phonokit

A toolkit to create phonological representations

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Guilherme D. Garcia | gdgarcia.ca

What is it?

- A Typst package for phonology (Garcia, 2026)
- Idea: generate phonological representations (IPA, prosody, SPE, OT, etc.)
- Current version: `0.4.0`

phonokit

Typst...? Typst is a new language to typeset documents. It's modern, light, fast and intuitive. Visit typst.app to use their online editor (also check out their excellent tutorials)

Transcrição fonética

☞ Charis SIL is the default font, but you can alter it

```
#ipa("[tR \\~ a Ns.kRi.'s \\~ a \\~ w]")
```

[tʀãŋs.kɾi.ˈsãw̃]

```
#ipa("['lIt \\v l \\s 'b2R \\schwar ,flaI]")
```

[ˈlɪtl̩ ˈbʌɾɚˌflaɪ]

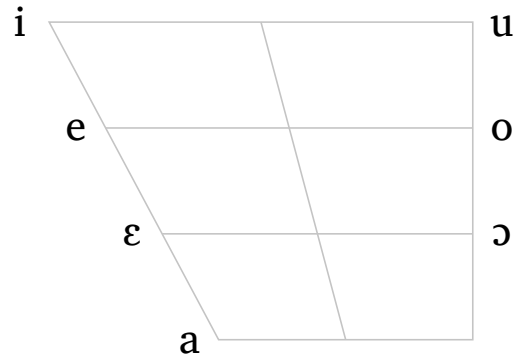
Intuitive shortcuts. Based on LaTeX's `tipa` package + some *very* subjective optimization:

- [ɲ]: `\textltailn` (LaTeX) → `\\nh` (both work in **phonokit**)
- [ʝ]: `\textbardotlessj` → `\\barredj`

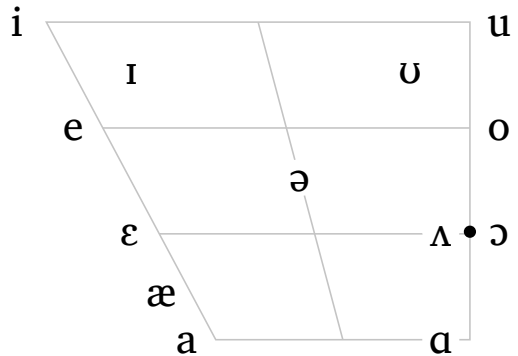
Phonemic inventories

- Vowel trapezoids (input = string): **pre-defined** inventories

```
#vowels("portuguese")
```



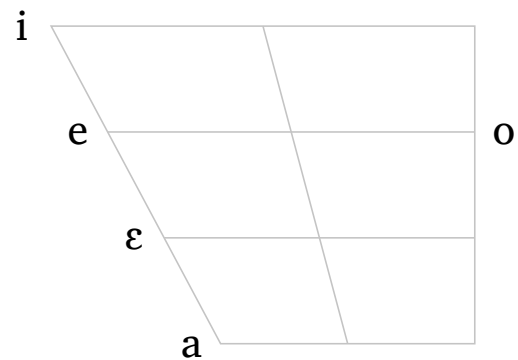

```
#vowels("english")
```



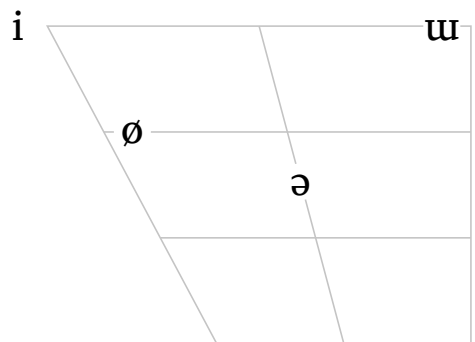
Phonemic inventories

- Vowel trapezoids (input = string): **custom** inventories

```
#vowels("aeoiE")
```



