

HUMBOLDT-UNIVERSITÄT ZU BERLIN



L^AT_EX for Linguists

L^AT_EX 8: Venn diagram, vowel diagram, sonority profile & tables 2

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Venn diagram

Venn diagrams can be drawn with the `tikz` **package**. It is quite **complex**, but the results are **perfect**. Mostly you can find the code for what you are trying to draw on the internet.

An easier way to draw Venn diagrams is using the `venndiagram` **package**. It is based on `TikZ`, but it has fewer options.

Drawing with TikZ

```
\begin{tikzpicture}

\begin{scope}[blend group=soft light]
\fill[red!40!white]
(90:1.2) circle (2);
\fill[green!40!white]
(210:1.2) circle (2);
\fill[blue!40!white]
(330:1.2) circle (2);
\end{scope}

\node at (90:2) {A};
\node at (210:2) {B};
\node at (330:2) {C};

\end{tikzpicture}
```

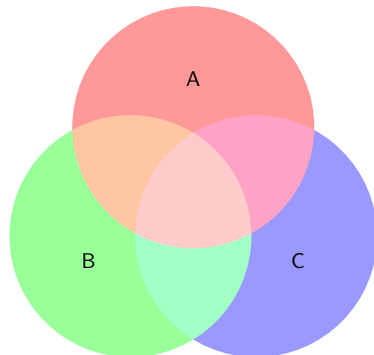


Fig. 1: Venn diagram

```

\begin{tikzpicture}
\def\firstrectangle{{(0,0) rectangle (6,4)}}
\def\firstcircle{{(3,2) circle (1.5cm)}}
\def\secondcircle{{(0:2cm) circle (1.5cm)}}

\begin{scope}[shift={(-3cm,2cm)}]
\clip \firstrectangle;
\fill[yellow] \firstrectangle;
\fill[white] \firstcircle;
\end{scope}

\begin{scope}[shift={(-3cm,2cm)}]
\draw \firstcircle;
\draw \firstrectangle;
\node at (33:6.8) {U};
\node at (60:4) {A};
\node at (40:4) {2};
\node at (30:3) {3};
\node at (17:4) {1};
\node at (50:4) {4};
\node at (27:4.5) {5};
\node at (6.9:2.3) {natural numbers without 1--5};
\end{scope}
\end{tikzpicture}

```

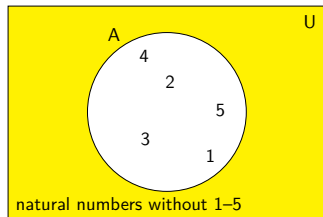


Fig. 2: Universe minus set

```

\begin{tikzpicture}
\def\firstellipse{(0,0) ellipse (1.3cm and 1.7cm)}
\def\secondellipse{(3.4,0) ellipse (1.3cm and 1.7cm)}
\begin{scope}
\draw \firstellipse ;
\draw \secondellipse ;
\node at (90:-2.25) {\textsc{dom}(f)};
\node at (90:1.25) {\blue{Lisa}};
\node at (90:.75) {\blue{Leia}};
\node at (90:.25) {\blue{Luke}};
\node at (90:-.25) {\blue{A. Merkel}};
\node at (90:-.75) {\blue{Friedrich II.}};
\node at (3.4,-2.25) {\textsc{rng}(f)};
\node at (3.4,1.25) {\alert{Homer}};
\node at (3.4,.75) {\alert{Vader}};
\node at (3.4,.25) {\alert{H. Kasner}};
\node at (3.4,-.25) {\alert{Friedrich I.}};
\node at (3.4,-.75) {\alert{Lex Luthor}};
\draw[thick,->] (.5,1.25) -- (2.8,1.25);
\draw[thick,->] (.5,.75) -- (2.8,.75);
\draw[thick,->] (.5,.25) -- (2.8,.75);
\draw[thick,->] (.9,-.25) -- (2.5,.25);
\draw[thick,->] (.9,-.75) -- (2.5,-.25);
\end{scope}
\end{tikzpicture}

```

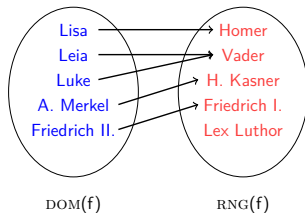


Fig. 3: Function *father of*

Drawing with venndiagram

Load the package:

```
\usepackage{venndiagram}
```

This package defines two environments:

- ① Venn diagrams with **two sets**
- ② Venn diagrams with **three sets**

```
\begin{venndiagram2sets}
```

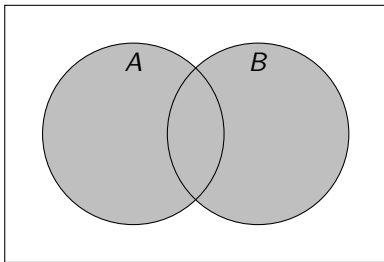
```
\end{venndiagram2sets}
```

```
\begin{venndiagram3sets}
```

