Ling 566
Dec 6, 2012

Sign-Based Construction Grammar

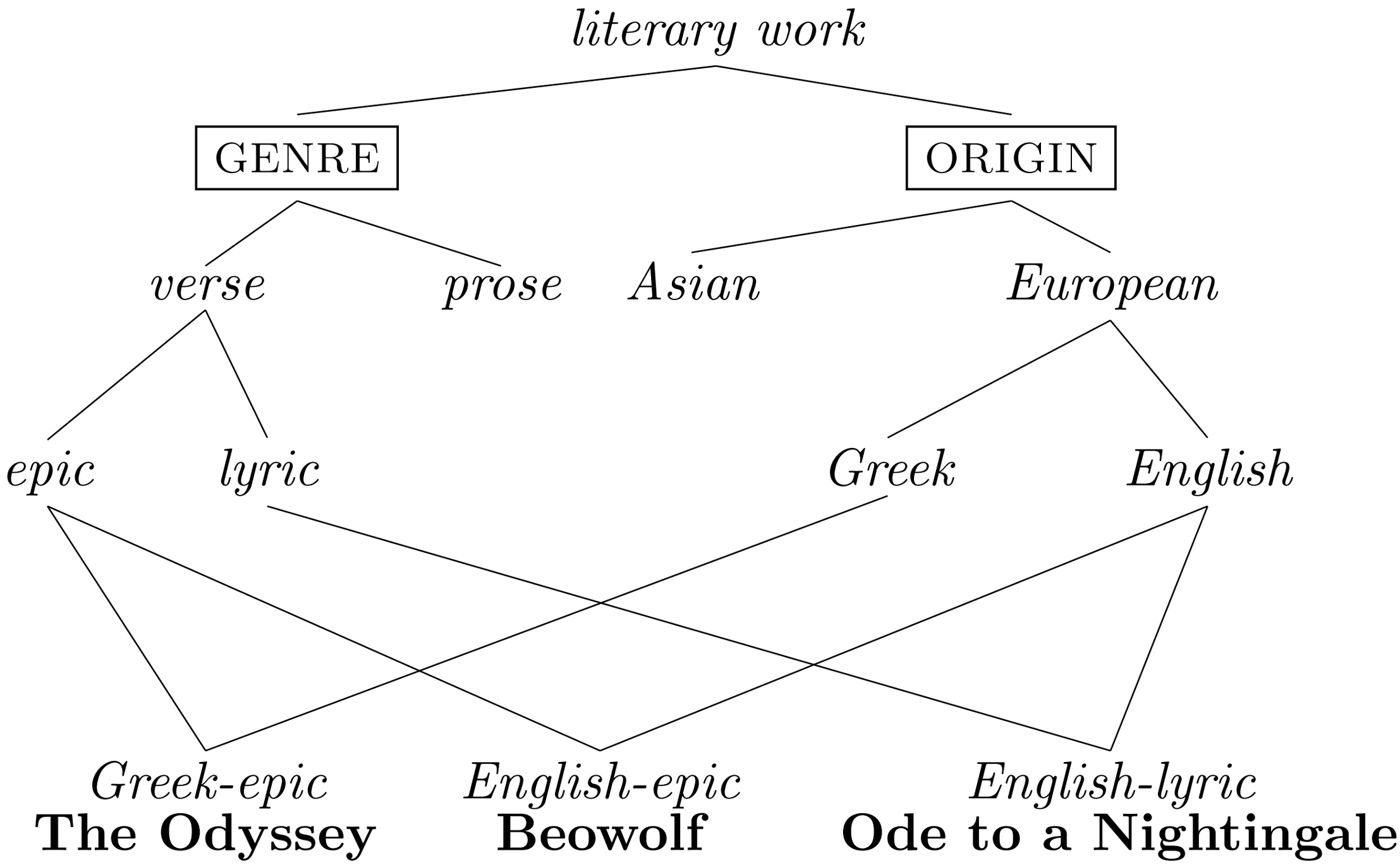
Overview

- Chapter 16 framework (same analyses, different underlying system)
- Reading questions
- General wrap up

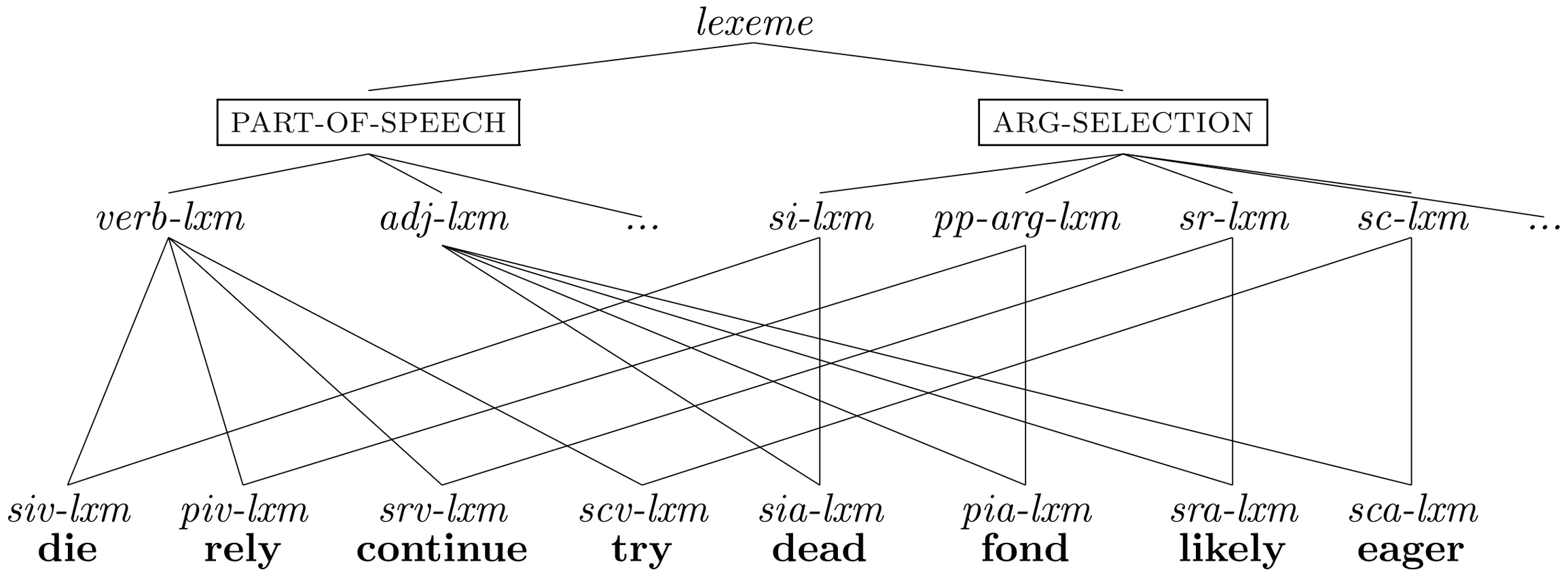
Overview of Differences

- Multiple Inheritance
- Signs
- Grammar rules form a hierarchy
- Every tree node has its own phonology
- Many principles become constraints on grammar rules
- The definition of well-formedness is simplified

