

# Small manual for the CCG L<sup>A</sup>T<sub>E</sub>X style file by B. Hoffman, M. Steedman, and J. Baldridge

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The package to use is `ccg` which can be downloaded from <https://github.com/jasonbaldridge/cg-latex>. Since the text is placed in math mode it also need at least `amstext` to get good results.

The main command is `\deriv` which takes two arguments: the number of columns (= words) and the derivation per se.

Inside the second argument of `\deriv` you build a table (with techniques similar to the `tabular` environment, but with specific commands).

Lines of this table can contain horizontal lines grouping categories for an application, or words (for the first line) or terms.

Here is an example of the CCG of a simple SVO sentence:

$$\begin{array}{ccc}
 \text{G  rard} & \text{aime} & \text{Alice} \\
 \hline
 NP & (S \backslash NP) / NP & NP \\
 & \xrightarrow{S \backslash NP} & \\
 \xrightarrow{S} & & 
 \end{array}$$

and the code :

```

1 \deriv{3}{
2 {\text{G  rard}}&{\text{aime}}&{\text{Alice}}\\
3 \uline{1}&\uline{1} & \uline{1}\\
4 \it NP & \it (S\bs NP)/NP & \it NP\\
5 & \fapply{2}\\
6 & \mc{2}{\it S\bs NP}\\
7 \bapply{2}&\\
8 \mc{2}{\it S}&
9 }

```

We request 3 columns. The first line places words into the appropriate columns.

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Line 3 requests underlines for each column. The 1 means that we want a line under a single column. Lines `\uline` do not add any symbol at the end of the line (lexical derivation).

On line 4 we place categories in the appropriate columns. On line 5 we have a right application (symbol  $>$ ), applied to columns 2 and 3, we put `\fapply{2}` into column 2 (2 columns starting from column 2).

On line 6 we place  $S \backslash NP$  centered under columns 2 and 3. The command `\mc` is similar to tabular's multicolumn command: it takes two arguments, the number of columns and the text we want to typeset (we are still in math mode).

On line 7 we have a left application (symbol  $<$ ) applied to columns 1 and 2.

## 1 Useful commands

- `\deriv`, a derivation;
- `\bs`, a backslash.

All the following commands take the number of columns as first argument:

- `\mc` a multi-column cell (in math mode, so better use `\text` to return to text mode);
- `\uline`, an underline without any symbol on the right;
- `\fapply`, an underline with a  $>$  symbol on the right;
- `\bapply`, an underline with a  $<$  symbol on the right;
- `\fcomp`, an underline with a  $> \mathbf{B}$  (bluebird) symbol on the right;
- `\fxcomp`, an underline with a  $> \mathbf{B}_\times$  symbol on the right;
- `\fxcompN`, an underline with a  $> \mathbf{B}_\times^\bullet$  symbol on the right where the exponent is given as a second argument;
- `\fcomptwo`, an underline with a  $> \mathbf{B}^2$  symbol on the right;
- `\fxcomptwo`, an underline with a  $> \mathbf{B}_\times^2$  symbol on the right;
- `\fcomptthree`, an underline with a  $> \mathbf{B}^3$  symbol on the right;
- `\fxcomptthree`, an underline with a  $> \mathbf{B}_\times^3$  symbol on the right;
- `\bcomp`, an underline with a  $< \mathbf{B}$  symbol on the right;
- `\bxcomp`, an underline with a  $< \mathbf{B}_\times$  symbol on the right;
- `\bxcompN`, an underline with a  $< \mathbf{B}_\times^\bullet$  symbol on the right where the exponent is given as a second argument;
- `\bcomptwo`, an underline with a  $< \mathbf{B}^2$  symbol on the right;

- `\bxcomptwo`, an underline with a  $\langle \mathbf{B}_x^2 \rangle$  symbol on the right;
- `\bcomptthree`, an underline with a  $\langle \mathbf{B}^3 \rangle$  symbol on the right;
- `\bxcomptthree`, an underline with a  $\langle \mathbf{B}_x^3 \rangle$  symbol on the right;
- `\fsubst`, an underline with a  $\rangle \mathbf{S}$  (starling) symbol on the right;
- `\bsubst`, an underline with a  $\langle \mathbf{S} \rangle$  symbol on the right;
- `\fxsubst`, an underline with a  $\rangle \mathbf{S}_x$  symbol on the right;
- `\bxsubst`, an underline with a  $\langle \mathbf{S}_x \rangle$  symbol on the right;
- `\ftype`, an underline with a  $\rangle \mathbf{T}$  (thrush) symbol on the right;
- `\btype`, an underline with a  $\langle \mathbf{T} \rangle$  symbol on the right;
- `\conj`, an underline with a  $\langle \Phi \rangle$  symbol on the right;
- `\boundary`, an underline with a  $\langle \% \rangle$  symbol on the right;
- `\asterisk`, an underline with a  $*$  symbol on the right;
- `\comb`, an arbitrary combinator (the symbol used is given as second argument) ;
- `\badcomb`, like the previous but for an inappropriate use of combinator (underline with `***`);
- `\dcomp`, an arbitrary decomposition (with leaders);
- `\unfreeze`, an underline with  $@$  symbol on the right;

For more information on CCGs read [3], for more info on the bird names, read [2], for a good introduction to combinatory logics read [1].

## References

- [1] Katalin Bimbó. *Combinatory Logic, pure, applied and typed*. Discrete Mathematics and its Applications. CRC Press, 2012.
- [2] Raymond Smullyan. *To mock a mockingbird, and other logic puzzles including an amazing adventure in combinatory logic*. Alfred A. Knopf, 1985.
- [3] Mark Steedman. *The syntactic process*. The MIT Press, 2000.