Praat → LuaLaTeX Pipeline

Spectrograms with TikZ-drawn alignment tiers

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This worked example shows the pipeline used by phoneticians and computational linguists to publish aligned acoustic data: export a spectrogram from Praat as a PDF, embed it with `graphicx`, and draw the phoneme / word / gloss tiers over it with TikZ.

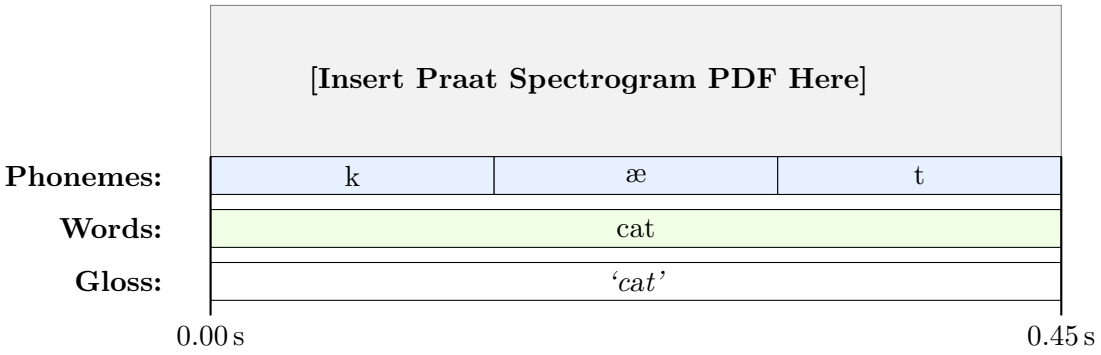
1 Step 1 — Export from Praat

In Praat, select the Sound and the TextGrid together, open **View & Edit**, show the spectrogram and the tiers you want, then **File → Save as PDF...** Call the file `spectrogram.pdf`.

For automated workflows, export the TextGrid as a text or CSV file and read it from Python with `parselmouth` or `textgridtools`. That gives you the exact start/end time of every segment in seconds, which you can feed directly into the TikZ coordinates below.

2 Step 2 — Embed and overlay in LaTeX

The example below uses a gray placeholder box in place of a real spectrogram so this file compiles out of the box. Replace it with `\includegraphics` once you have a real `spectrogram.pdf`.



3 Step 3 — Scaling the coordinates

TikZ draws in abstract units, but the spectrogram sits in seconds. If your audio file is T seconds long and you embedded the spectrogram at width W cm, then an event starting at time t seconds has x-coordinate

$$x \;=\; \frac{t}{T} \cdot W \quad \text{(cm)}.$$

Example: a vowel starting at 0.3 s in a 1.5 s file, with a 12 cm wide spectrogram, starts at $x = (0.3/1.5) \times 12 = 2.4$ cm.

For anything more than a handful of segments, let Python do the arithmetic. A short script can read the TextGrid and spit out `\phonbox{...}{...}{...}` lines directly, which you then `\input{}` into the TikZ picture. LaTeX does the drawing; Python does the math.

4 Related packages

- `tikz-dependency` — for dependency parsing: draws labeled arcs over text (useful for spaCy or UDPipe output).
- `expex`, `linguex` — alternatives to `gb4e` for numbered glosses; some departments prefer them.
- `forest` — phrase-structure trees (already in the main kit).

5 Where to Get Praat and Learn More

Rather than ship a copyrighted spectrogram with this kit, we point you at the original sources. Everything below is free to download and read.

- **Praat (the software).** The current version runs on Linux, macOS, and Windows, and is distributed under the GPL by its authors, Paul Boersma and David Weenink at the University of Amsterdam.
  https://www.fon.hum.uva.nl/praat/
- **The Praat manual.** Built into the application (**Help** → **Praat Intro**), and also available as a reference via the same project page. The "Intro" and "Tutorials" entries are the quickest way in.
- **Boersma, P. (2014).** ***The use of Praat in corpus research.*** In J. Durand, U. Gut & G. Kristoffersen (Eds.), *The Oxford Handbook of Corpus Phonology* (pp. 342–360). Oxford University Press.
  DOI: https://doi.org/10.1093/oxfordhb/9780199571932.013.016
  Open access (UvA-DARE):
  https://dare.uva.nl/id/68169330-87c7-486a-9450-403748a32e0d
  Author's preprint:
  https://www.fon.hum.uva.nl/paul/papers/PraatForCorpora2.pdf

  A chapter aimed at researchers who want to use Praat's scripting facilities on larger corpora, and a good practical complement to the built-in manual. Either of the two open-access links above gives you the full text without a university login.

Produce one short recording ("hello world" is enough), annotate the TextGrid in Praat, export the spectrogram as PDF, and drop it into this file where the placeholder currently sits. The TikZ tiers above are deliberately simple so you can see exactly where to adjust the coordinates once your own audio replaces the placeholder.