Multiple Inheritance Hierarchies



Lexeme Hierarchy



Lexeme Abbreviations

- *si-lxm* : *strict-intransitive-lexeme*
- *pp-arg-lxm* : *PP-argument-lexeme*
- *sr-lxm* : *subject-raising-lexeme*
- *sc-lxm* : *subject-control-lexeme*
- *siv-lxm* : *strict-intransitive-verb-lexeme*
- *piv-lxm* : *PP-intransitive-verb-lexeme*
- *srv-lxm* : *subject-raising-verb-lexeme*
- *scv-lxm* : *subject-control-verb-lexeme*
- *sia-lxm* : *strict-intransitive-adjective-lexeme*
- *pia-lxm* : *PP-intransitive-adjective-lexeme*
- *sra-lxm* : *subject-raising-adjective-lexeme*
- *sca-lxm* : *subject-control-adjective-lexeme*

Lexeme Constraints

- *si-lxm* : $\left[\text{ARG-ST} \quad \langle\ \text{X}\ \rangle\right]$
- *pp-arg-lxm* : $\left[\text{ARG-ST} \quad \langle\ \text{X}\ ,\ \text{PP}\ \rangle\right]$
- *sr-lxm* : $\left[\text{ARG-ST} \quad \left\langle\ \boxed{1}\ ,\ \left[\text{SPR} \quad \langle\ \boxed{1}\ \rangle\right]\right\rangle\right]$
- *sc-lxm* : $\left[\text{ARG-ST} \quad \left\langle\ \text{NP}_i\ ,\ \left[\text{SPR} \quad \langle\ \text{NP}_i\ \rangle\right]\right\rangle\right]$

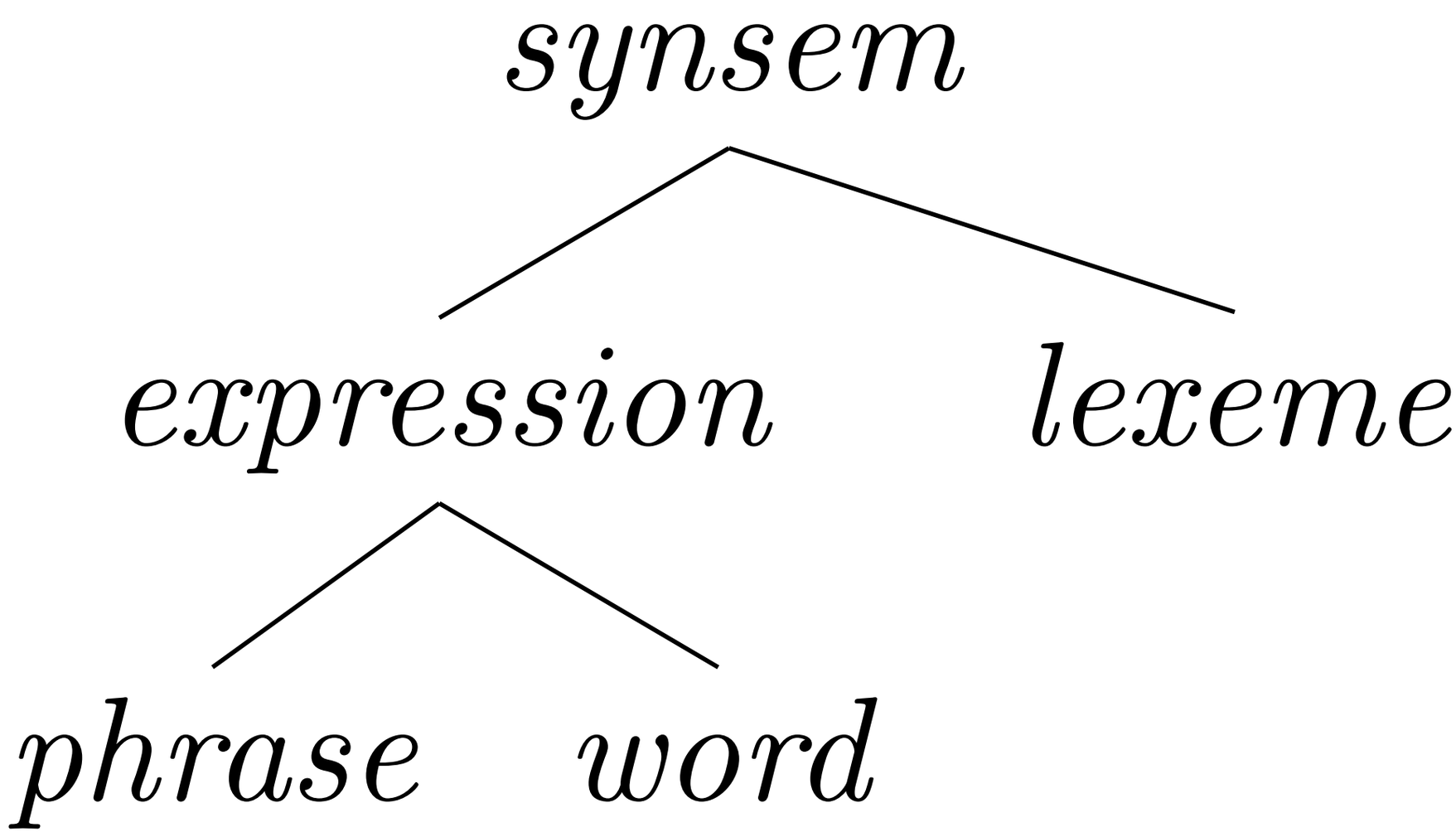
Another Lexeme Constraint

$$
\textit{verb-lxm}: \left[\begin{array}{ll}
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \left[\begin{array}{ll}
\textit{verb} & \\
\text{PRED} & - \\
\text{INF} & / - \\
\text{AUX} & / - \\
\text{POL} & -
\end{array}\right] \\
\text{ARG-ST} & \left\langle \left[\begin{array}{ll}
\text{HEAD} & \textit{nominal} \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \langle\,\rangle \\
\text{COMPS} & \langle\,\rangle
\end{array}\right]
\end{array}\right], \ldots \right\rangle \\
\text{SEM} & \left[\text{MODE} \quad \text{prop}\right]
\end{array}\right]
\end{array}\right]
$$