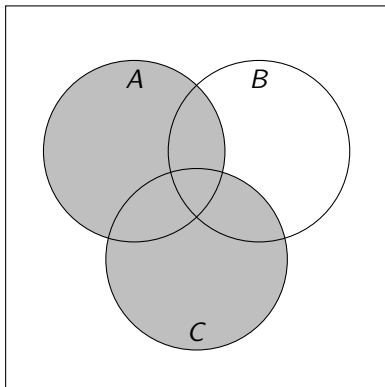
```
\end{venndiagram3sets}
```



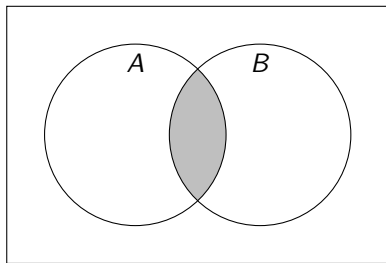
```
\begin{venndiagram2sets}  
  \fillA \fillB  
\end{venndiagram2sets}
```



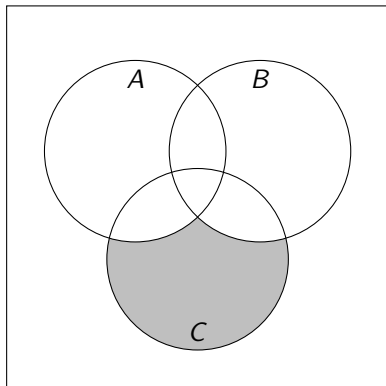
```
\begin{venndiagram3sets}  
  \fillA \fillC  
\end{venndiagram3sets}
```



```
\begin{venndiagram2sets}
  \fillACapB
\end{venndiagram2sets}
```

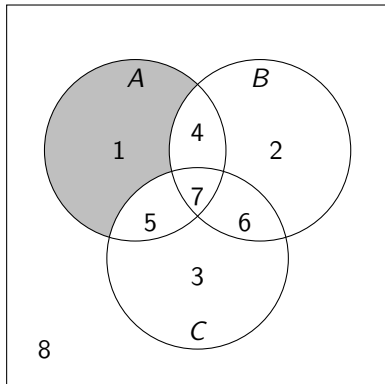


```
\begin{venndiagram3sets}
  \fillOnlyC
\end{venndiagram3sets}
```



Elements of the sets are given as options to the environment.

```
\begin{venndiagram3sets}[  
  labelOnlyA={1},  
  labelOnlyB={2},  
  labelOnlyC={3},  
  labelOnlyAB={4},  
  labelOnlyAC={5},  
  labelOnlyBC={6},  
  labelABC={7},  
  labelNotABC={8}  
]  
  
\fillOnlyA  
\end{venndiagram3sets}
```



Further features

- For further features, check the package documentation (Talbot, 2016).
- For complex diagrams, it is recommendable to use `TikZ`.

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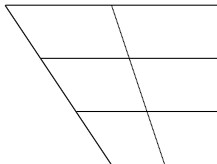
Vowel diagram

Load the package `vowel` (it works with the package `tipa`):

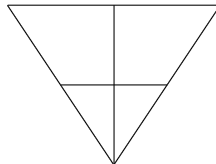
```
\usepackage{vowel}
```

Vowel provides a `vowel` **environment** with different **options**:

```
\begin{vowel}  
\end{vowel}
```



```
\begin{vowel}[triangle,three]  
\end{vowel}
```



Vowels can be included with the command `\putcvowel`.

```
\putcvowel[l|r]{x}{y}
```

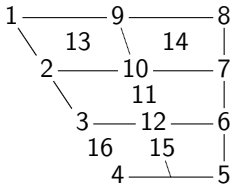
- **Options:**

`l` or `r` → left or right of a specified point (`y`) in the diagram

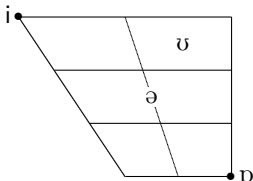
- **Arguments:**

`x` → IPA symbol

`y` → specified position in the diagram (every position in the diagram has a number!)



```
\begin{vowel}
  \putcvowel[l]{i}{1}
  \putcvowel[r]{\textscripta}{5}
  \putcvowel{\textschwa}{11}
  \putcvowel{\textupsilon}{14}
\end{vowel}
```



Vowels can be included with the command `\putvowel`.

```
\putvowel[l|r]{x}{z}{w}
```

