{...}...\end{minipage}`

typst	LaTeX
`#box(stroke: 1pt)[...]`	`\fbox{...}`
`#box(width: 5cm)[...]`	`\parbox{5cm}{...}`
`#align(center)[...]`	`\begin{center}...\end{center}`
`#columns(2)[...]`	`\begin{multicols}{2}...\end{multicols}`
`#canvas[...]` (via cetz)	`\begin{tikzpicture}...\end{tikzpicture}`
`$ ... $` (block, with spaces)	`\begin{equation}...\end{equation}`
`$ ... & ... \ $`	`\begin{align}...\end{align}`
`$cases(...)$`	`\begin{cases}...\end{cases}`
`$mat(...)$`	`\begin{matrix}...\end{matrix}`
`#show: ... or #let ...`	`\renewcommand{\...}{...}`
`#let x = ...`	`\def\x{...}`
`#include "file.typ"`	`\input{file}`
`#import "@preview/pkg:1.0.0": *`	`\usepackage{pkg}`

Tabellen

typst

```
#table(
  columns: (1fr, 1fr),
  align: left,
  table.hline(),
  [*Header 1*], [*Header 2*],
  table.hline(),
  [Cell A], [Cell B],
  [Cell C], [Cell D],
  table.hline(),
)
```

LaTeX

```
\begin{tabular}{ll}
  \hline
  \textbf{Header 1} & \textbf{Header 2} \\
  \hline
  Cell A & Cell B \\
  Cell C & Cell D \\
  \hline
\end{tabular}
```

Schreibumgebung

typst	LaTeX
inkrementelle Live-Kompilierung	Pseudo-Live-Kompilierung mit Kompilierungslimit im Online-Editor
ungefähr verständliche Fehlermeldungen	kryptische Fehlermeldungen
einheitliche Dokumentation	viele dezentrale Dokumentationen

Verwendung im akademischen Bereich

typst	LaTeX
Der typst-Quellcode wird bisher nur vom *International Journal of Interactive Multimedia and Artificial Intelligence (IJIMAI)* akzeptiert. Bei einigen Journals können auch PDFs eingereicht werden.	Der LaTeX-Quellcode wird von den allermeisten Journals und Konferenzen akzeptiert.
Alles ist möglich, gar nicht so kompliziert, manches ist noch in der Entwicklung.	LaTeX ist etabliert, es gibt zu allem Templates und Lösungen (auch wenn diese teilweise sehr kompliziert sind).

Packages für die Linguistik

eggs

- Linguistische Beispiele und Glossings (Dokumentation)
- Leipzig Glossing Abkürzungen
- Markdown für Judges

```
#import "@preview/eggs:0.8.0": *
#import abbreviations: *
#show: eggs

#example[
  Beispiel
  + - Colorless  green
    - ideas sleep
  + furiously.
]
```

(1) Beispiel
   a. Colorless green ideas sleep
   b. furiously.

eggs

```
#example[
  @mohanan1995wordhood[77--78]
  + - ilaa  #emph[baccõ=ko] kʰojtii  rahtii  hai
    - Ila.#nom  children=#acc  search.#smallcaps[hab]  #prog  be.#prs
    'Ila keeps searching for the/some children.'
  + - ilaa  #emph[bacce]  kʰojtii  rahtii  hai
    - Ila.#nom  children.#nom  search.#smallcaps[hab]  #prog  be.#prs
    'Ila keeps children-searching (i.e. performing the act of searching for children).'
  ]
```

(2) (Mohanan 1995: 77–78)