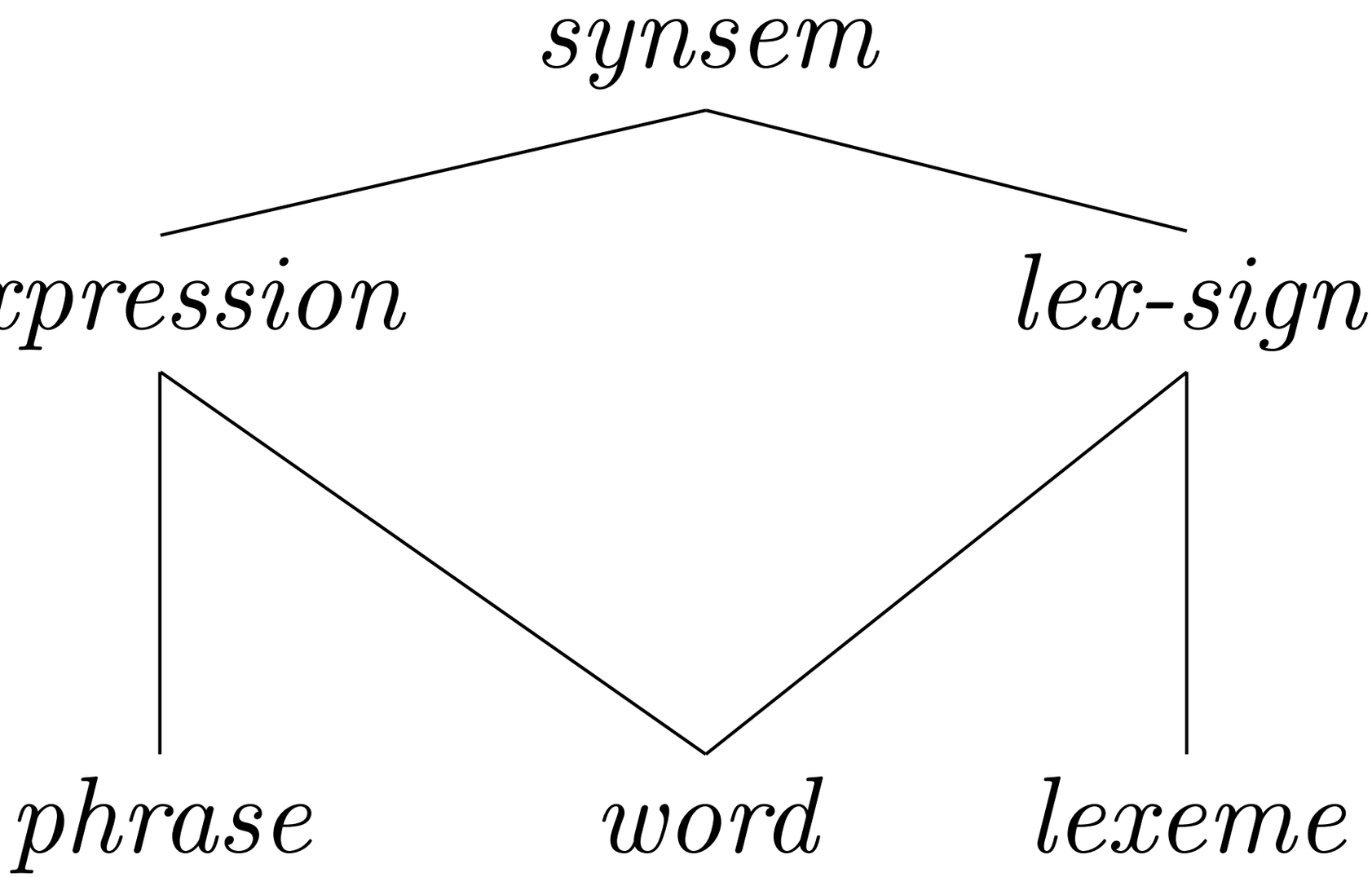
And Another

$$
\textit{adj-lxm} : \left[\begin{array}{ll}
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & adj \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \langle\ \text{X}\ \rangle \\
\text{MOD} & \langle\ [\text{HEAD}\ \ noun]\ \rangle
\end{array}\right]
\end{array}\right] \\
\text{ARG-ST} & \left\langle \left[\begin{array}{ll}
\text{HEAD} & nominal \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \langle\ \rangle \\
\text{COMPS} & \langle\ \rangle
\end{array}\right]
\end{array}\right], \ldots \right\rangle \\
\text{SEM} & \left[\text{MODE}\ \ \text{prop}\right]
\end{array}\right]
$$

Synsem Types



Give ARG-ST a Unique Home



Words and Phrases as Saussurean Signs

$$\begin{bmatrix} \textit{word} & & \\ \text{PHON} & \langle\ \text{Kim}\ \rangle & \\ \text{SEM} & \begin{bmatrix} \text{MODE} & \text{ref} \\ \text{INDEX} & i \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \textbf{name} \\ \text{SIT} & s \\ \text{NAME} & \text{Kim} \\ \text{NAMED} & i \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix}$$

Augmented Signs

$$\begin{bmatrix} word & & \\ \text{PHON} & \langle\ \text{Kim}\ \rangle & \\ \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} noun & \\ \text{AGR} & 3sing \end{bmatrix} \end{bmatrix} & \\ \text{ARG-ST} & \langle\ \ \rangle & \\ \text{SEM} & \begin{bmatrix} \text{MODE} & \text{ref} & \\ \text{INDEX} & i & \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \textbf{name} \\ \text{SIT} & s \\ \text{NAME} & \text{Kim} \\ \text{NAMED} & i \end{bmatrix} \right\rangle & \end{bmatrix} & \end{bmatrix}$$

Phrases as Signs

$$\begin{bmatrix} \textit{phrase} & & \\ \text{PHON} & \langle\ \text{Kim}\ ,\ \text{walks}\ \rangle & \\ \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{verb} & \\ \text{FORM} & \text{fin} \end{bmatrix} \\ \text{SPR} & \langle\ \ \rangle \\ \text{COMPS} & \langle\ \ \rangle \end{bmatrix} & \\ \text{SEM} & \begin{bmatrix} \text{MODE} & \text{prop} & \\ \text{INDEX} & s & \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \textbf{name} \\ \text{NAME} & \text{Kim} \\ \text{NAMED} & i \end{bmatrix}, \begin{bmatrix} \text{RELN} & \textbf{walk} \\ \text{SIT} & s \\ \text{WALKER} & i \end{bmatrix}, \ldots \right\rangle & \end{bmatrix} & \end{bmatrix}$$