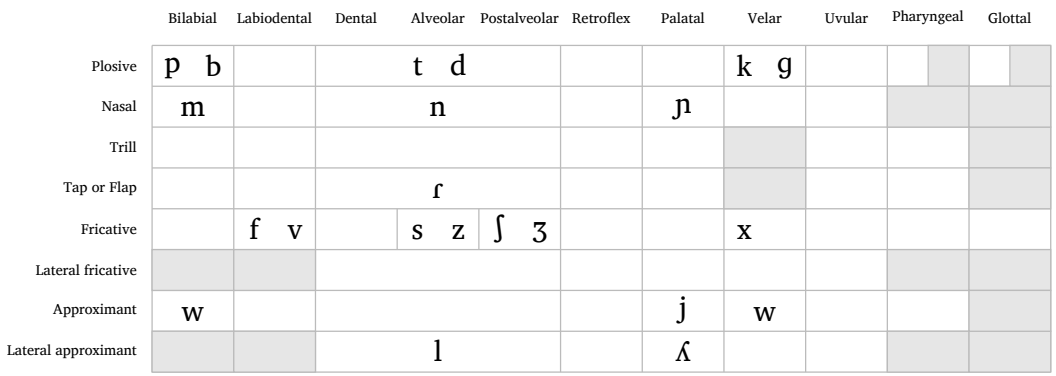

```
#vowels("\\o iW@")
```



Phonemic inventories

- Consonant table (input = string): **pre-defined** languages or **custom** inventory

```
#consonants("portuguese", scale: 0.6)
```



Phonemic inventories

- Consonant table (input = string): **pre-defined** languages or **custom** inventory

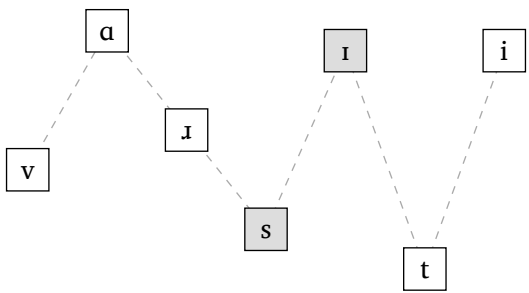
```
#consonants("french", scale: 0.6)
```

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

Sonority

- Visual representation of the sonority principle (Parker, 2011)

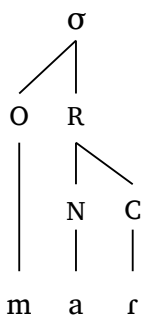
```
#sonority("vA \\*r .sI.ti", scale: 0.7)
```



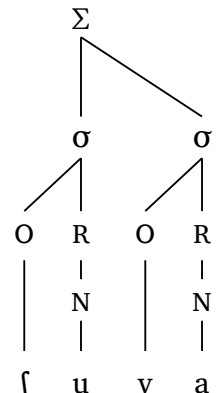
Prosodic representation

- Syllable and metrical foot: intuitive functions to generate precise outputs

```
#syllable("maR")
```




```
#foot("'Su.va")
```

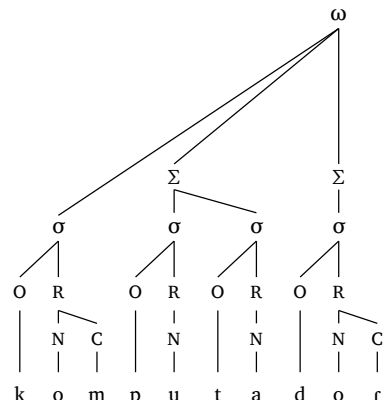


Prosodic representation

- Moraic representation and prosodic words

```
#foot-mora("maR",
           coda: true, scale: 0.68)
```

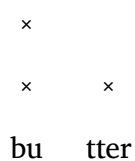

```
#word("kom.('pu.ta).('doR)",
      scale: 0.68)
```



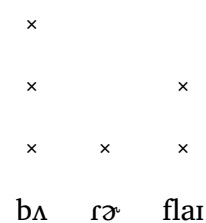
Prosodic representation: metrical grid

- Input as string (left) or tuple with IPA support (right)

```
#met-grid("bu2.tter1")
```