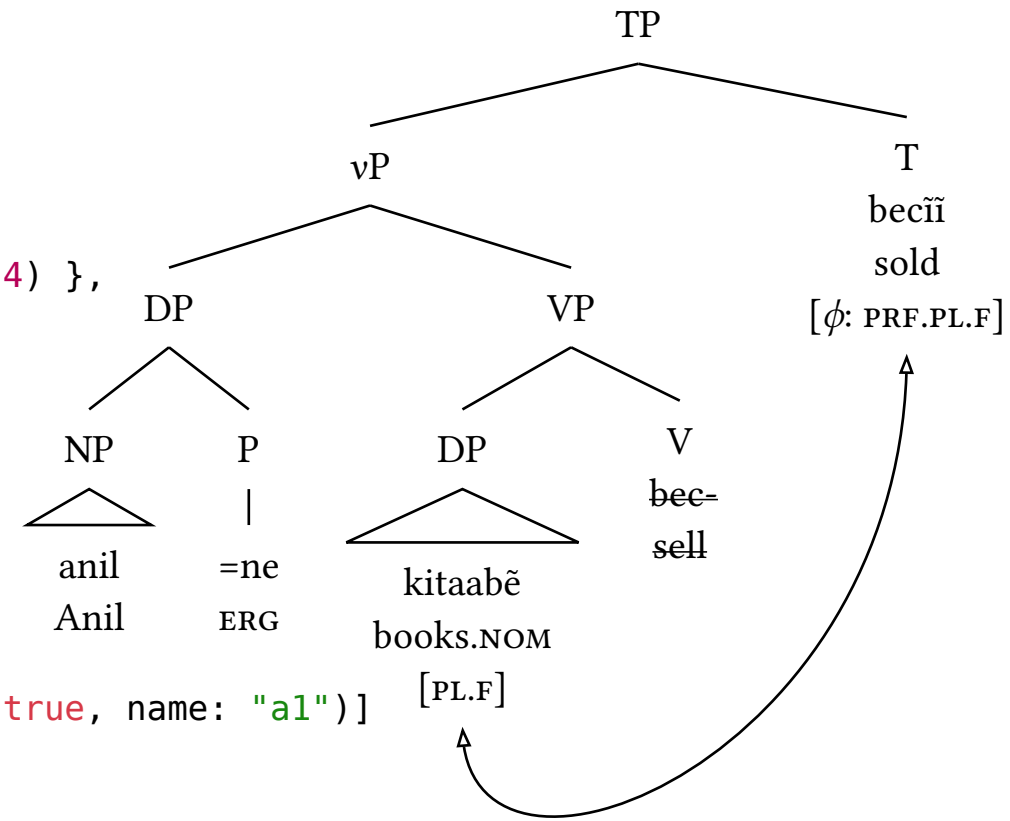
a. ilaa *baccõ=ko* kʰojtii rahtii hai
   Ila.NOM children=ACC search.HAB PROG be.PRS
   'Ila keeps searching for the/some children.'

b. ilaa *bacce* kʰojtii rahtii hai
   Ila.NOM children.NOM search.HAB PROG be.PRS
   'Ila keeps children-searching (i.e. performing the act of searching for children).'

arborly

```
#import "@preview/arborly:0.3.2": *

#tree(style: (fit: "band"), code: { agree("a1", "a2", 4) },
)[TP
  [#sym.nu\P
    [DP
      [NP [anil\ Anil #a(triangle: true)]]
      [P [=ne\ #erg]]
    ]
    [VP
      [DP
        [kitaabẽ\ books.#nom\ \[#pl.#f\] #a(triangle: true, name: "a1")]
      ]
      [V\ #strike(offset: -2.4pt)[bec-\ sell]]
    ]
  ]
  [T\ becĩĩ\ sold\ \[#emph(sym.phi.alt): #prf.#pl.#f\] #a(name: "a2")]
]
```



IPA

Unicode (ohne Paket)

ˌfoʊnəˈtɪʃən ⟶ ˌfoʊnəˈtɪʃən

tyipa

```
#import "@preview/tyipa:0.1.1" as ipa
#ipa.text[stress-mark.secondary f o upsilon n schwa stress-mark t I esh schwa n] ⟶
```

ˌfoʊnəˈtɪʃən

ascii-ipa

```
#import "@preview/ascii-ipa:2.1.0": *
#branner("'XU.X:i.,Xae)S:t.lI")
#cxs("'XU.X:i.,X&S:t.lI")
#praat("\\'1\\cf\\hs.\\cf\\:f.\\'2\\ae\\sh\\:ft.l\\ic")
#sil("}x=u<x=:i}}x=a<s=:tli=")
#xsampa("\"XUX:i%X{S:tlI")
```

ˈχʊ.χːi.ˌχæʃːt.lɪ

Zitieren

Zitieren ohne Paket: BibTeX, Unified Style Sheet for Linguistics

- `#cite(<mohanan1995wordhood>, supplement: [101])`
- `@mohanan1995wordhood[101]`

} (Mohanan 1995: 101)

- `#cite(<mohanan1995wordhood>, supplement: [101], form: "prose")` ⟶ Mohanan (1995: 101)

```
#bibliography("refs.bib", style: "unified-style-sheet-for-linguistics.csl")
```

citesugar

```
#import "citesugar.typ": *
#show cite: citesugar
```

`@mohanan1995wordhood`	(Mohanan 1995)
`@mohanan1995wordhood[p:]`	Mohanan (1995)
`@mohanan1995wordhood[a:]`	Mohanan
`@mohanan1995wordhood[y:]`	1995
`@mohanan1995wordhood[b:]`	Mohanan 1995
`@mohanan1995wordhood[ps:]`	Mohanan's (1995)
`@mohanan1995wordhood[as:]`	Mohanan's