- **Options:**

`l` or `r` → left or right of a node specified by the coordinates `z` and `w`

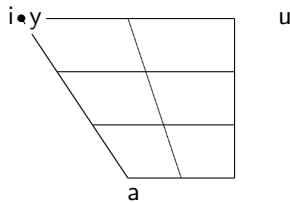
- **Arguments:**

`x` → IPA symbol

`z` → coordinate on x axis

`w` → coordinate on y axis

```
\begin{vowel}
  \putvowel[l]{i}{0pt}{0pt}
  \putvowel[r]{y}{0pt}{0pt}
  \putvowel{a}{42pt}{66pt}
  \putvowel{u}{99pt}{0pt}
\end{vowel}
```




```

\begin{vowel}
  \putcvowel[l]{\textipa{i}}{1}
  \putcvowel[r]{\textipa{y}}{1}
  \putcvowel[l]{e}{2}
  \putcvowel[r]{o}{2}
  \putcvowel[l]{\textepsilon}{3}
  \putcvowel[r]{\oe}{3}
  \putcvowel[l]{a}{4}
  \putcvowel[r]{\textsc{oe}lig}{4}
  \putcvowel[l]{\textscripta}{5}
  \putcvowel[r]{\textturnscripta}{5}
  \putcvowel[l]{\textturnv}{6}
  \putcvowel[r]{\textopeno}{6}
  \putcvowel[l]{\texttramshorns}{7}
  \putcvowel[r]{o}{7}
  \putcvowel[l]{\textturnm}{8}
  \putcvowel[r]{u}{8}
  \putcvowel[l]{\textbari}{9}
  \putcvowel[r]{\textbaru}{9}
  \putcvowel[l]{\textreve}{10}
  \putcvowel[r]{\textbaro}{10}
  \putcvowel{\textschwa}{11}
  \putcvowel[l]{\textrevepsilon}{12}

```

```

\putcvowel[r]{\textcloserevepsilon}
  {12}
\putcvowel{\textsci\ \textscy}{13}
\putcvowel{\textupsilon}{14}
\putcvowel{\textturna}{15}
\putcvowel{\ae}{16}
\end{vowel}

```

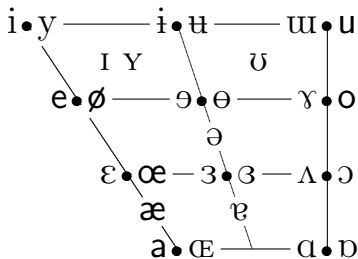


Fig. 4: Vowel diagram

Further features

Check the documentation (Rei, 2001) for more features.

Check also Felix Kopecky's solution (for Language Science Press) with `tikz`:
[http://userblogs.fu-berlin.de/langsci-press/2016/06/15/
drawing-vowel-charts-with-tikz/](http://userblogs.fu-berlin.de/langsci-press/2016/06/15/drawing-vowel-charts-with-tikz/)

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```
\begin{tikzpicture}[scale=.5]
\draw[black] (-1,0)--(6.5,0); % x axis
\draw[black] (-1,0)--(-1,6.5); % y axis

\node at (-2.5,6) {vowel};
\node at (-2.5,5) {\textipa{/R/}};
\node at (-2.5,4) {\textipa{/l/}};
\node at (-2.5,3) {nasal};
\node at (-2.5,2) {fricative};
\node at (-2.5,1) {plosive};

\draw[black] (0,2)--(1,1)--(2,5)--(3,6)
--(4,2);
\node at (0,-1) {\strut \textipa{S}};
\node at (1,-1) {\strut \textipa{p}};
\node at (2,-1) {\strut \textipa{\textsc{t}}}
\textsc{t}};
\node at (3,-1) {\strut \textipa{I}};
\node at (4,-1) {\strut \textipa{\c{c}}}};

\fill (0,2) circle [radius=3pt];
```

```
\fill (1,1) circle [radius=3pt];
\fill (2,5) circle [radius=3pt];
\fill (3,6) circle [radius=3pt];
\fill (4,2) circle [radius=3pt];
\end{tikzpicture}
```

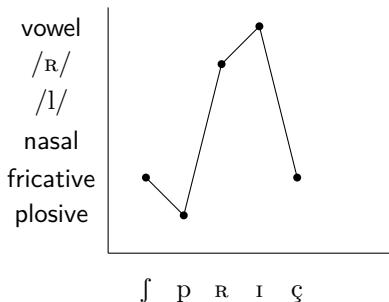


Fig. 5: Sonority profile with TikZ

You can do lots of things with TikZ, but normally you can **just copy the code**, because somebody else already did it.