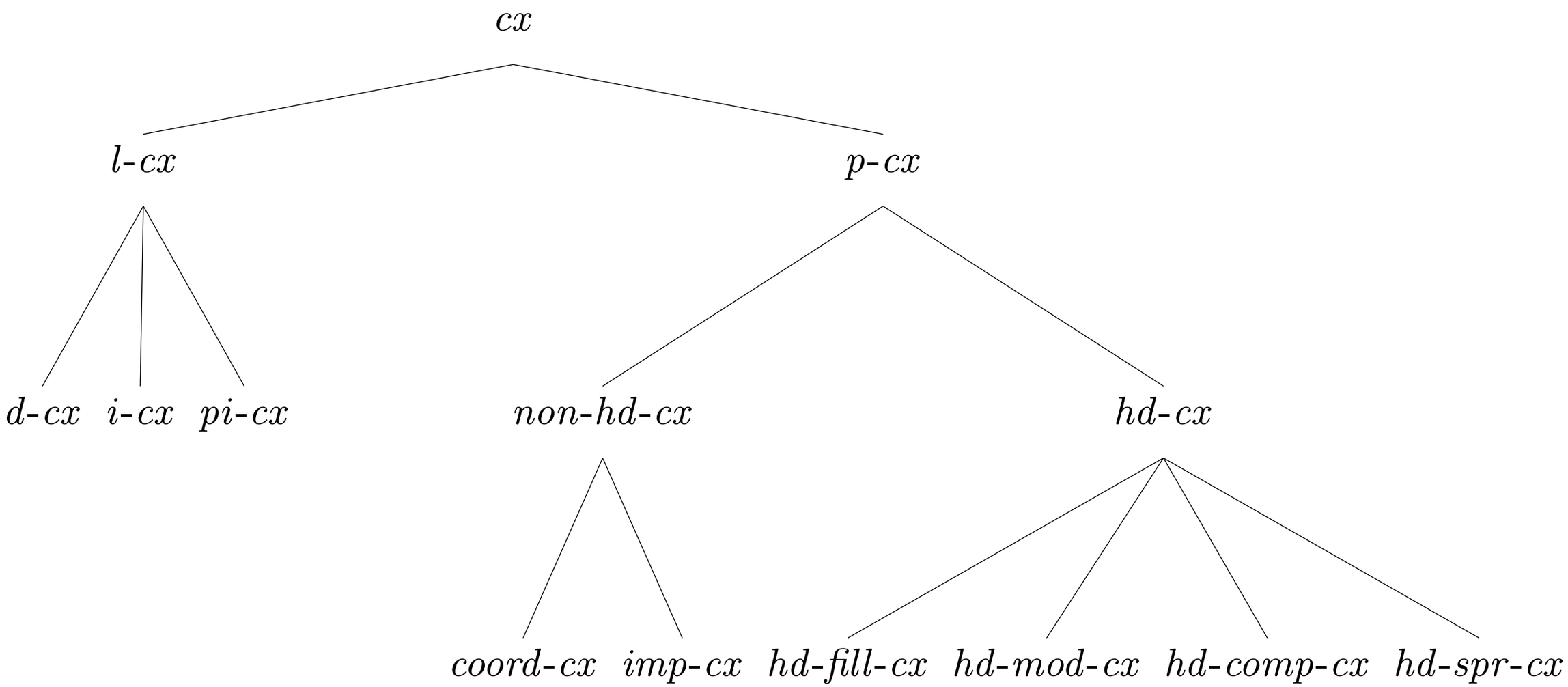
Types and Constraints

TYPE	FEATURES/VALUE TYPES	IST
sign	$\begin{bmatrix} \text{PHON} & \textit{list}(\textit{form}) \\ \text{SYN} & \textit{syn-cat} \\ \text{SEM} & \textit{sem-cat} \end{bmatrix}$	*feat-struc*
expression		*sign*
lex-sign	$[\text{ARG-ST} \quad \textit{list}(\textit{expression})]$	*sign*
phrase		*expression*
word		*expression* & *lex-sign*
lexeme		*lex-sign*

Constructions: Some Abbreviations

cx	*construction*
l-cx	*lexical-construction*
d-cx	*derivational-construction*
i-cx	*inflectional-construction*
pi-cx	*postinflectional-construction*
p-cx	*phrasal-construction*
non-hd-cx	*non-headed-construction*
hd-cx	*headed-construction*
coord-cx	*coordinate-construction*
imp-cx	*imperative-construction*
hd-fill-cx	*head-filler-construction*
hd-comp-cx	*head-complement-construction*
hd-spr-cx	*head-specifier-construction*
hd-mod-cx	*head-modifier-construction*

The World of Constructions



Properties of Constructions

TYPE	FEATURES/VALUE TYPES	IST
cx	$\begin{bmatrix} \text{MOTHER} & \textit{sign} \\ \text{DTRS} & \textit{list}(\textit{sign}) \end{bmatrix}$	*feat-struc*
l-cx	$\begin{bmatrix} \text{MOTHER} & \textit{lex-sign} \\ \text{DTRS} & \langle\ \textit{lex-sign}\ \rangle \end{bmatrix}$	*cx*
p-cx	$\begin{bmatrix} \text{MOTHER} & \textit{phrase} \\ \text{DTRS} & \textit{list}(\textit{expression}) \end{bmatrix}$	*cx*

Well-Formed Tree Structure

Φ is a Well-Formed Structure according to a grammar G if and only if

1. there is some construction C in G, such that
2. there is a feature structure I that is an instantiation of C, such that Φ is the value of the MOTHER feature of I.

A Well-Formed Feature Structure

The grammar licenses a feature structure of type *phrase* whose PHON value is < *ate* , *a* , *pizza* > because there is a feature structure instantiating the head-complement construction that has that feature structure as its MOTHER value. This phrasal construct satisfies the following description:

$$\begin{bmatrix} \textit{phrase} & & \\ \text{PHON} & \langle\ \text{ate}\ ,\ \text{a}\ ,\ \text{pizza}\ \rangle & \\ \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{verb} & \\ \text{FORM} & \text{fin} \end{bmatrix} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \langle\ \text{NP}\ \rangle \\ \text{COMPS} & \langle\ \rangle \\ \text{MOD} & \langle\ \rangle \end{bmatrix} \\ \text{GAP} & \langle\ \rangle \end{bmatrix} & \\ \text{SEM} & \begin{bmatrix} \text{MODE} & \text{prop} & \\ \text{INDEX} & s & \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \mathbf{eat} \\ \text{SIT} & s \\ \text{EATER} & i \\ \text{EATEN} & j \end{bmatrix}, \begin{bmatrix} \text{RELN} & \mathbf{a} \\ \text{BV} & j \end{bmatrix}, \begin{bmatrix} \text{RELN} & \mathbf{pizza} \\ \text{INST} & j \end{bmatrix}, \right\rangle \end{bmatrix} & \end{bmatrix}$$

Another Well-Formed Feature Structure

$$\begin{bmatrix} \textit{lexeme} & & \\ \text{PHON} & \langle\ \text{driver}\ \rangle & \\ \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{noun} & \\ \text{AGR} & [\text{PER} \quad \text{3rd}] \end{bmatrix} \\ \text{VAL} & \begin{bmatrix} \text{SPR} & \langle\ \text{DP}\ \rangle \\ \text{COMPS} & \langle\ \rangle \\ \text{MOD} & \langle\ \rangle \end{bmatrix} \\ \text{GAP} & \langle\ \rangle \end{bmatrix} \\ \text{SEM} & \begin{bmatrix} \text{MODE} & \text{ref} \\ \text{INDEX} & i \\ \text{RESTR} & \left\langle \begin{bmatrix} \text{RELN} & \textbf{drive} \\ \text{SIT} & s \\ \text{DRIVER} & i \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix}$$

Two Constraints

Root Constraint:

$$\begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{HEAD} & \begin{bmatrix} \textit{verb} \\ \text{FORM} \quad \text{fin} \end{bmatrix} \\ \text{VAL} & \begin{bmatrix} \text{COMPS} \quad \langle\ \rangle \\ \text{SPR} \quad \langle\ \rangle \end{bmatrix} \\ \text{GAP} \quad \langle\ \rangle \end{bmatrix} \end{bmatrix}$$

Principle of Order:

$$cx: \begin{bmatrix} \text{MOTHER} & [\text{PHON} \ \boxed{\text{A1}} \oplus \ldots \oplus \boxed{\text{An}}\ ] \\ \text{DTRS} & \langle\ [\text{PHON}\ \boxed{\text{A1}}]\ ,\ \ldots\ ,\ [\text{PHON}\ \boxed{\text{An}}]\ \rangle \end{bmatrix}$$

Semantic Compositionality Principle

$$cx: \begin{bmatrix} \text{MOTHER} & [\text{SEM } [\text{RESTR } \boxed{\text{A1}} \oplus ... \oplus \boxed{\text{An}} \,]] \\ \text{DTRS} & \langle\, [\text{SEM } [\text{RESTR } \boxed{\text{A1}}]] \;,\; ... \;,\; [\text{SEM } [\text{RESTR } \boxed{\text{An}}]] \,\rangle \end{bmatrix}$$

