15. DBS.3: Adnominal and Adverbial Modifiers

15.1 Interpreting Elementary and Complex Modifiers

15.1.1 Preposition, complex adjective, and elementary adjective

on	on the big table	fast
sur: on	sur: on	sur: fast
adj: *on* n_2	adj: *on table*	adj: *fast*
cat: adj	cat: adj	cat: adj
sem:	sem: def sg	sem:
mdr:	mdr: big	mdr: B
mdd:	mdd: apple 1	mdd: car 4
idy:	idy: 2	idy: B
prn:	prn: 1	prn: 3

15.1.2 Representing (eat) the apple on the table (adnominal)

noun: apple	adj: on table
cat: np	cat: adn
sem: def sg	sem: def sg
fnc: eat	mdr:
mdr: on table	mdd: apple 1
idy: 1	idy: 2
prn: 1	prn: 1

15.1.3 Representing eat (the apple) on the table (adverbial)

$$\begin{bmatrix} \text{sur:} \\ \text{verb: } \textit{eat} \\ \text{cat: v} \\ \text{sem: past} \\ \text{mdr: on table} \\ \text{arg: Julia apple} \\ \text{nc:} \\ \text{pc:} \\ \text{prn: 1} \end{bmatrix} \begin{bmatrix} \text{adj: on table} \\ \text{cat: adv} \\ \text{sem: def sg} \\ \text{mdr:} \\ \text{mdd: eat} \\ \text{idy: 2} \\ \text{prn: 1} \end{bmatrix}$$

15.1.4 Positions of elementary adnominals

(i)	The + *young* + girl ate an apple	(modifying the subject)
(ii)	Julia gave the + *young* + girl an apple	(modifying the indirect object)
(iii)	Julia gave the girl a + *red* + apple	(modifying the direct object)

15.1.5 Positions of complex adnominals (prepositional phrases)

(i)	the apple + *on the table* + pleased Julia	(modifying the subject)
(ii)	Julia ate the apple + *on the table*	(modifying the direct object)
(iii)	Julia gave John the apple + *on the table*	(modifying the direct object)

15.1.6 Positions of elementary adverbials

(i) *quickly* + Julia ate the apple
(ii) Julia + *quickly* + ate the apple
(iii) Julia slept + *soundly*
(iv) Julia ate the apple + *quickly*

15.1.7 Positions of prepositional phrases used as adverbs

(i) *on the table* + Julia ate an apple
(ii) *Julia + *on the table* + ate the apple
(iii) Julia slept + *on the table*
(iv) Julia ate the apple + *on the table*

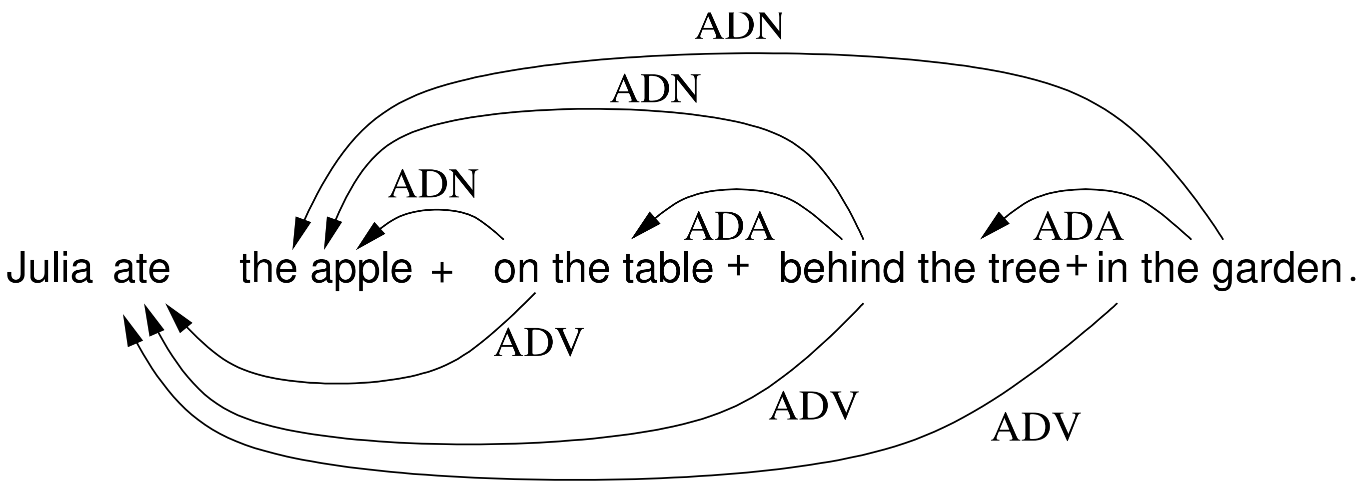
15.1.8 Positions of intensifiers

(i)	the + *very* big + table	(noun phrase)
(ii)	on the + *very* big + table	(prepositional phrase)
(iii)	*very* quickly + Julia ate an apple	(elementary adverbial)
(iv)	Julia + *very* quickly + ate an apple	(elementary adverbial)
(v)	Julia ate the apple + *very* quickly	(elementary adverbial)