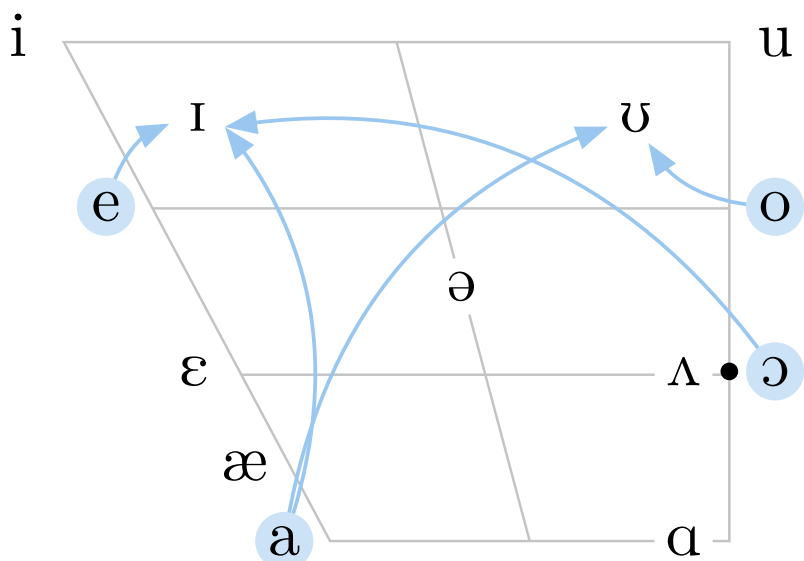
phonokit

```
#consonants("german", scale: 1.1)
```

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d				k g			
Nasal	m			n							
Trill											
Tap or Flap											
Fricative		f v		s z	ʃ ʒ		ç	x	ʁ		h
Lateral fricative											
Approximant							j				
Lateral approximant				l							

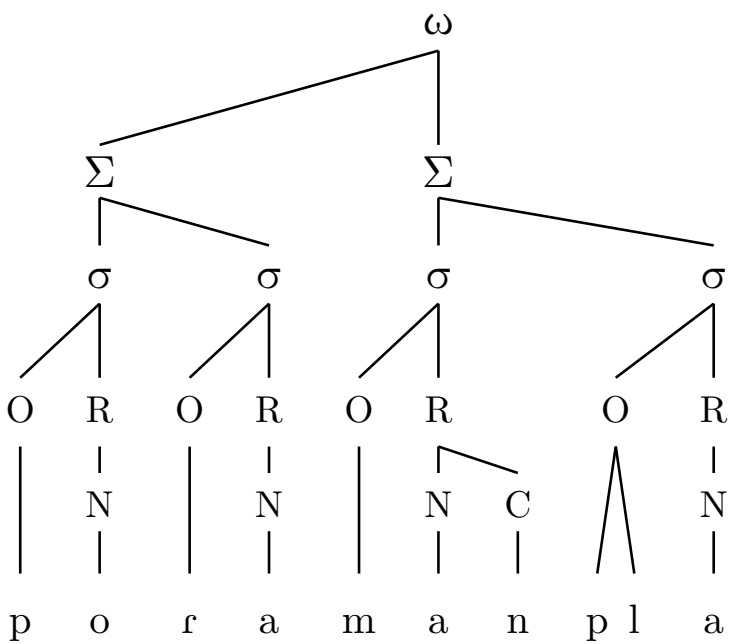
phonokit

```
#vowels(
  "english",
  arrows: (
    ("a", "U"),
    ("a", "I"),
    ("e", "I"),
    ("O", "I"),
    ("o", "U"),
  ),
  arrow-color: blue.lighten(60%),
  curved: true,
  highlight: ("a", "e", "o", "O"),
  highlight-color: blue.lighten(80%),
  scale: 1.1
)
```