Alternative Version:

$$cx: \begin{bmatrix} \text{MOTHER} & [\text{SEM } [\text{RESTR } \boxed{\text{A0}} \oplus \boxed{\text{A1}} \oplus ... \oplus \boxed{\text{An}} \,]] \\ \text{DTRS} & \langle\, [\text{SEM } [\text{RESTR } \boxed{\text{A1}}]] \;,\; ... \;,\; [\text{SEM } [\text{RESTR } \boxed{\text{An}}]] \,\rangle \\ \text{CX-SEM} & \boxed{\text{A0}} \end{bmatrix}$$

Headed Constructions

TYPE	FEATURES/VALUE TYPES	IST
hd-cx	[HD-DTR *sign*]	*cx*

Head Feature Principle:

$$hd\text{-}cx : \begin{bmatrix} \text{MOTHER} & [\text{SYN} & [\text{HEAD} & \boxed{1}]] \\ \text{HD-DTR} & [\text{SYN} & [\text{HEAD} & \boxed{1}]] \end{bmatrix}$$

Two More Principles

Semantic Inheritance Principle:

$$hd\text{-}cx: \begin{bmatrix} \text{MOTHER} & \begin{bmatrix} \text{SEM} & \begin{bmatrix} \text{MODE} & \boxed{1} \\ \text{INDEX} & \boxed{2} \end{bmatrix} \end{bmatrix} \\ \text{HD-DTR} & \begin{bmatrix} \text{SEM} & \begin{bmatrix} \text{MODE} & \boxed{1} \\ \text{INDEX} & \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Valence Principle:

$$hd\text{-}cx: \begin{bmatrix} \text{MOTHER} & [\text{SYN} & [\text{VAL} & / \boxed{1}]] \\ \text{HD-DTR} & [\text{SYN} & [\text{VAL} & / \boxed{1}]] \end{bmatrix}$$

The GAP Principle

hd-cx:

$$\begin{bmatrix} \text{MOTHER} & [\text{SYN}\ [\text{GAP}\ \ (\ \boxed{\text{A1}} \oplus \ldots \oplus \boxed{\text{An}}\ )\ \ominus\ \boxed{\text{A0}}\ ]\ ] \\ \text{HD-DTR} & [\text{SYN}\ [\text{STOP-GAP}\ \ \boxed{\text{A0}}\ ]] \\ \text{DTRS} & \langle\ [\text{SYN}\ [\text{GAP}\ \boxed{\text{A1}}\ ]]\ ,\ \ \ldots\ \ ,\ [\text{SYN}\ [\text{GAP}\ \boxed{\text{An}}\ ]]\ \rangle \end{bmatrix}$$

The Head-Complement Construction

$$hd\text{-}comp\text{-}cx : \begin{bmatrix} \text{MOTHER} & [\text{SYN} \; [\text{VAL} \; [\text{COMPS} \; \langle \; \rangle \;]\;]] \\ \text{HD-DTR} & \boxed{0}\begin{bmatrix} word \\ \text{SYN} \; [\text{VAL} \; [\text{COMPS} \; \boxed{A} \;]] \end{bmatrix} \\ \text{DTRS} & \langle \; \boxed{0} \; \rangle \; \oplus \; \boxed{A}nelist \end{bmatrix}$$

And with inherited constraints....

$$\left[\begin{array}{ll}
\text{MOTHER} & \left[\begin{array}{ll}
\text{PHON} & \boxed{\text{A1}} \oplus \ldots \oplus \boxed{\text{An}} \\
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \boxed{1} \\
\text{VAL} & \left[\begin{array}{ll}
\text{COMPS} & \langle\ \rangle \\
\text{SPR} & \boxed{\text{D}} \\
\text{MOD} & \boxed{\text{E}}
\end{array}\right]
\end{array}\right] \\
\text{SEM} & \left[\begin{array}{ll}
\text{MODE} & \boxed{2} \\
\text{INDEX} & \boxed{3} \\
\text{RESTR} & \boxed{\text{C1}} \oplus \ldots \oplus \boxed{\text{Cn}}
\end{array}\right]
\end{array}\right] \\
\text{HD-DTR} & \boxed{4}\left[\begin{array}{ll}
\textit{word} & \\
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \boxed{1} \\
\text{VAL} & \left[\begin{array}{ll}
\text{COMPS} & \langle\ \boxed{5}\ ,\ \ldots\ ,\ \boxed{\text{m}}\ \rangle \\
\text{SPR} & \boxed{\text{D}} \\
\text{MOD} & \boxed{\text{E}}
\end{array}\right]
\end{array}\right] \\
\text{SEM} & \left[\begin{array}{ll}
\text{MODE} & \boxed{2} \\
\text{INDEX} & \boxed{3}
\end{array}\right]
\end{array}\right] \\
\text{DTRS} & \left\langle \boxed{4}\left[\begin{array}{ll}\text{PHON} & \boxed{\text{A1}} \\ \text{RESTR} & \boxed{\text{C1}}\end{array}\right], \boxed{5}\left[\begin{array}{ll}\text{PHON} & \boxed{\text{A2}} \\ \text{RESTR} & \boxed{\text{C2}}\end{array}\right], \ldots, \boxed{\text{m}}\left[\begin{array}{ll}\text{PHON} & \boxed{\text{An}} \\ \text{RESTR} & \boxed{\text{Cn}}\end{array}\right] \right\rangle
\end{array}\right]$$

An Instance of the HCC

$$\left[\begin{array}{l} \textit{hd-comp-cx} \\ \text{MOTHER} \left[\begin{array}{l} \textit{phrase} \\ \text{PHON} \langle \text{ talked , to , Kim } \rangle \\ \text{SYN} \left[\begin{array}{ll} \text{HEAD} & \textit{verb} \\ \text{VAL} & \left[\begin{array}{ll} \text{SPR} & \boxed{\text{A}}\langle \text{ NP } \rangle \\ \text{COMPS} & \langle\ \rangle \end{array}\right] \end{array}\right] \\ \text{SEM} \left[\text{ ... } \right] \end{array}\right] \\ \text{HD-DTR} \ \boxed{0} \\ \text{DTRS} \left\langle \boxed{0}\left[\begin{array}{l} \textit{word} \\ \text{PHON} \ \langle \text{ talked } \rangle \\ \text{SYN} \left[\begin{array}{ll} \text{HEAD} & \textit{verb} \\ \text{VAL} & \left[\begin{array}{ll} \text{SPR} & \boxed{\text{A}} \\ \text{COMPS} & \langle\ \boxed{1}\ \rangle \end{array}\right] \end{array}\right] \\ \text{SEM} \left[\text{ ... } \right] \end{array}\right] , \boxed{1}\left[\begin{array}{l} \textit{phrase} \\ \text{PHON} \ \langle \text{ to , Kim } \rangle \\ \text{SYN} \left[\begin{array}{ll} \text{HEAD} & \textit{prep} \\ \text{VAL} & \left[\begin{array}{ll} \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{array}\right] \end{array}\right] \\ \text{SEM} \left[\text{ ... } \right] \end{array}\right] \right\rangle \end{array}\right]$$