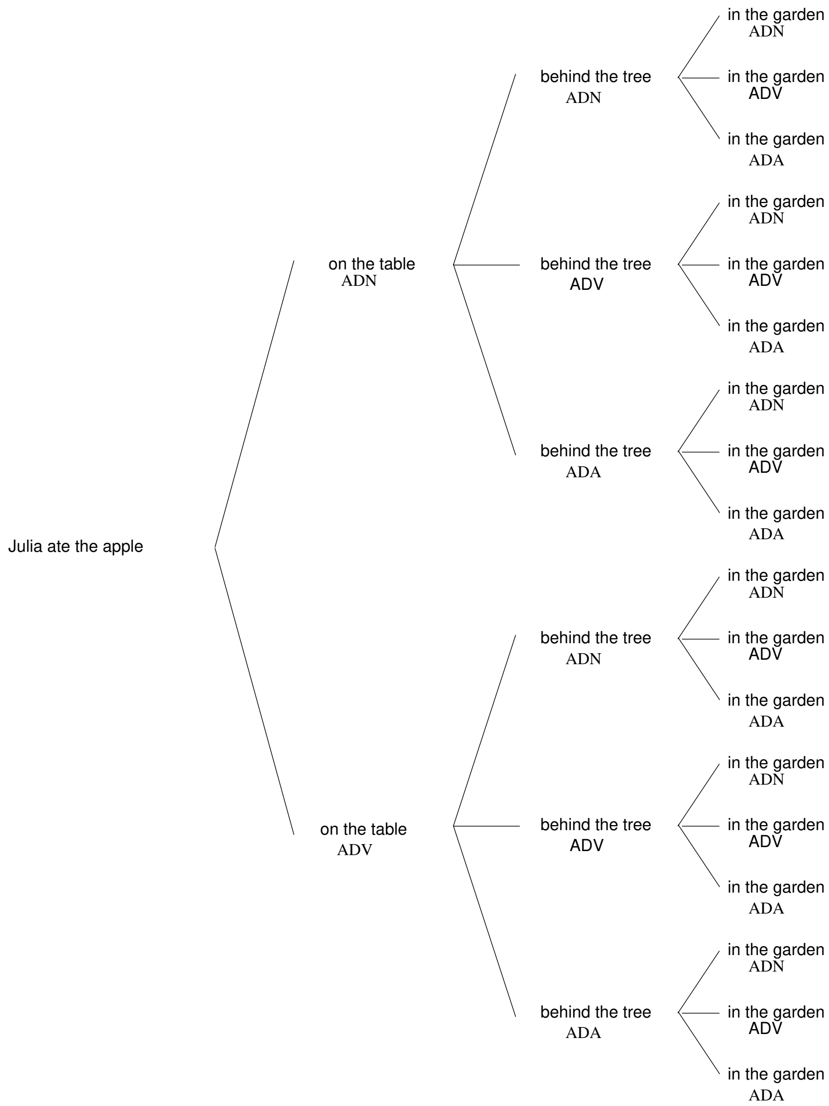
15.1.9 Interpretations of sequences of prepositional phrases

(i) the car + in the garage + with the broken window
(ii) Julia walked + into the garden + with John's shoes

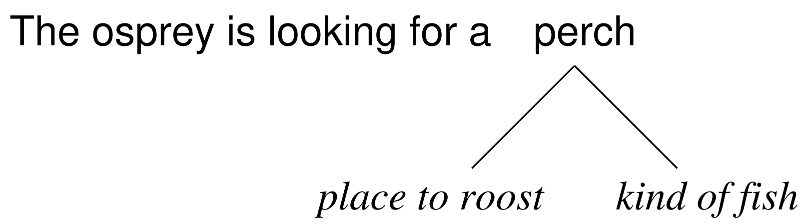
15.1.10 Readings created by a sequence prepositional phrases



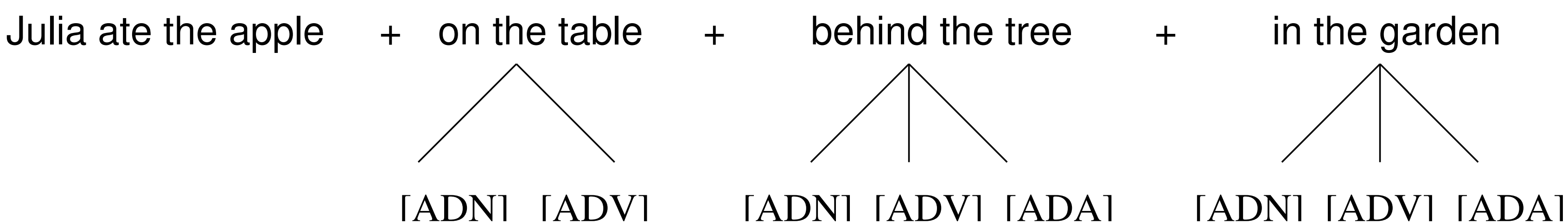
15.1.11 Nativist treatment of prepositional phrase ambiguities