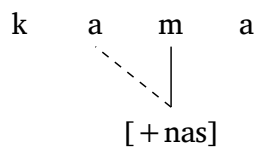

```
#met-grid(("b2", 3), ("R \\shwar", 1), ("flaI", 2))
```



Autosegmental phonology

- Assimilation processes with intuitive and minimalist syntax

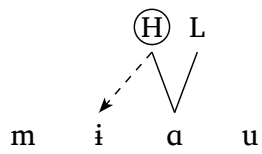
```
#autoseg(
    ("k", "a", "m", "a"),
    features: ("", "", "[+nas]", ""),
    links: ((2,1),),
    spacing: 1.0,
    arrow: false,
)
```



Autosegmental phonology

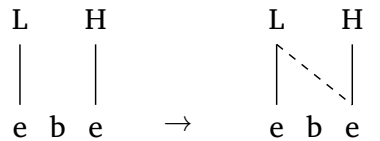
- `#autoseg()` can easily be adapted to tonal processes with a wide range of arguments

```
#autoseg(
    ("m", "1", "A", "u"),
    features: ("", "", ("H", "L"), ""),
    tone: true,
    links: (((2,0),1),),
    highlight: ((2,0),),
    spacing: 1.0,
    arrow: true,
)
```



Autosegmental phonology

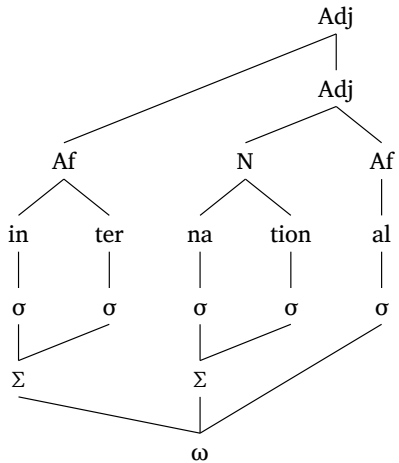
```
#autoseg(
      ("e", "b", "e"),
      features: ("L", "", "H"),
      spacing: 0.5,
      tone: true,
      gloss: [],
    )
    #a-r // arrow
    #autoseg(
      ("e", "b", "e"),
      features: ("L", "", "H"),
      links: ((0, 2),),
      spacing: 0.5,
      tone: true,
      gloss: [èbě _pumpkin_],
    )
```



èbě *pumpkin*

Adapted from Zsiga (2024).

Multi-tier representations

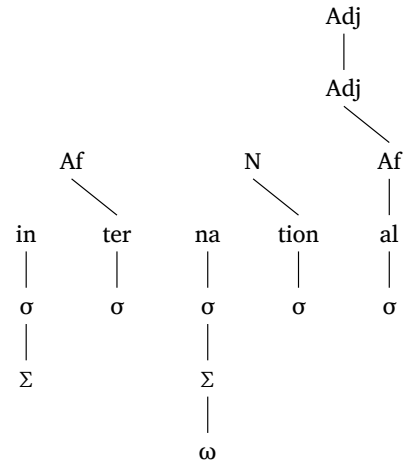


- Function `#multi-tier()` : **very flexible**
- Wide range of arguments based on a grid architecture
- Helper: temporary grid with coordinates
- Figure adapted from Booij (2012)

☞ Let's unpack this figure and its code

Multi-tier representations

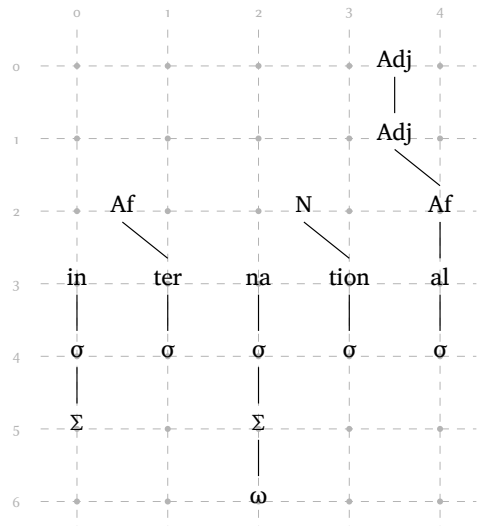
```
#multi-tier(
      show-grid: false,
      levels: (
        ("", "", "", "", ("Adj", 3.5)),
        ("", "", "", "", ("Adj", 3.5)),
        ("", ("Af", 0.5), "", ("N", 2.5), "Af"),
        ("in", "ter", "na", "tion", "al"),
        ("sigma", "sigma", "sigma", "sigma", "sigma"),
        ("Sigma", "", "Sigma", "", ""),
        ("", "", "omega", "", ""),
      ),
      scale: 0.8,
    )
```