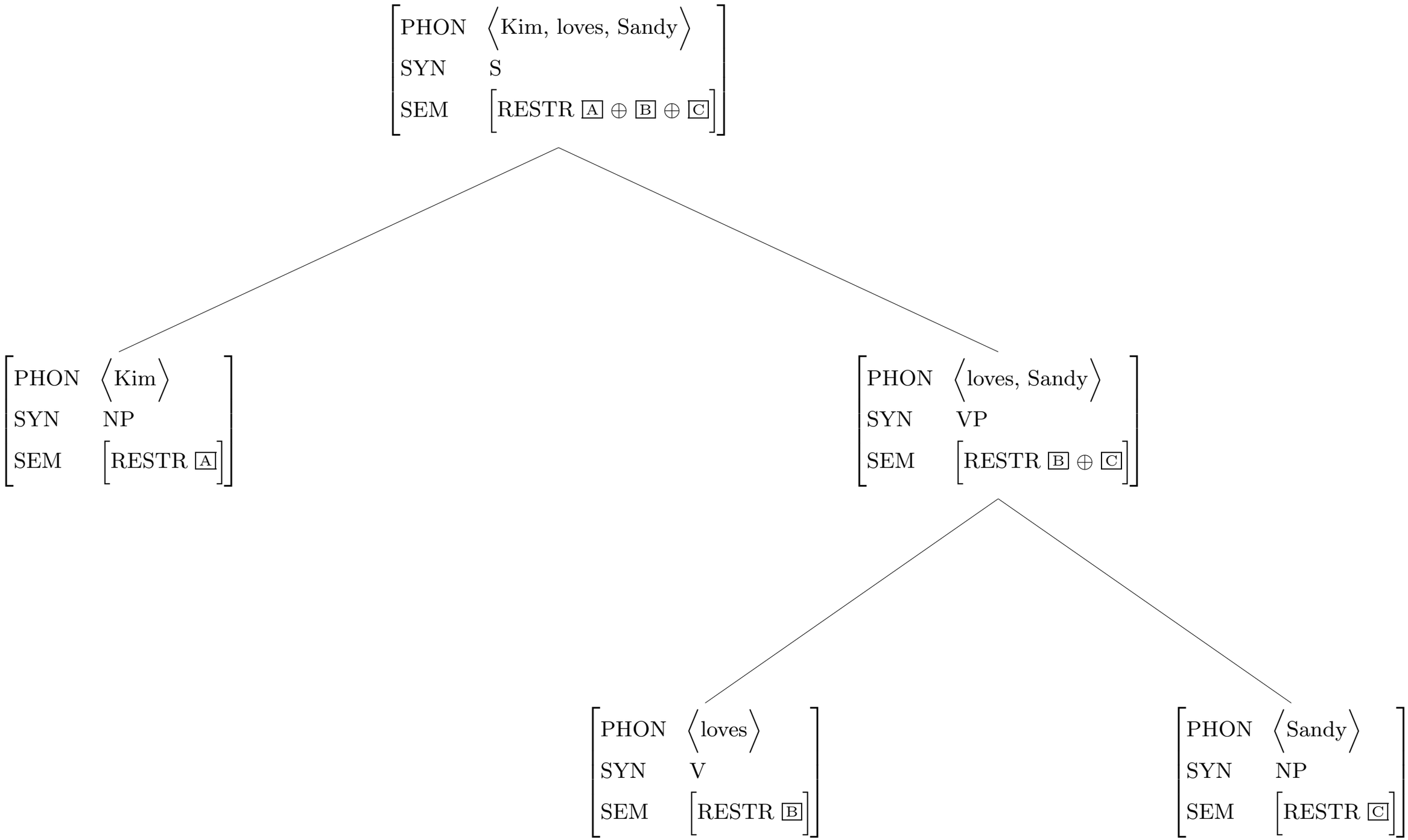
$$\left[\begin{array}{l}
\textit{hd-comp-cx} \\
\text{MOTHER} \left[\begin{array}{l}
\textit{phrase} \\
\text{PHON} \quad \langle\ \text{in}\ ,\ \text{Seattle}\ \rangle \\
\text{SYN} \left[\begin{array}{ll}
\text{HEAD} & \textit{prep} \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \boxed{\text{A}} \\
\text{COMPS} & \langle\ \rangle \\
\text{MOD} & \boxed{\text{B}}
\end{array}\right]
\end{array}\right] \\
\text{SEM}\ [\ \ldots\ ]
\end{array}\right] \\
\text{HD-DTR}\ \ \boxed{0} \\
\text{DTRS} \left\langle \boxed{0} \left[\begin{array}{l}
\textit{word} \\
\text{PHON}\ \langle\ \text{in}\ \rangle \\
\text{SYN} \left[\begin{array}{ll}
\text{HEAD} & \textit{prep} \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \boxed{\text{A}} \\
\text{COMPS} & \langle\ \boxed{1}\ \rangle \\
\text{MOD} & \boxed{\text{B}}
\end{array}\right]
\end{array}\right] \\
\text{SEM}\ [\ \ldots\ ]
\end{array}\right] , \boxed{1} \left[\begin{array}{l}
\textit{word} \\
\text{PHON}\ \langle\ \text{Seattle}\ \rangle \\
\text{SYN} \left[\begin{array}{ll}
\text{HEAD} & \textit{noun} \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \langle\ \rangle \\
\text{COMPS} & \langle\ \rangle
\end{array}\right]
\end{array}\right] \\
\text{SEM}\ [\ \ldots\ ]
\end{array}\right] \right\rangle
\end{array}\right]$$

Two More Constructions

$$\textit{hd-spr-cx}: \begin{bmatrix} \text{MOTHER} & \begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{SPR} & \langle\,\rangle \end{bmatrix} \end{bmatrix} \\ \text{HD-DTR} & \boxed{0}\begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{SPR} & \langle\,\boxed{1}\,\rangle \\ \text{COMPS} & \langle\,\rangle \\ \text{STOP-GAP} & \langle\,\rangle \end{bmatrix} \end{bmatrix} \\ \text{DTRS} & \langle\,\boxed{1}\,,\,\boxed{0}\,\rangle \end{bmatrix}$$

$$\textit{hd-mod-cx}: \begin{bmatrix} \text{HD-DTR} & \boxed{1}\begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{VAL} & \begin{bmatrix} \text{COMPS} & \langle\,\rangle \end{bmatrix} \\ \text{STOP-GAP} & \langle\,\rangle \end{bmatrix} \end{bmatrix} \\ \text{DTRS} & \left\langle\,\boxed{1}\,,\begin{bmatrix} \text{SYN} & \begin{bmatrix} \text{VAL} & \begin{bmatrix} \text{COMPS} & \langle\,\rangle \\ \text{MOD} & \langle\,\boxed{1}\,\rangle \end{bmatrix} \end{bmatrix} \end{bmatrix}\right\rangle \end{bmatrix}$$