15.1.12 Example of lexically-based semantic doubling



15.1.13 Prepositional phrase ambiguity as semantic doubling

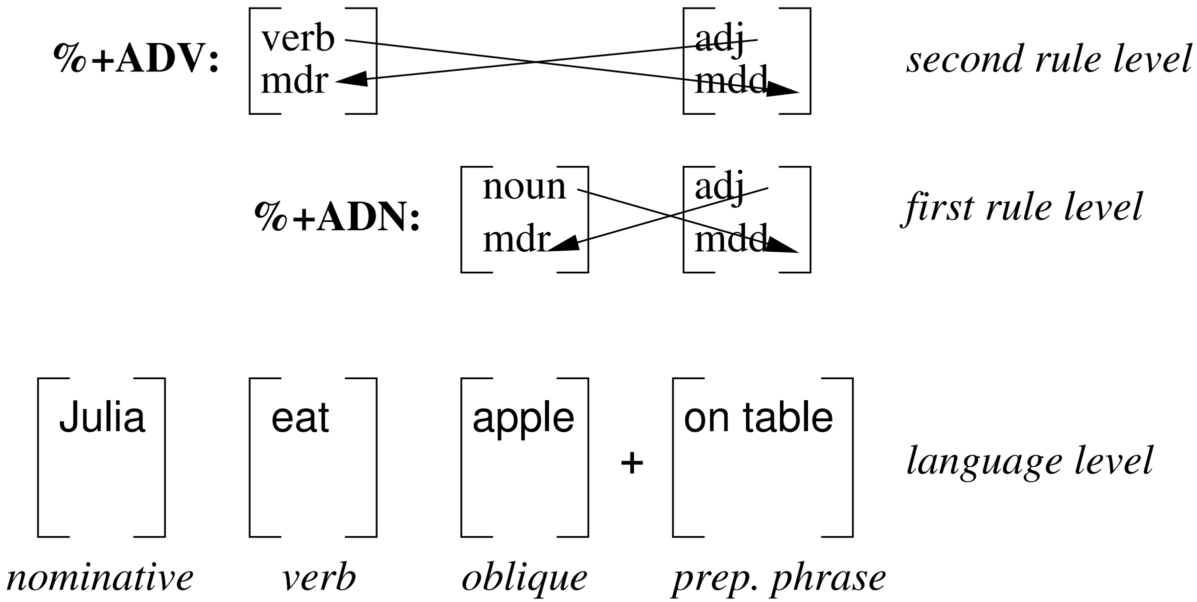


15.1.14 Formalizing semantic doubling in Database Semantics

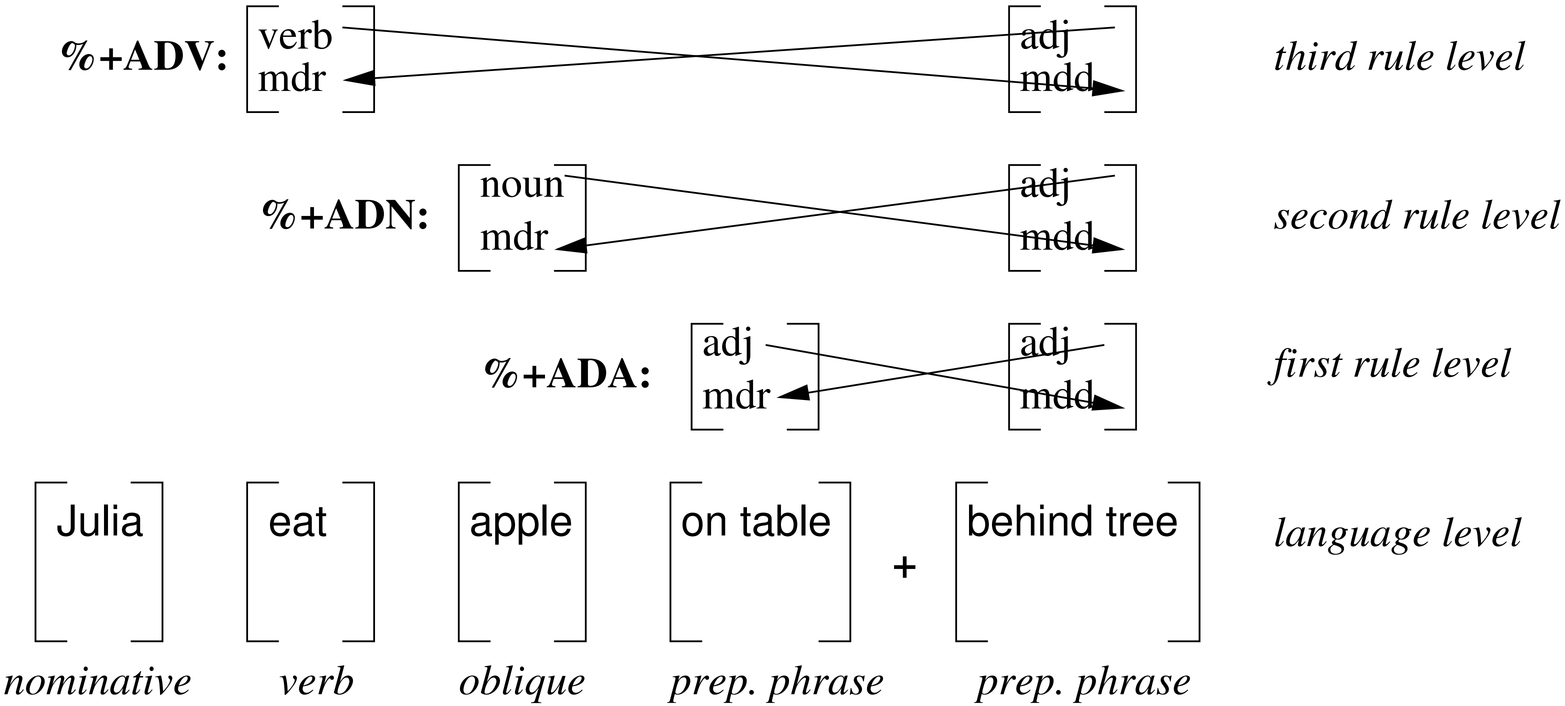
$$\begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{verb: } \textit{eat}\\ \text{cat: decl}\\ \text{sem: past}\\ \text{mdr: \%on table}\\ \quad\text{\%behind tree}\\ \quad\text{\%in garden}\\ \text{arg: Julia apple}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{apple}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr: \%on table}\\ \quad\text{\%behind tree}\\ \quad\text{\%in garden}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 1}\end{bmatrix}_3$$