- Any element projects **one** line/link by default (this can be deleted later with `delinks`)

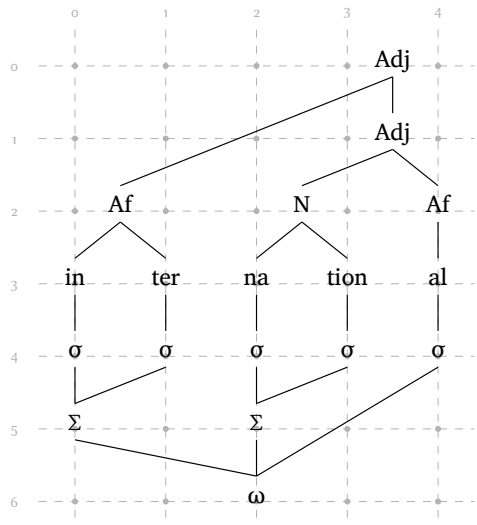
Multi-tier representations

```
#multi-tier(
      show-grid: true, // ← HELPER GRID
      levels: (
        ("", "", "", "", ("Adj", 3.5)),
        ("", "", "", "", ("Adj", 3.5)),
        ("", ("Af", 0.5), "", ("N", 2.5), "Af"),
        ("in", "ter", "na", "tion", "al"),
        ("sigma", "sigma", "sigma", "sigma", "sigma"),
        ("Sigma", "", "Sigma", "", ""),
        ("", "", "omega", "", ""),
      ),
      scale: 0.8,
    )
```



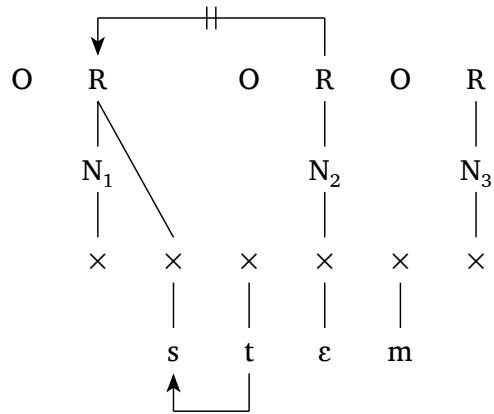
Multi-tier representations

```
#multi-tier(
      show-grid: true,
      levels: (
        ("", "", "", "", ("Adj", 3.5)),
        ("", "", "", "", ("Adj", 3.5)),
        ("", ("Af", 0.5), "", ("N", 2.5), "Af"),
        ("in", "ter", "na", "tion", "al"),
        ("sigma", "sigma", "sigma", "sigma", "sigma"),
        ("Sigma", "", "Sigma", "", ""),
        ("", "", "omega", "", ""),
      ),
      scale: 0.8,
      links: (
      ((0, 4), (2, 1)), // Adj → Af
      ((1, 4), (2, 3)), // Adj → N
      ((2, 1), (3, 0)), // Af → in
      ((2, 3), (3, 2)), // N → na
      ((5, 0), (4, 1)), // Ft → Syl
      ((5, 2), (4, 3)), // Ft → Syl
      ((6, 2), (5, 0)), // PWd → Ft
      ((6, 2), (4, 4)), // PWd → Ft
      ),
    )
```