A Tree



The Head-Filler Construction

$$
\textit{hd-fill-cx}: \left[\begin{array}{ll}
\text{HD-DTR} & \boxed{0}\left[\begin{array}{ll}
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \left[\begin{array}{ll} \textit{verb} & \\ \text{FORM} & \text{fin} \end{array}\right] \\
\text{VAL} & \left[\begin{array}{ll} \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{array}\right] \\
\text{GAP} & \langle\ \boxed{1}\ \rangle \\
\text{STOP-GAP} & \langle\ \boxed{1}\ \rangle
\end{array}\right]
\end{array}\right] \\
\text{DTRS} & \langle\ \boxed{1}[\text{GAP}\ \langle\ \rangle]\ ,\ \boxed{0}\ \rangle
\end{array}\right]
$$

$$\left[\begin{array}{l} \textit{hd-fill-cx} \\ \\ \text{MOTHER} \left[\begin{array}{ll} \text{PHON} & \langle\ \text{Bagels , I , think , she , likes}\ \rangle \\ \text{SYN} & \left[\begin{array}{ll} \text{HEAD} & \boxed{2}\left[\begin{array}{ll} \textit{verb} & \\ \text{FORM} & \text{fin} \end{array}\right] \\ \text{VAL} & \left[\begin{array}{ll} \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{array}\right] \\ \text{GAP} & \langle\ \rangle \end{array}\right] \\ \text{SEM} & [\ \ldots\ ] \end{array}\right] \\ \\ \text{HD-DTR}\ \boxed{0} \\ \\ \text{DTRS}\ \left\langle \boxed{1}\left[\begin{array}{ll} \text{PHON} & \langle\ \text{Bagels}\ \rangle \\ \text{SYN} & \left[\begin{array}{ll} \text{HEAD} & \textit{noun} \\ \text{VAL} & \left[\begin{array}{ll} \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{array}\right] \end{array}\right] \\ \text{SEM} & [\ \ldots\ ] \end{array}\right] , \boxed{0}\left[\begin{array}{ll} \text{PHON} & \langle\ \text{I, think, she, likes}\rangle \\ \text{SYN} & \left[\begin{array}{ll} \text{HEAD} & \boxed{2} \\ \text{VAL} & \left[\begin{array}{ll} \text{SPR} & \langle\ \rangle \\ \text{COMPS} & \langle\ \rangle \end{array}\right] \\ \text{GAP} & \langle\ \boxed{1}\ \rangle \\ \text{STOP-GAP} & \langle\ \boxed{1}\ \rangle \end{array}\right] \\ \text{SEM} & [\ \ldots\ ] \end{array}\right] \right\rangle \end{array}\right]$$

The Imperative Construction

$$
\textit{imp-cx}: \left[\begin{array}{l}
\text{MOTHER} \left[\begin{array}{ll}
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \textit{verb} \\
\text{VAL} & \left[\text{SPR} \quad \langle\ \rangle\right] \\
\text{GAP} & \boxed{\text{A}}
\end{array}\right] \\
\text{SEM} & \left[\begin{array}{ll}
\text{MODE} & \text{dir} \\
\text{INDEX} & s
\end{array}\right]
\end{array}\right] \\
\text{DTRS} \left\langle \left[\begin{array}{ll}
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \left[\begin{array}{ll}
\textit{verb} & \\
\text{INF} & - \\
\text{FORM} & \text{base}
\end{array}\right] \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \langle\ \text{NP[PER 2nd]}\ \rangle \\
\text{COMPS} & \langle\ \rangle
\end{array}\right] \\
\text{GAP} & \boxed{\text{A}}
\end{array}\right] \\
\text{SEM} & [\text{INDEX} \quad s\ ]
\end{array}\right] \right\rangle
\end{array}\right]
$$

Coordination Construction

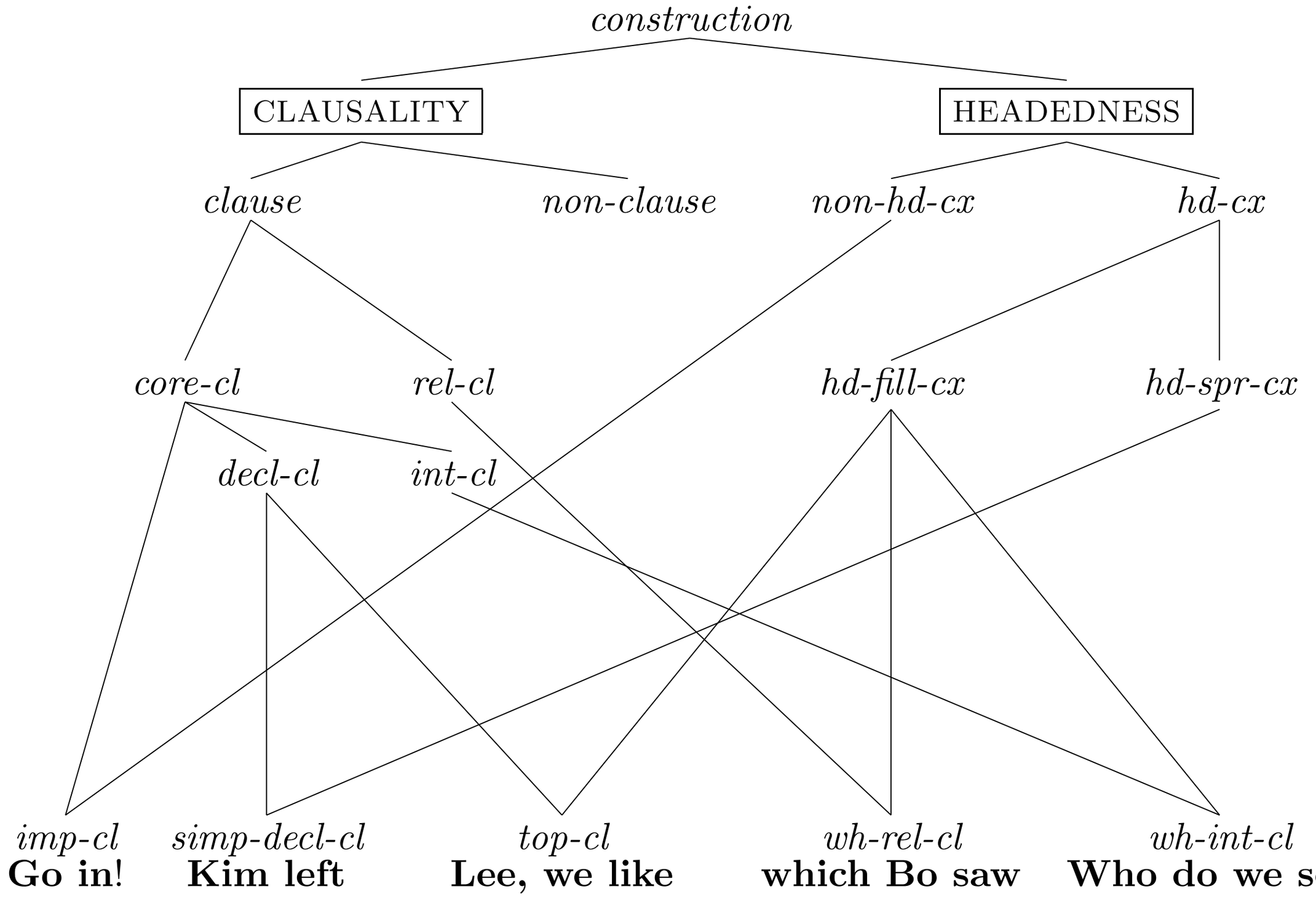
$$\left[\begin{array}{l}
\text{MOTHER} \left[\begin{array}{ll} \text{SYN} & \left[\begin{array}{ll} \text{HEAD} & [\text{FORM } \boxed{1}] \\ \text{VAL} & \boxed{2} \\ \text{GAP} & \boxed{A} \end{array}\right] \\ \text{SEM} & [\text{IND} \quad s_0] \end{array}\right] \\
\text{DTRS} \left\langle \left[\begin{array}{ll} \text{SYN} & \left[\begin{array}{ll} \text{HEAD} & [\text{FORM } \boxed{1}] \\ \text{VAL} & \boxed{2} \\ \text{GAP} & \boxed{A} \end{array}\right] \\ \text{SEM} & [\text{IND} \quad s_1] \end{array}\right], \ldots, \left[\begin{array}{ll} \text{SYN} & \left[\begin{array}{ll} \text{HEAD} & [\text{FORM } \boxed{1}] \\ \text{VAL} & \boxed{2} \\ \text{GAP} & \boxed{A} \end{array}\right] \\ \text{SEM} & [\text{IND} \quad s_{n-1}] \end{array}\right], \right. \\
\left. \left[\begin{array}{l} \text{HEAD } \textit{conj} \\ \text{IND} \quad s_0 \\ \text{RESTR} \left\langle [\text{ARGS } \langle s_1 \ldots s_n \rangle] \right\rangle \end{array}\right], \left[\begin{array}{ll} \text{SYN} & \left[\begin{array}{ll} \text{HEAD} & [\text{FORM } \boxed{1}] \\ \text{VAL} & \boxed{2} \\ \text{GAP} & \boxed{A} \end{array}\right] \\ \text{SEM} & [\text{IND} \quad s_n] \end{array}\right] \right\rangle
\end{array}\right]$$