$$\begin{bmatrix}\text{sur:}\\ \text{adj: } \textit{on table}\\ \text{cat: adj}\\ \text{sem: def sg}\\ \text{mdr: \%behind tree}\\ \text{mdd: \%apple 2}\\ \qquad\quad\text{\%eat}\\ \text{idy: 3}\\ \text{prn: 1}\end{bmatrix}_5 \begin{bmatrix}\text{sur:}\\ \text{adj: } \textit{behind tree}\\ \text{cat: adj}\\ \text{sem: def sg}\\ \text{mdr: \%in garden}\\ \text{mdd: \%apple 2}\\ \qquad\text{\%eat}\\ \qquad\text{\%on table 3}\\ \text{idy: 4}\\ \text{prn: 1}\end{bmatrix}_8 \begin{bmatrix}\text{sur:}\\ \text{adj: } \textit{in garden}\\ \text{cat: adj}\\ \text{sem: def sg}\\ \text{mdr:}\\ \text{mdd: \%apple 2}\\ \qquad\text{\%eat}\\ \qquad\text{\%behind tree 4}\\ \text{idy: 5}\\ \text{prn: 1}\end{bmatrix}_{11}$$

15.1.15 Adding preposition. phrase with adv and adn interpretation



15.1.16 Prepositional phrase with adv, adn, and ada interpretation



15.2 ADN and ADA Interpretations of Prepositional Phrases

15.2.1 Combining Julia and ate with NOM+FV

NOM+FV {22 FV+NP, 23 AUX+NFV, 24 S+IP}

$$\begin{bmatrix}\text{noun: } \alpha\\ \text{cat: NP}\\ \text{fnc:}\\ \text{prn: k}\end{bmatrix} \quad \begin{bmatrix}\text{verb: } \beta\\ \text{cat: NP}' \text{ X VT}\\ \text{arg:}\\ \text{nc:}\\ \text{pc:}\end{bmatrix} \quad \begin{array}{l}\text{delete NP}' \text{ nw.cat}\\ \text{acopy } \alpha \text{ nw.arg}\\ \text{ecopy } \beta \text{ ss.fnc}\\ \text{ecopy PC nw.pc}\\ \text{acopy PCV nw.pc}\\ \text{set } \beta \text{ NCV}\\ \text{copy}_{ss} \text{ copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur: ate}\\ \text{verb: } \textit{eat}\\ \text{cat: n}' \text{ a}' \text{ v}\\ \text{sem: past}\\ \text{mdr:}\\ \text{arg:}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_2 \Longrightarrow \begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{verb: } \textit{eat}\\ \text{cat: a}' \text{ v}\\ \text{sem: past}\\ \text{mdr:}\\ \text{arg: Julia}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_2$$

15.2.2 Combining Julia ate and the with FV+NP

FV+NP {DET+NN, DET+ADN, DET+INT, FV+NP, %NP+PREP, %V+ADV, V+INT, S+IP}

$$\begin{bmatrix}\text{verb: } \beta \\ \text{cat: NP}' \text{ X VT} \\ \text{arg:}\end{bmatrix} \begin{bmatrix}\text{noun: } \alpha \\ \text{cat: Y NP} \\ \text{fnc:}\end{bmatrix} \quad \begin{array}{l}\text{delete NP}' \text{ ss.cat} \\ \text{acopy } \alpha \text{ ss.arg} \\ \text{ecopy } \beta \text{ nw.fnc} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{eat} \\ \text{cat: a}' \text{ v} \\ \text{sem: past} \\ \text{mdr:} \\ \text{arg: Julia} \\ \text{nc:} \\ \text{pc:} \\ \text{prn: 2}\end{bmatrix}_1 \quad \begin{bmatrix}\text{sur: the} \\ \text{noun: n\_1} \\ \text{cat: nn}' \text{ np} \\ \text{sem: def} \\ \text{mdr:} \\ \text{fnc:} \\ \text{idy:} \\ \text{prn:}\end{bmatrix}_3 \Longrightarrow \begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{eat} \\ \text{cat: v} \\ \text{sem: past} \\ \text{mdr:} \\ \text{arg: Julia n\_1} \\ \text{nc:} \\ \text{pc:} \\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur:} \\ \text{noun: n\_1} \\ \text{cat: nn}' \text{ np} \\ \text{sem: def} \\ \text{mdr:} \\ \text{fnc: eat} \\ \text{idy: 2} \\ \text{prn: 1}\end{bmatrix}_3$$

15.2.3 Combining Julia ate the and apple with DET+NN

DET+NN {NOM+FV, ADVNOM+FV, FV+NP, %NP+PREP, %V+ADV, V+INT, S+IP}

$$
\begin{bmatrix}\text{noun: N\_}n\\ \text{cat: N}'\ \text{X}\\ \text{sem: Y}\end{bmatrix}
\begin{bmatrix}\text{noun: }\alpha\\ \text{cat: N}\\ \text{sem: Z}\end{bmatrix}
\quad
\begin{array}{l}\text{delete N}'\ \text{ss.cat}\\ \text{acopy nw.sem ss.sem}\\ \text{replace }\alpha\ \text{N\_}n\\ \text{copy}_{ss}\end{array}
$$

$$
\begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{eat}\\ \text{cat: v}\\ \text{sem: past}\\ \text{mdr:}\\ \text{arg: Julia n\_1}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_2
\begin{bmatrix}\text{sur:}\\ \text{noun: n\_1}\\ \text{cat: nn}'\ \text{np}\\ \text{sem: def}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 1}\end{bmatrix}_3
\begin{bmatrix}\text{sur: apple}\\ \text{noun: }\textit{apple}\\ \text{cat: sn}\\ \text{sem: sg}\\ \text{mdr:}\\ \text{fnc:}\\ \text{idy:}\\ \text{prn:}\end{bmatrix}_4
\Longrightarrow
\begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{eat}\\ \text{cat: v}\\ \text{sem: past}\\ \text{mdr:}\\ \text{arg: Julia apple}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_2
\begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{apple}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 3}\end{bmatrix}_3
$$