```
\newcommand{\shrug}[1][\color{blue}]{%
  \begin{tikzpicture}[baseline,x=0.8\ht\strutbox,y=0.8\ht\strutbox,line width
    =0.125ex,#1]
    \def\arm{(-2.5,0.95) to (-2,0.95) (-1.9,1) to (-1.5,0) (-1.35,0) to (-0.8,0)
      };
    \draw \arm;
    \draw[xscale=-1] \arm;
    \def\headpart{(0.6,0) arc[start angle=-40, end angle=40,x radius=0.6,y radius
      =0.8]};
    \draw \headpart;
    \draw[xscale=-1] \headpart;
    \def\eye{(-0.075,0.15) .. controls (0.02,0) .. (0.075,-0.15)};
    \draw[shift={(-0.3,0.8)}] \eye;
    \draw[shift={(0,0.85)}] \eye;
    % draw mouth
    \draw (-0.1,0.2) to [out=15,in=-100] (0.4,0.95);
  \end{tikzpicture}}
```

For instance:

```
\shrug\ or \shrug[x=1ex,y=1ex,blue]
```

For instance:

```
\_('')\_ or \_('')\_
```

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Tables 2

Two more helpful commands for tables:

- With `\multicolumn{number of cols}{alignment}{text}`, text can occupy more than one column.
- With `\cline{cell number - cell number}`, you can have horizontal lines specifying its begin (cell number) and end (cell number).

```
\begin{tabular}[t]{llr}
  \multicolumn{2}{c}{Item} & \\
  \cline{1-2}
  article & unit & price \\
  \hline
  proofreading & per words & 0.02 \\
  layout & per page & 0.80 \\
  printing & per page & 0.99 \\
  typesetting & per article & 40.33 \\
\end{tabular}
```

Item		
article	unit	price
proofreading	per words	0.02
layout	per page	0.80
printing	per page	0.99
typesetting	per article	40.33

The package `tabularx` provides

- an extra **argument** to **specify the width** of the table, and
- a new column specifier `x`; the `x`-columns will be **stretched** until the table is as wide as specified.

The package `booktabs` provides `\toprule`, `\bottomrule`, `\midrule`, and `\cmidrule{x-y}` which are versions of `\hline` and `\cline{x-y}` with better spacing.

The package `multirow` gives you the possibility to merge cells vertically.

```
\begin{tabularx}{.4\textwidth}{XXX}
  \toprule
  0001&002&03\\
  \midrule
  0A&\multirow{2}{*}{Bii}&000C\\
  \cmidrule{1-1}\cmidrule{3-3}
  00i& &000iii\\
  \bottomrule
\end{tabularx}
```

0001	002	03
0A	Bii	000C
00i		000iii

You can find further packages and commands for tables on:
<https://en.wikibooks.org/wiki/LaTeX/Tables>

Internet sources I

- Link: Drawing vowel charts with TikZ – Felix Kopecky.
<https://userblogs.fu-berlin.de/langsci-press/2016/06/15/drawing-vowel-charts-with-tikz/> [Access: 08/12/2018]
- Link: Language Science Press
www.langsci-press.org [Access: 02/01/2019]
- Link: LaTeX Coffee Stains – Hanno Rein.
<http://hanno-rein.de/downloads/coffee.pdf> [Access: 12/01/2019]
- Link: LaTeX/Special Characters.
https://en.wikibooks.org/wiki/LaTeX/Special_Characters [Access: 02/01/2019]
- Link: TeX – LaTeX Stack Exchange: Typeset the shrug emoji
<https://tex.stackexchange.com/questions/279100/typeset-the-shrug-ᝠ--ᝠ-emoji> [Access: 16/01/2019]
- Link: Wikibooks: LaTeX/Tables.
<https://en.wikibooks.org/wiki/LaTeX/Tables> [Access: 16/01/2019]
- Link: Type IPA phonetic symbols.
<http://ipa.typeit.org/full/> [Access: 02/01/2019]

Literature I

- Freitag, Constantin & Antonio Machicao y Priemer. 2015. LaTeX-Einführung für Linguisten. Manuscript. <https://www.linguistik.hu-berlin.de/de/staff/amp/latex-einfuehrung>.
- Knuth, Donald E. 1986. *The TeX book*. Boston: Addison-Wesley.
- Kopka, Helmut. 1994. *LaTeX: Einführung*, vol. 1. Bonn: Addison-Wesley.
- Nordhoff, Sebastian & Stefan Müller. 2018. Language Science Press: Complete set of guidelines. Online.
<http://langsci.github.io/guidelines/latexguidelines/LangSci-guidelines.pdf>.
- Rei, Fukui. 2001. vowel – Draw vowel charts for phonetic research. *CTAN: Comprehensive TeX Archive Network* <https://ctan.org/pkg/vowel>.
- Talbot, Nicola L. C. 2016. venndiagram v1.1: Drawing simple venn diagrams. *CTAN: Comprehensive TeX Archive Network* <https://ctan.org/pkg/venndiagram>.