$$\left[\begin{array}{ll}
\text{MOTHER} & \left[\begin{array}{ll}
\text{PHON} & \langle\ \text{Kim , sleeps , and , Pat , works}\ \rangle \\
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \textit{verb} \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \langle\ \rangle \\
\text{COMPS} & \langle\ \rangle
\end{array}\right]
\end{array}\right] \\
\text{SEM} & [\ \ldots\ ]
\end{array}\right] \\
\text{DTRS} \langle & \left[\begin{array}{ll}
\text{PHON} & \langle\ \text{Kim , sleeps}\ \rangle \\
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \textit{verb} \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \langle\ \rangle \\
\text{COMPS} & \langle\ \rangle
\end{array}\right]
\end{array}\right] \\
\text{SEM} & [\ \ldots\ ]
\end{array}\right], \left[\begin{array}{ll}
\text{PHON} & \langle\ \text{and}\ \rangle \\
\text{SYN} & \left[\text{HEAD}\ \textit{conj}\right] \\
\text{SEM} & [\ \ldots\ ]
\end{array}\right], \\
& \left[\begin{array}{ll}
\text{PHON} & \langle\ \text{Pat , works}\ \rangle \\
\text{SYN} & \left[\begin{array}{ll}
\text{HEAD} & \textit{verb} \\
\text{VAL} & \left[\begin{array}{ll}
\text{SPR} & \langle\ \rangle \\
\text{COMPS} & \langle\ \rangle
\end{array}\right]
\end{array}\right] \\
\text{SEM} & [\ \ldots\ ]
\end{array}\right] \rangle
\end{array}\right]$$

Some More Abbreviations

imp-cl	*imperative-clause*
decl-cl	*declarative-clause*
simp-decl-cl	*simple-declarative-clause*
top-cl	*topicalized-clause*
wh-rel-cl	*wh-relative-clause*
wh-int-cl	*wh-interrogative-clause*
core-cl	*core-clause*

A Construction Hierarchy



Locality

- Like CFG rules, constructions involve only mothers and daughters.
- A lexical head can place constraints on its sisters or on an appropriate maternal dependent.
- Unbounded dependencies are localized.

  Sandy is hard ((for us) to continue) to please___

  Getting it done is hard for us to imagine them considering___
- Our principles provide a theory of what information (reflected in terms of HEAD,VAL, GAP, etc.) is passed up within the domain projected by a lexical head (including subjects and modifiers) and hence a theory of what information is locally accessible at any given point in a tree.

Reading Questions

- Can we use multiple inheritance to factor out more redundancies, like [HEAD noun] and [PER 3rd] on cn-lxm and pn-lxm?
- Why didn't the text do this sooner?

Reading Questions

- Shouldn't PHON have IPA strings in it, rather than orthography?
- Or be called ORTH?
- Why does it need a name at all?
- What do we mean by "Where the PHON value will usually be a list of more than one form."?

Reading Questions

- Are there any instances where the actual phonology has bearings on other features (such as SYN and/or SEM)?
- The phonology, semantics and orthography are completely arbitrary in their connections. Are we conflating phonolgy and orthography in PHON? Is the RESTR values connecting meaning and phonology? or meaning and orthography?
- How could we model the "a" v. "an" rule?

Reading Questions

- Do the multiple dimensions in some way constrain the realm of possibilities in the grammar? In other words, how does the grammar prevent certain combinations of dimensions (if such a combination is ever not present in the grammar)? Does that happen (it seems like it must)? Do they have to share some ununifiable feature?

Reading Questions

- Are signs significantly different from our lexical entries, besides adding in the PHON feature that reflects its surface structure? It seems that the sign for Kim walks has the exact same information as the feature structure that is mother to the NP Kim and the VP walks.

Reading Questions

- Re: the switch from rules to "constructions." While I can see the logic in having these principles organized in a hierarchy, couldn't we have done that with the rules as they were?

- I understand the addition of PHON to create "signs", but I don't see how have "constructions" instead of "rules" (and they both read the same way to me, really) assists with the idea of "signs"...?

Reading Questions

- Why draw the instantiations of constructions? Is this a proposed replacement of the tree structure? It seems a little redundant to the trees we've drawn, and I don't really see how the instantiations could end up being inside of one.

Reading Questions

- T or F: It is now possible to express the syntax of a sentence in one (possibly huge) phrase construction by nesting every grammatical information, instead of using tree structure. I thought it may be the simpler way to express sentence in computational point of view.

Reading Questions

- There was a tantalizing tidbit about the architectural support for pitch semantics. Would these just be implemented as additional phrase constructions? What about morphosyntactic rules, such as strong/weak adjective inflection in German, or reduplication as intensification, or even just ablaut? Is it really just a simple matter of developing new constructions (and possibly features)?

Reading Questions

- Please decipher (Page 488): Not a single human language would have a verb that selects for an S complement whose VP head daughter must contain an accusative NP.

Reading Questions

- In applying HPSG to new languages, are you able to estimate of a "goodness-of-fit" statistical metric in order to see how well the basic grammar matrix does in initially "fitting" the language. In practice, do you keep track of how many extra principles, rules and/or features are required to make this type of grammar formalism work? For example, would you say that the ERG Project has English worked out to a 90% confidence interval level or some similar type of statistic?

Reading Questions

- What do you (Emily) think about linguistic relativity, whether different languages embody different world views? With the caveat the all languages are equally ABLE to be well suited to particular tasks, do you think that some languages are in fact better suited to certain tasks?

Course overview

- Survey of some phenomena central to syntactic theory
- Introduction to the HPSG framework
- Process over product: How to build a grammar fragment
- Value of precise formulation (and of getting a computer to do the tedious part for you!)

Reflection

- What was the most surprising thing in this class?
- What do you think is most likely wrong?
- What do you think is the coolest result?
- What do you think you're most likely to remember?
- How do you think this course will influence your work as a computational linguist?

Overview

- Chapter 16 framework (same analyses, different underlying system)
- Reading questions
- General wrap up