15.2.4 Combining Julia ate the apple and on with %NP+PREP

%NP+PREP {PREP+NP}

$$\begin{bmatrix}\text{noun: }\alpha\\ \text{cat: N}\\ \text{mdr:}\\ \text{idy: j}\end{bmatrix} \quad \begin{bmatrix}\text{adj: PREP N\_}n\\ \text{cat: adj}\\ \text{mdd:}\end{bmatrix}$$

%ecopy nw.adj ss.mdr
%ecopy α nw.mdd
acopy ss.idy nw.mdd
copy$_{ss}$copy$_{nw}$

$$\begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{apple}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 1}\end{bmatrix}_3 \begin{bmatrix}\text{sur: on}\\ \text{adj: } \textit{on} \text{ n\_2}\\ \text{cat: adj}\\ \text{sem:}\\ \text{mdr:}\\ \text{mdd:}\\ \text{idy:}\\ \text{prn:}\end{bmatrix}_5 \Longrightarrow \begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{apple}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr: \%on n\_2}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 1}\end{bmatrix}_3 \begin{bmatrix}\text{sur:}\\ \text{adj: } \textit{on} \text{ n\_2}\\ \text{cat: adj}\\ \text{sem:}\\ \text{mdr:}\\ \text{mdd: \%apple 2}\\ \text{idy: 3}\\ \text{prn: 1}\end{bmatrix}_5$$

15.2.5 Combining Julia ate the apple on and the with PREP+NP

PREP+NP {PREP+NN,PREP+ADN,PREP+INT,%NP+PREP,%V+ADV,%PREP+PREP,ADV+NOM,S+IP}

$$
\begin{bmatrix} \text{adj: PREP N\_}n \\ \text{cat: adj} \\ \text{sem:} \end{bmatrix}
\begin{bmatrix} \text{noun: } \alpha \\ \text{cat: Y NP} \\ \text{sem: x} \end{bmatrix}
\quad
\begin{array}{l} \text{replace } \alpha \text{ N\_}n \\ \text{acopy Y ss.cat:1} \\ \text{acopy nw.sem ss.sem} \\ \text{copy}_{ss} \end{array}
$$

$$
\begin{bmatrix} \text{sur:} \\ \text{noun: } \textit{apple} \\ \text{cat: np} \\ \text{sem: def sg} \\ \text{mdr: \%on n\_2} \\ \text{fnc: eat} \\ \text{idy: 2} \\ \text{prn: 1} \end{bmatrix}_3
\begin{bmatrix} \text{sur:} \\ \text{adj: } \textit{on} \text{ n\_2} \\ \text{cat: adj} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd: \%apple 2} \\ \text{idy: 3} \\ \text{prn: 1} \end{bmatrix}_5
\begin{bmatrix} \text{sur: the} \\ \text{noun: n\_3} \\ \text{cat: nn}' \text{ np} \\ \text{sem: def} \\ \text{mdr:} \\ \text{fnc:} \\ \text{idy:} \\ \text{prn:} \end{bmatrix}_6
\Longrightarrow
\begin{bmatrix} \text{sur:} \\ \text{noun: } \textit{apple} \\ \text{cat: np} \\ \text{sem: def sg} \\ \text{mdr: \%on n\_3} \\ \text{fnc: eat} \\ \text{idy: 2} \\ \text{prn: 1} \end{bmatrix}_3
\begin{bmatrix} \text{sur:} \\ \text{adj: } \textit{on} \text{ n\_3} \\ \text{cat: nn}' \text{ adj} \\ \text{sem: def} \\ \text{mdr:} \\ \text{mdd: \%apple 2} \\ \text{idy: 3} \\ \text{prn: 1} \end{bmatrix}_5
$$

15.2.6 Combining Julia ate the apple on the and table with PREP+NN

PREP+NN {ADV+NOM, NOM+FV, FV+NP, %NP+PREP, %V+ADV, %PREPP+PREP, V+INT, S+IP}

$$\begin{bmatrix} \text{adj: PREP N\_}n \\ \text{cat: N}' \text{ adj} \\ \text{sem: Y} \end{bmatrix} \begin{bmatrix} \text{noun: } \alpha \\ \text{cat: N} \\ \text{sem: Z} \end{bmatrix} \quad \begin{array}{l} \text{delete N}' \text{ ss.cat} \\ \text{acopy nw.sem ss.sem} \\ \text{replace } \alpha \text{ N\_}n \\ \text{copy}_{ss} \end{array}$$

