Computational Tools for Logic-Based Grammar Formalisms
Minimalist Grammar

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Contents

1. Minimalist Grammar

A minimalist grammar $MG = (\sum, F, Types, Lex, \mathcal{F})$

Features F:

$$
\begin{aligned}
\textbf{base } B &= \{v, n, np, case, wh, \ldots\} \\
\textbf{selectors } S &= \{\texttt{=f} | \texttt{f} \in B\} \\
\textbf{licensees } M &= \{\texttt{-f} | \texttt{f} \in B\} \\
\textbf{licensors } N &= \{\texttt{+f} | \texttt{f} \in B\} \\
\textbf{features } F &= B \cup S \cup M \cup N
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Grammar

$$\begin{array}{llcl}
\textbf{Lexical types} & LT & = & \Sigma^* :: F^* \\
\textbf{Derived types} & DT & = & \Sigma^* : F^* \\
 & \cdot & \in & \{::, :\} \\
\textbf{Lexicon} & Lex & \subset & LT^+ \\
\textbf{Minimalist grammar} & G & = & Lex
\end{array}$$

Operations

Merge $:(E \times E) \rightarrow E$
where $\mathsf{t} = (\mathsf{t}_s \mathsf{t}_h \mathsf{t}_c)$

[r1] *if* s *is lexical, and* t *has one* $[\mathtt{f}]$

$$\frac{\mathsf{s} :: \; \mathtt{=f}\gamma \quad \mathsf{t}_s,\, \mathsf{t}_h,\, \mathsf{t}_c \cdot \mathtt{f}}{\epsilon,\, \mathsf{s},\, \mathsf{t} : \gamma}\; r1$$

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[r2] *if* s *is derived, and* t *has one* $[\mathtt{f}]$

$$\frac{\mathtt{s}_s,\ \mathtt{s}_h,\ \mathtt{s}_c :\ \mathtt{=f}\gamma \quad \mathtt{t}_s,\ \mathtt{t}_h,\ \mathtt{t}_c \cdot \mathtt{f}}{\mathtt{ts}_s,\ \mathtt{s}_h,\ \mathtt{s}_c :\ \gamma}\ r2$$

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[r2] *if* s *is derived, and* t *has one* [f]

$$\frac{\mathtt{s}_s,\ \mathtt{s}_h,\ \mathtt{s}_c : \mathtt{=f}\gamma \quad \mathtt{t}_s,\ \mathtt{t}_h,\ \mathtt{t}_c \cdot \mathtt{f}}{\mathtt{ts}_s,\ \mathtt{s}_h,\ \mathtt{s}_c : \gamma}\ r2$$

[r3] *if* s *is lexical or derived, and* t *has one* [f] *and a set of (licensee) features* δ

$$\frac{\mathtt{s}_s,\ \mathtt{s}_h,\ \mathtt{s}_c \cdot \mathtt{=f}\gamma \quad \mathtt{t}_s,\ \mathtt{t}_h,\ \mathtt{t}_c \cdot \mathtt{f}\delta}{\mathtt{s}_s,\ \mathtt{s}_h,\ \mathtt{s}_c : \gamma,\ \mathtt{t} : \delta}\ r3$$

1.1. Declarative sentence

Lexicon:

Lexical:	*Functional:*
willem :: `d` maxima :: `d` loves :: `=d =d vp`	ϵ :: `=vp C`

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willem :: d maxima :: d loves :: =d =d vp	ϵ :: =vp C

$$\dfrac{\epsilon :: \texttt{=vp C} \qquad \dfrac{\dfrac{\text{loves} :: \texttt{=d =d vp} \quad \text{maxima} :: \texttt{d}}{(\epsilon, \text{loves}, \text{maxima}) : \texttt{=d vp}} \qquad \text{willem} :: \texttt{D}}{(\text{willem}, \text{loves}, \text{maxima}) : \texttt{vp}}}{(\epsilon, \epsilon, \text{willem loves maxima}) : \texttt{C}}$$

Move : $E \to E$

[m1] *if* s *is derived, and* t *in the chain is the only element (SMC) with one* $[-\mathtt{f}]$

$$\frac{\mathsf{s}_s,\ \mathsf{s}_h,\ \mathsf{s}_c\ :\ \mathtt{+f}\gamma,\ \ \Gamma[\mathtt{t}_s,\ \mathtt{t}_h,\ \mathtt{t}_c\ :\ \mathtt{-f}]}{\mathsf{ts}_s,\ \mathsf{s}_h,\ \mathsf{s}_c\ :\ \gamma,\ \ \Gamma}\ m1$$

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[m2] *if* s *is derived, and* t *in the chain is the only element (SMC) with a* $[-\mathtt{f}]$ *followed by a non-empty set of features* δ

$$\frac{\mathtt{s}_s,\ \mathtt{s}_h,\ \mathtt{s}_c\ :\ \mathtt{+f}\gamma,\ \ \Gamma[\mathtt{t}_s,\mathtt{t}_h,\mathtt{t}_c\ :\ \mathtt{-f}\delta]}{\mathtt{s}_s,\ \mathtt{s}_h,\ \mathtt{s}_c\ :\ \gamma,\ \ \Gamma[\ \mathtt{t}_s,\mathtt{t}_h,\mathtt{t}_c\ :\ \delta]}\ m2$$

Wh-movement in MG

Lexicon:

Lexical:	*Functional:*
willem :: d	
maxima :: d	ϵ :: =vp C
loves :: =d =d vp	ϵ :: =I C
love :: =d =d V	does :: =V I

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Lexical:	*Functional:*
willem :: `d`	
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loves :: `=d =d vp`	ϵ :: `=I C`
love :: `=d =d V`	does :: `=V I`

Question:

who :: `?`	ϵ :: `?`