phonokit

```
#word("('po.Ra).('man.pla)", foot: "R", scale: 1.4)
```

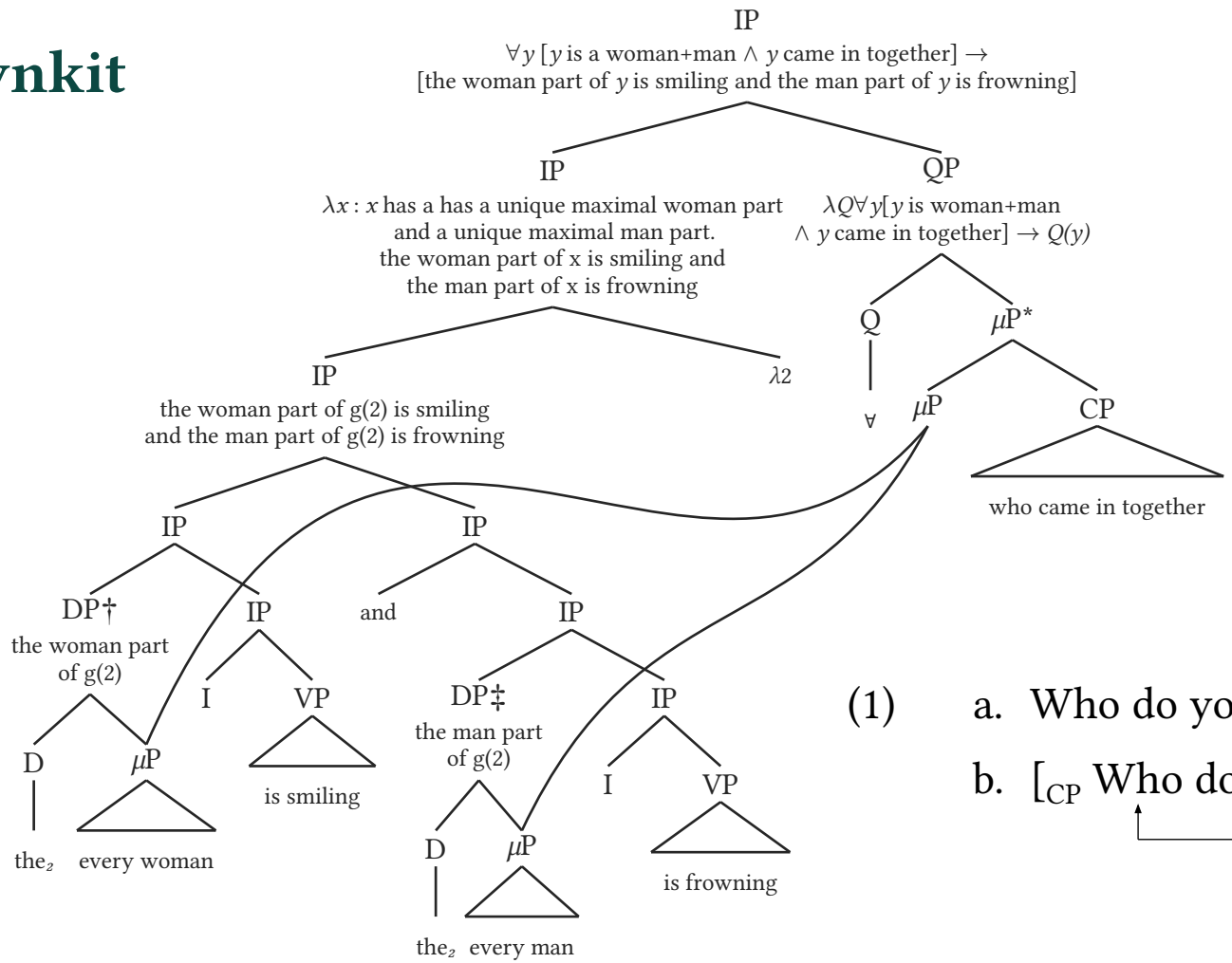


phonokit

```
#tableau(
  input: "kraTa",
  candidates: ("[kra.Ta]", "[ka.Ta]", "[ka.ra.Ta]"),
  constraints: ("Max", "Dep", "*Complex"),
  violations: (
    ("", "", "*"),
    ("*!", "", ""),
    ("", "*!", ""),
  ),
  winner: 0,
  dashed-lines: (0,),
)
```

/kraθa/	MAX	DEP	*COMPLEX
☞ [kra.θa]			*
[ka.θa]	*!		
[ka.ra.θa]		*!	

synkit



(1) a. Who do you think saw Mary?

b. $[_{CP}$ Who do you think $[_{(CP)}[_{TP}$ ⟨who⟩ saw Mary]]]

Weitere, allgemeine Packages

- *cetz*: Zeichenpaket (≡ LaTeX: tikz)
- *fletcher* / *lilaq*: Diagramme zeichnen.
- *mitex*: LaTeX-Code innerhalb von **typst** ausführen.

Konverter LaTeX ↔ typst

- Typlite
- Tylax

Bibliografie

Mohanan, Tara. 1995. Wordhood and lexicality: Noun incorporation in Hindi. *Natural Language & Linguistic Theory* 13(1). 75–134.

Danke für Eure Aufmerksamkeit!

```
#focus-slide[Danke für Eure Aufmerksamkeit!]
```