$$\begin{bmatrix} \text{sur:} \\ \text{noun: } \textit{apple} \\ \text{cat: np} \\ \text{sem: def sg} \\ \text{mdr: \%on n\_3} \\ \text{fnc: eat} \\ \text{idy: 2} \\ \text{prn: 1} \end{bmatrix}_3 \begin{bmatrix} \text{sur:} \\ \text{adj: } \textit{on} \text{ n\_3} \\ \text{cat: nn}' \text{ adj} \\ \text{sem: def} \\ \text{mdr:} \\ \text{mdd: \%apple 2} \\ \text{idy: 3} \\ \text{prn: 1} \end{bmatrix}_5 \begin{bmatrix} \text{sur: table} \\ \text{noun: } \textit{table} \\ \text{cat: sn} \\ \text{sem: sg} \\ \text{mdr:} \\ \text{fnc:} \\ \text{idy:} \\ \text{prn:} \end{bmatrix}_6 \Longrightarrow \begin{bmatrix} \text{sur:} \\ \text{noun: } \textit{apple} \\ \text{cat: np} \\ \text{sem: def sg} \\ \text{mdr: \%on table} \\ \text{fnc: eat} \\ \text{idy: 2} \\ \text{prn: 1} \end{bmatrix}_3 \begin{bmatrix} \text{sur:} \\ \text{adj: } \textit{on table} \\ \text{cat: adj} \\ \text{sem: def sg} \\ \text{mdr:} \\ \text{mdd: \%apple 2} \\ \text{idy: 3} \\ \text{prn: 1} \end{bmatrix}_5$$

15.2.7 The ADN-interpretation of Julia ate the apple on the table

$$
\begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1
\begin{bmatrix}\text{sur:}\\ \text{verb: } \textit{eat}\\ \text{cat: v}\\ \text{sem: past}\\ \text{mdr:}\\ \text{arg: Julia apple}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_2
\begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{apple}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr: \%on table}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 1}\end{bmatrix}_3
\begin{bmatrix}\text{sur:}\\ \text{adj: } \textit{on table}\\ \text{cat: adj}\\ \text{sem: def sg}\\ \text{mdr:}\\ \text{mdd: \%apple 2}\\ \text{idy: 3}\\ \text{prn: 1}\end{bmatrix}_5
$$

15.2.8 Combining the apple on the table and behind with %PREPP+PREP

%PREPP+PREP {PREP+NP}

$$\begin{bmatrix}\text{adj: PREP } \alpha \\ \text{cat: adj} \\ \text{mdr:} \\ \text{idy: j}\end{bmatrix} \quad \begin{bmatrix}\text{adj: PREP N\_}n \\ \text{cat: adj} \\ \text{mdd:}\end{bmatrix}$$

%ecopy nw.adj ss.mdr
%ecopy ss.adj nw.mdd
acopy ss.idy nw.mdd
copy$_{ss}$copy$_{nw}$

$$\begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{apple} \\ \text{cat: snp} \\ \text{sem: def sg} \\ \text{mdr: \%on table} \\ \text{fnc:} \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}_3 \begin{bmatrix}\text{sur:} \\ \text{adj: } \textit{on table} \\ \text{cat: adj} \\ \text{sem: def sg} \\ \text{mdr:} \\ \text{mdd: \%apple 2} \\ \text{idy: 3} \\ \text{prn: 1}\end{bmatrix}_5 \begin{bmatrix}\text{sur: behind} \\ \text{adj: } \textit{behind} \text{ n\_4} \\ \text{cat: adj} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd:} \\ \text{idy:} \\ \text{prn:}\end{bmatrix} \Longrightarrow \begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{apple} \\ \text{cat: snp} \\ \text{sem: def sg} \\ \text{mdr: \%on table} \\ \text{fnc:} \\ \text{idy: 2} \\ \text{prn: 1}\end{bmatrix}_3 \begin{bmatrix}\text{sur:} \\ \text{adj: } \textit{on table} \\ \text{cat: adj} \\ \text{sem: def sg} \\ \text{mdr: \%}\textit{behind} \text{ n\_4} \\ \text{mdd: \%apple 2} \\ \text{idy: 3} \\ \text{prn: 1}\end{bmatrix}_5$$

$$\begin{bmatrix}\text{sur: behind} \\ \text{adj: } \textit{behind} \text{ n\_4} \\ \text{cat: adj} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd: \%on table} \\ \text{idy: 4} \\ \text{prn:}\end{bmatrix}_8$$

15.3 ADV Interpretation of Prepositional Phrases

15.3.1 Combining Julia ate the apple and on with %V+ADV

%V+ADV {PREP+NP, %V+ADV, S+IP}

$$\begin{bmatrix}\text{verb: } \alpha\\ \text{cat: V}\\ \text{mdr:}\end{bmatrix} \quad \begin{bmatrix}\text{adj: } \beta \text{ X}\\ \text{cat: ADV}\\ \text{mdd:}\end{bmatrix} \quad \begin{array}{l}\text{\%acopy nw.adj ss.mdr}\\ \text{\%ecopy } \alpha \text{ nw.mdd}\\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur:}\\ \text{verb: } \textit{eat}\\ \text{cat: v}\\ \text{sem: past}\\ \text{mdr:}\\ \text{mdd:}\\ \text{arg: Julia apple}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{apple}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 3}\end{bmatrix}_3 \begin{bmatrix}\text{sur: on}\\ \text{adj: } \textit{on} \text{ n\_2}\\ \text{cat: adj}\\ \text{sem:}\\ \text{mdr:}\\ \text{mdd:}\\ \text{idy:}\\ \text{prn:}\end{bmatrix}_5 \Longrightarrow \begin{bmatrix}\text{sur:}\\ \text{verb: } \textit{eat}\\ \text{cat: v}\\ \text{sem: past}\\ \text{mdr: \%on n\_2}\\ \text{arg: Julia apple}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{apple}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 3}\end{bmatrix}_3 \begin{bmatrix}\text{sur:}\\ \text{adj: } \textit{on} \text{ n\_2}\\ \text{cat: adj}\\ \text{sem:}\\ \text{mdr:}\\ \text{mdd \%:eat}\\ \text{idy: 3}\\ \text{prn:}\end{bmatrix}_5$$

