`lingsem`
Macros for Typesetting Semantics (Linguistics)
Version 0.1

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Abstract

This document is documentation (pun intended) for LaTeX macros that have been written in order to make the typesetting of semantics both easier and more readable. Section 1 includes explanations of how the macros work, using examples for illustration purposes. Section 2 provides definitions of the macros themselves. Section 3 includes some kudos to Alan Munn for helping with these macros. And, finally, section 4 documents changes that have been made to these macros over time.

0 Introductory Remarks

These are LaTeX macros that aim to make the typesetting of work in semantics easier and the markup more readable. There is an unfortunate dearth of tools available to do so. Perhaps these macros will become a full-fledged package at some point. At the moment, however, the macros are rather skimpy and not, I think, worth putting on CTAN.

That being said, any suggestions, comments, and improvements that **you** might have might lead to this becoming a more robust set of macros worth putting on CTAN. If you do have suggestions, comments, or requests, please file them with the GitHub issue tracker. Or, if you want to contribute to development of these macros directly, fork the repo and/or submit a pull request.

At any rate, the source code for these macros is documented below and examples of usage are interspersed throughout this documentation. The source code for the documentation and the source code for the macros themselves are available in the GitHub repo.

1 Examples & Explanations

1.1 The Interpretation Function

There are two relevant macros for typesetting text inside of the semantic interpretation function ('⟦ ⟧'). They are `\interp` and `\wraptext`. `\interp` takes an optional argument, which can be used to relativize the interpretation function to an assignment.[1] For example, `\interp{fast}` produces the expression in (1a), while `\interp[g]{fast}` produces the expression in (1b).

Note that the `\interp` command is written so that the optional argument is in a math-mode environment. Thus, for example, if we want to relativize the interpretation function to a world of interpretation, say w_7, we write `\interp[w_{7}]{fast}`—which produces the expression in (1c)—and **not** `\interp[w$_{7}$]{fast}`, which will cause the compilation to crash.

(1) a. $[\![\text{fast}]\!]$
b. $[\![\text{fast}]\!]^{g}$
c. $[\![\text{fast}]\!]^{w_7}$

The second macro, `\wraptext`, is used for handling denotations that we wish to specify that are lengthy. It exploits the fact that the two commands from the `stmaryrd` package—`\llbracket` and `\rrbracket`—are written so as to be delimiters. `\wraptext` goes inside the `\interp` command. It is written so that it's default optional argument value is '1in'.

Thus, `\interp{\wraptext{example of . . .}}` will produce the expression in (2a).

Similarly, if we write, `\interp{\wraptext[2in]{example of . . .}}`, that will produce the expression in (2b).

The definition of the `\wraptext` command uses a varwidth environment, which is made available by the varwidth package. This environment sets the width of its contents to their natural width; thus, we need never worry about setting the width of the `\wraptext` command such that the right denotation bracket is offset because of how the text wraps, as is the case in (2c).

(2) a. $[\![\begin{array}{l} \text{example of re-} \\ \text{ally long text} \\ \text{inside an in-} \\ \text{terpretation} \\ \text{function which} \\ \text{will continue as} \\ \text{long as we like} \end{array}]\!]$

[1] Assignment functions are used primarily to account for indexicals like pronouns (*e.g.*, Heim & Kratzer, 1998:90–95). When doing intensional semantics, we might also want to relativize the interpretation function to a world of evaluation. The optional argument allows us to do so.

b. $[\![\text{example of really long text inside an interpretation function which will continue as long as we like}]\!]$

c. $[\![\text{example of really long text inside an interpretation function which will continue as long as we like}]\!]$

1.2 Denotations & Arguments

By making minor adjustments to the `\interp` command, we can define two new commands, `\den` and `\argum`, which do the exact same thing for denotations and arguments that `\interp` does for text inside of the interpretation function.[2] So, `\den{x is fast in w}` produces the expression in (3a). Similarly, `\argum{Fred}` produces the expression in (3b). Both of these commands also work with the `\wraptext` command just like `\interp` does (*cf.* (3c) & (3d)).

(3) a. $[\,\text{x is fast in w}\,]$

b. $(\,\text{Fred}\,)$

c. $\lceil \text{example of a really long denotation which will continue as long as we like} \rceil$

d. $\left(\begin{array}{l}\text{example of a}\\ \text{really long argu-}\\ \text{ment which will}\\ \text{continue as long}\\ \text{as we like}\end{array}\right)$

1.3 λ-expressions

For lambda expressions, we can use one of two commands, either `\lam` or `\lamexp`. `\lamexp` allows one to write a complete and explicit λ-expression as in (4a). This command necessarily takes two arguments. Thus, to produce (4a), we write `\lamexp{p}{<s,t>}`.

(4) a. $\lambda p \in D_{<s,t>}.$

b. $\lambda p.$

c. $\lambda p_{<s,t>}.$

Often, though, we are satisfied with either of the abbreviations seen in (4b) or (4c). We can produce either of these with the `\lam` command. This macro takes an optional argument which can be used to specify the domain of the

[2] Note that these new commands no longer take an optional argument, as one—as far as I am aware—never need specify another argument of a denotation or an argument like one often must specify an assignment function or world of evaluation for the interpretation function.