CV phonology

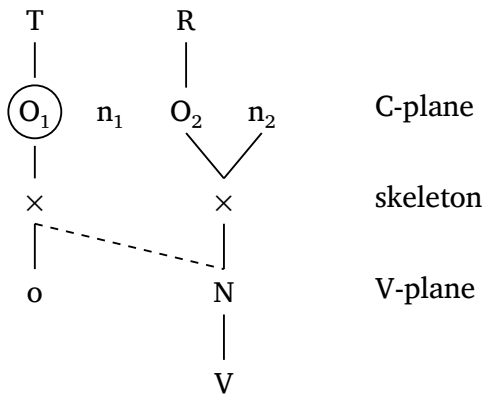
```
#multi-tier(
      levels: (
        ("O", "R", "", "O", "R", "O", "R"),
        ("", "N1", "", "", "N2", "", "N3"),
        ("", "x", "x", "x", "x", "x", "x"),
        ("", "", "s", "t", "E", "m", ""),
      ),
      links: (
        ((0, 1), (2, 2)),
      ),
      ipa: (3,),
      arrows: (
        ((3, 3), (3, 2)),
        ((0, 4), (0, 1)),
      ),
      arrow-delinks: (
        (1,)
      ),
      spacing: 1,
    )
```



Adapted from Goad (2012)

CV phonology

```
#multi-tier(
        levels: (
          ("T", "", "R", ""),
          ("O1", "n1", "O2", "n2"),
          ("x", "", ("x", 2.5), ""),
          ("o", "", ("N", 2.5), ""),
          ("", "", ("V", 2.5), ""),
        ),
        links: (
          ((1, 3), (2, 2)),
        ),
        dashed: (
          ((2, 0), (3, 2)),
        ),
        level-spacing: 1.2,
        highlight: (
          (1, 0),
        ),
        spacing: 1,
        stroke-width: 0.7pt,
        tier-labels: (
          (1, "C-plane"),
          (2, "skeleton"),
          (3, "V-plane"),
        ),
        scale: 1,
      )
```



Adapted from Carvalho (2017)

SPE

- Feature matrices and rules

```
#feat-matrix("\\ae")
```

/æ/

$$\begin{bmatrix} +\text{syllabic} \\ -\text{consonantal} \\ +\text{sonorant} \\ +\text{continuant} \\ +\text{voice} \\ -\text{high} \\ +\text{low} \\ +\text{front} \\ -\text{back} \\ -\text{round} \end{bmatrix}$$

```
#feat("+son", "-approx") #a-r #feat(alpha +
[#smallcaps("place")]) / #blank()\]#sub[#sigma]
#feat("-son", "-cont", "-del rel", alpha +
[#smallcaps("place")])
```

$$\begin{bmatrix} +\text{son} \\ -\text{approx} \end{bmatrix} \rightarrow [\alpha\text{PLACE}] \,/\, \underline{\quad}]_{\sigma} \begin{bmatrix} -\text{son} \\ -\text{cont} \\ -\text{del rel} \\ \alpha\text{PLACE} \end{bmatrix}$$

OT

- Dynamic tableaux with auto shading (optional)

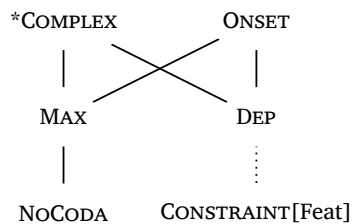
```
#tableau(
    input: "kraTa",
    candidates: ("kra.Ta", "ka.Ta", "ka.ra.Ta"),
    constraints: ("Max", "Dep", "*Complex"),
    violations: (
    ("", "", "*"),
    ("*!", "", ""),
    ("", "*!", ""), ),
    winner: 0,
    dashed-lines: (1,),
    shade: true // ← auto shading after !
)
```

/kraθa/	Max	Dep	*Complex
☞ kra.θa			*
ka.θa	*!		
ka.ra.θa		*!	