15.3.2 The ADV-interpretation of Julia ate the apple on the table

$$\begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{eat}\\ \text{cat: v}\\ \text{sem: past}\\ \text{mdr: \%on table}\\ \text{arg: Julia apple}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{apple}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 1}\end{bmatrix}_3 \begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{on table}\\ \text{cat: adj}\\ \text{sem: def sg}\\ \text{mdr:}\\ \text{mdd: \%eat}\\ \text{idy: 3}\\ \text{prn: 1}\end{bmatrix}_5$$

15.3.3 Combining Julia ate the apple and fast with %V+ADV

%V+ADV {PREP+NP, %V+ADV, S+IP}

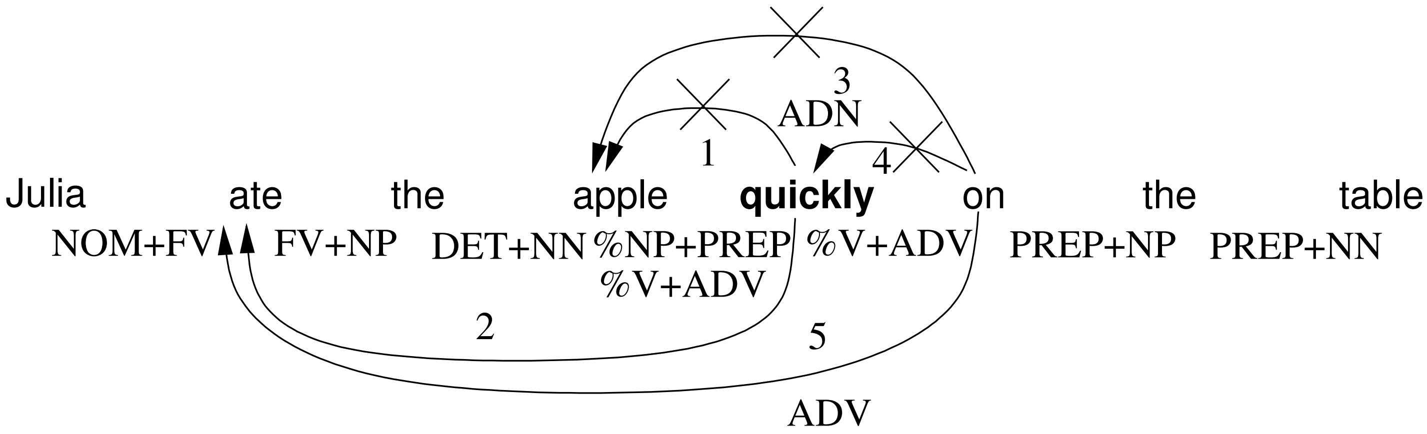
$$\begin{bmatrix}\text{verb: } \alpha \\ \text{cat: v} \\ \text{mdr:}\end{bmatrix} \quad \begin{bmatrix}\text{adj: } \beta \text{ X} \\ \text{cat: ADV} \\ \text{mdd:}\end{bmatrix} \quad \begin{array}{l}\text{\%acopy nw.adj ss.mdr} \\ \text{\%ecopy } \alpha \text{ nw.mdd} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{eat} \\ \text{cat: v} \\ \text{sem: past} \\ \text{mdr:} \\ \text{arg: Julia apple} \\ \text{nc:} \\ \text{pc:} \\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur: fast} \\ \text{adj: } \textit{fast} \\ \text{cat: adj} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd:} \\ \text{idy:} \\ \text{prn:}\end{bmatrix}_5 \Longrightarrow \begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{eat} \\ \text{cat: v} \\ \text{sem: past} \\ \text{mdr: \%fast} \\ \text{arg: Julia apple} \\ \text{nc:} \\ \text{pc:} \\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur:} \\ \text{adj: } \textit{fast} \\ \text{cat: adj} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd: \%eat} \\ \text{idy:} \\ \text{prn: 1}\end{bmatrix}_5$$

15.3.4 Result of interpreting Julia ate the apple fast

1	2	3	5
sur:	sur:	sur:	sur:
noun: *Julia*	verb: *eat*	noun: *apple*	adj: *fast*
cat: nm	cat: v	cat: np	cat: adj
sem: f	sem: past	sem: def sg	sem:
mdr:	mdr: %fast	mdr:	mdr:
fnc: eat	arg: Julia apple	fnc: eat	mdd: %eat
idy: 1	nc:	idy: 2	idy:
prn: 1	pc:	prn: 1	prn: 1
	prn: 1		

15.3.5 Interpretation of post-adverbial prepositional phrases



15.3.6 Result of interpreting Julia ate the apple quickly on the table

sur:	sur:	sur:	sur:	sur:
noun: *Julia*	verb: *eat*	noun: *apple*	adj: *quick*	adj: *on table*
cat: nm	cat: v	cat: np	cat: adj	cat: adj
sem: f	sem: past	sem: def sg	sem:	sem: def sg
mdr:	mdr: %quick %on table	mdr:	mdr:	mdr:
fnc: eat	arg: Julia apple	fnc: eat	mdd: %eat	mdd: %eat
idy: 1	nc:	idy: 2	idy:	idy: 3
prn: 1	pc:	prn: 1	prn: 1	prn: 1
	prn: 1			
1	2	3	6	5