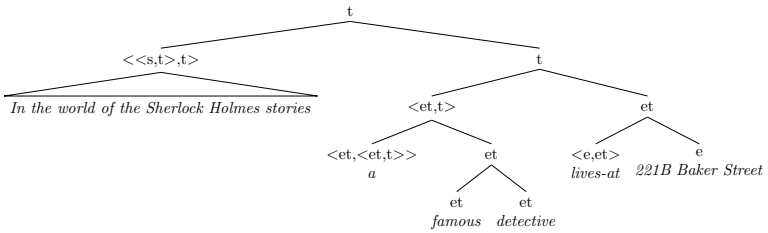
variable in the λ-expression. So, `\lam{p}` produces the expression in (4b), and `\lam[<s,t>]{p}` produces the expression in (4c).

Similar to the `\interp` command, note that both the `\lam` command and the `\lamexp` are written so that all of their arguments are in a math-mode environment.

1.4 Putting It All Together

(6) is an example—abstracting away from many minor details—of how these commands can be used for readability's sake for computing the semantic derivation of the structure in (5), whereas (7) is an example of what (6) might look like without these macros.

(5)



(6) a. $[\![\text{a famous detective lives at 221B Baker Street}]\!]^{w_7,g} = 1$ iff $\exists$x : x is famous in w_7 and x is a detective in w_7 and x lives at 221B Baker Street in w_7

b. $$[\![\text{In the world of the Sherlock Holmes stories, a famous detective lives at 221B Baker Street}]\!]^{w_7,g} = [\![\text{In the world of the Sherlock Holmes stories}]\!]^{w_7,g}\left(\lambda w.\ [\![\text{a famous detective lives at 221B Baker Street}]\!]^{w,g}\right)$$

$$= [\![\forall w' \text{ compatible with the Sherlock Holmes stories in w, } p(w') = 1]\!]\left(\lambda w.\ [\![\text{a famous detective lives at 221B Baker Street}]\!]^{w,g}\right)$$

$=$ 1 iff, $\forall w'$ compatible with the Sherlock Holmes stories in w, $\exists$x : x is famous in w' and x is a detective in w' and x lives at 221B Baker Street in w'

(7) a. $[\![\text{a famous detective lives at 221B Baker Street}]\!]^{w_7,g} = 1$ iff $\exists$x : x is famous in w_7 and x is a detective in w_7 and x lives at 221B Baker

Street in w_7

b. $[\![$In the world of the Sherlock Holmes stories, a famous detective lives at 221B Baker Street$]\!]^{w_7,g}$ = $[\![$In the world of the Sherlock Holmes stories$]\!]^{w_7,g}(\lambda w.[\![$a famous detective lives at 221B Baker Street$]\!]^{w,g})$

= [$\forall$w′ compatible with the Sherlock Holmes stories in w, p(w′) = 1]$(\lambda w.[\![$a famous detective lives at 221B Baker Street$]\!]^{w,g})$

= 1 iff, $\forall$w′ compatible with the Sherlock Holmes stories in w, $\exists$x : x is famous in w′ and x is a detective in w′ and x lives at 221B Baker Street in w′

In my opinion, at least, the version in (6) looks much better and is much more readable than the version in (7).

2 Writing the Macros

2.1 Writing the Macros Yourself

If you would like, you can follow the instructions below to write the macros yourself.

2.1.1 Required Packages

In order to write these macros, you will need to load the following packages in your `.tex` document.

- `stmaryrd`
- `amsmath`
- `ragged2e`
- `varwidth`

2.1.2 The Macros

In order to use the macros, define the following commands in the preamble of your `.tex` document.

- `\interp` is defined as follows:

```
\newcommand{\interp}[2][]{
\(
\left\llbracket\,\text{#2}\,\right\rrbracket^{#1}
\)
}
```

- `\den` is defined as follows:

```
\newcommand{\den}[1]{
\(
\left[\,\text{#1}\,\right]
\)
}
```

- `\argum` is defined as follows:

```
\newcommand{\argum}[1]{
\(
\left(\,\text{#1}\,\right)
\)
}
```

- `\wraptext` is defined as follows:

```
\newcommand{\wraptext}[2][1in]{
\begin{varwidth}{#1}{\RaggedRight#2}\end{varwidth}
}
```

- `\lam` is defined as follows:

```
\newcommand{\lam}[2][]{$\lambda {#2}_{#1}$.}
```

- `\lamexp` is defined as follows:

```
\newcommand{\lamexp}[2]{$\lambda {#1} \in D_{#2}$.}
```

2.2 Downloading the Macros

If you would rather not write the macros yourselves, you can simply download the source code directly for these macros from the GitHub repo and place them in your preamble.

Or, if you use TeXShop, this `.tex` file can then be placed in the Templates directory (`~/Library/TeXShop/Templates`), which will allow you to access the macros from the Templates menu in TeXShop.

3 Acknowledgements

The two macros, `\interp` & `\wraptext`, were written by Alan Munn in response to a question that I posted on TeX.SX. I adapted the `\den` and `\argum` commands from his macro for `\interp`, and I wrote the two macros for λ-expressions myself.

4 Change Log

Version 0.1 (2014.06.02) Pushed the macros to GitHub.

References

Heim, Irene & Angelika Kratzer. 1998. *Semantics in generative grammar*. Malden, MA: Blackwell Publishers Inc.