Hasse diagrams

- Visualizing OT rankings with minimal syntax and with automatic small caps

```
#hasse(
    (
    ("*Complex", "Max", 0),
    ("*Complex", "Dep", 0),
    ("Onset", "Max", 0),
    ("Onset", "Dep", 0),
    ("Max", "NoCoda", 1),
    ("Dep", "Constraint[Feat]", 1, "dotted"),
    ),
    node-spacing: 3,
)
```



MaxEnt

- MaxEnt tableaux with automatic calculation and optional probability visualization

	$w = 2.5$	$w = 1.8$	$w = 0.5$			
/kraθa/	MAX	DEP	*COMPLEX	h_i	e^{-h_i}	P_i
[kra.θa]	0	0	1	0.5	0.607	0.71
[ka.θa]	1	0	0	2.5	0.082	0.096
[ka.ra.θa]	0	1	0	1.8	0.165	0.194

	$w = 2.5$	$w = 1.8$	$w = 0.5$			
/kraθa/	MAX	DEP	*COMPLEX	h_i	e^{-h_i}	P_i
[kra.θa]	0	0	1	0.5	0.607	0.71
[ka.θa]	1	0	0	2.5	0.082	0.096
[ka.ra.θa]	0	1	0	1.8	0.165	0.194

MaxEnt

- MaxEnt tableaux with automatic calculation and optional probability visualization

```
#maxent(
    input: "kraTa",
    candidates: ("[kra.Ta]", "[ka.Ta]", "[ka.ra.Ta]"),
    constraints: ("Max", "Dep", "*Complex"),
    weights: (2.5, 1.8, 0.5),
    violations: (
      (0, 0, 1),
      (1, 0, 0),
      (0, 1, 0),
    ),
    visualize: true,
)
```

Numbered examples

- Phonology-friendly numbered examples: (1a) and (1b) are easy to reference
- Alignment is guaranteed given **table** structure; optional caption for table of contents

```
#show: ex-rules // ← this must be added to your doc
#ex(caption: "A phonology example")[
  #table(
    columns: 4, // ← where we may specify widths
    stroke: none,
    align: left,
    [#subex-label()<ex-anba>], [#ipa("/anba/")], [#a-r],
[#ipa("[amba]")],
    [#subex-label()<ex-anka>], [#ipa("/anka/")], [#a-r],
[#ipa("[aNka]")],
  )]
```

(1) a. /anba/ → [amba]
b. /anka/ → [aŋka]

FAQ & final thoughts

Common questions

1. Do I need to adopt Typst to take advantage of **phonokit**?
2. Can I completely replace LaTeX with Typst in 2026?
3. How about my `bib` references?
4. What *can't* I do with Typst?
5. What software do I need to use it?

FAQ & final thoughts

Common questions

1. No. You can export outputs as `PNG` and use them in LaTeX, Word, etc. Pair it with `oxipng` for tiny file sizes. See workflow example in Garcia (2026, appendix).
2. That depends. Journals will take a while to accept `typ`, and very few people know Typst. But you don't have to choose: they're two useful tools/languages. If you work in phonology, you *could* probably use Typst 99% of the time. In syntax, LaTeX still offers more when it comes to trees.
3. They work with Typst. So your workflow will not be affected.
4. LaTeX is much older, so it has **many** more packages. What you can/can't do depends on what packages your workflow requires.
5. VS Code, Positron, NeoVim, etc. Use `tinymist` as your extension/plugin.

References

Booij, G. (2012). *The grammar of words: An introduction to linguistic morphology* (3rd ed.). Oxford University Press.

Carvalho, J. B. d. (2017). Deriving sonority from the structure, not the other way round: A Strict CV approach to consonant clusters. *The Linguistic Review*, *34*(4), 589–614.

Garcia, G. D. (2026,). *phonokit: a toolkit to create phonological representations in Typst*. Zenodo. https://doi.org/10.5281/zenodo.18434478

Goad, H. (2012). sC clusters are (almost always) coda-initial. *Linguistic Review*, *29*(3).

Parker, S. (2011). Sonority. In M. van Oostendorp, C. J. Ewen, E. Hume, & K. Rice (Eds.), *The Blackwell Companion to Phonology: The Blackwell Companion to Phonology* (pp. 1160–1184). Wiley Online Library. https://doi.org/10.1002/9781444335262.wbctp0049

Zsiga, E. C. (2024). *The sounds of language: An introduction to phonetics and phonology* (2nd ed.). John Wiley & Sons.