15.3.7 Combining Quickly and Julia with ADV+NOM

ADV+NOM {NOM+ADV, ADVNOM+FV, DET+NN, DET+ADN, DET+INT}

$$\begin{bmatrix} \text{adj: } \alpha \\ \text{cat: ADV} \\ \text{mdd:} \end{bmatrix} \quad \begin{bmatrix} \text{noun: } \beta \\ \text{cat: Y NP} \\ \text{fnc:} \end{bmatrix}$$

acopy v_*n* ss.mdd
ecopy v_*n* nw.fnc
replace adv ss.cat
$\text{copy}_{ss}\text{copy}_{nw}$

$$\begin{bmatrix} \text{sur: quickly} \\ \text{adj: } \textit{quick} \\ \text{cat: adv} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd:} \\ \text{idy:} \\ \text{prn: 1} \end{bmatrix}_1 \begin{bmatrix} \text{sur: Julia} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc:} \\ \text{idy:} \\ \text{prn:} \end{bmatrix}_2 \Longrightarrow \begin{bmatrix} \text{sur:} \\ \text{adj: } \textit{quick} \\ \text{cat: adv} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd: v\_1} \\ \text{idy:} \\ \text{prn: 1} \end{bmatrix}_1 \begin{bmatrix} \text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: v\_1} \\ \text{idy: 1} \\ \text{prn: 1} \end{bmatrix}_2$$

15.3.8 Combining On the table and Julia with ADV+NOM

ADV+NOM {NOM+ADV, ADVNOM+FV, DET+NN, DET+ADN, DET+INT}

$$\begin{bmatrix}\text{adj: } \alpha \\ \text{cat: ADV} \\ \text{mdd: }\end{bmatrix} \quad \begin{bmatrix}\text{noun: } \beta \\ \text{cat: Y NP} \\ \text{fnc: }\end{bmatrix} \quad \begin{array}{l}\text{acopy v\_}n\text{ ss.mdd} \\ \text{ecopy v\_}n\text{ nw.fnc} \\ \text{replace adv ss.cat} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur: } \\ \text{adj: } \textit{on table} \\ \text{cat: adj} \\ \text{sem: def sg} \\ \text{mdr: } \\ \text{mdd: } \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur: Julia} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr: } \\ \text{fnc: } \\ \text{idy: } \\ \text{prn: }\end{bmatrix}_2 \Longrightarrow \begin{bmatrix}\text{sur: } \\ \text{adj: } \textit{on table} \\ \text{cat: adv} \\ \text{sem: def sg} \\ \text{mdr: } \\ \text{mdd: v\_1} \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur: } \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr: } \\ \text{fnc: v\_1} \\ \text{idy: 2} \\ \text{prn: 1}\end{bmatrix}_2$$

15.3.9 Combining Julia and quickly with NOM+ADV

NOM+ADV {ADVNOM+FV}

$$\begin{bmatrix}\text{noun: } \beta \\ \text{cat: NP} \\ \text{fnc: }\end{bmatrix} \quad \begin{bmatrix}\text{adj: } \alpha \\ \text{cat: adv} \\ \text{mdd: }\end{bmatrix} \qquad \begin{array}{l}\text{acopy v\_1 nw.mdd} \\ \text{ecopy v\_1 ss.fnc} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur: } \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr: } \\ \text{fnc: } \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur: quickly} \\ \text{adj: } \textit{quick} \\ \text{cat: adv} \\ \text{sem: } \\ \text{mdr: } \\ \text{mdd: } \\ \text{idy: } \\ \text{prn: 1}\end{bmatrix}_2 \Longrightarrow \begin{bmatrix}\text{sur: } \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr: } \\ \text{fnc: v\_1} \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur: } \\ \text{adj: } \textit{quick} \\ \text{cat: adv} \\ \text{sem: } \\ \text{mdr: } \\ \text{mdd: v\_1} \\ \text{idy: } \\ \text{prn: 1}\end{bmatrix}_2$$

15.3.10 Combining Quickly Julia and ate with ADVNOM+FV

ADVNOM+FV {FV+NP, AUX+NFV, %V+ADV, S+IP}

$$\begin{bmatrix}\text{adj: } \alpha \\ \text{cat: adv} \\ \text{mdd: V\_}n\end{bmatrix} \begin{bmatrix}\text{noun: } \beta \\ \text{cat: NP} \\ \text{fnc: V\_}n\end{bmatrix} \begin{bmatrix}\text{verb: } \gamma \\ \text{cat: NP}' \text{ X VT} \\ \text{mdr:} \\ \text{arg:} \\ \text{pc:}\end{bmatrix}$$

delete NP′ nw.cat
acopy β nw.arg
replace γ V_n
acopy α nw.mdr
ecopy PC nw.pc
acopy PCV nw.pc
set γ NCV
copy$_{ss}$ copy$_{nw}$

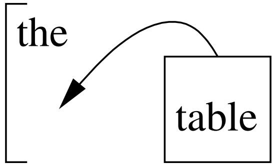
$$\begin{bmatrix}\text{sur:} \\ \text{adj: } \textit{quick} \\ \text{cat: adv} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd: v\_2} \\ \text{idy:} \\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: v\_2} \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{eat} \\ \text{cat: n}' \text{ a}' \text{ v} \\ \text{sem: past} \\ \text{mdr:} \\ \text{arg:} \\ \text{nc:} \\ \text{pc:} \\ \text{prn:}\end{bmatrix}_3 \Longrightarrow \begin{bmatrix}\text{sur:} \\ \text{adj: } \textit{quick} \\ \text{cat: adv} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd: eat} \\ \text{idy:} \\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: eat} \\ \text{idy: 1} \\ \text{prn:}\end{bmatrix}_2 \begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{eat} \\ \text{cat: a}' \text{ v} \\ \text{sem: past} \\ \text{mdr: quick} \\ \text{arg: Julia} \\ \text{nc:} \\ \text{pc:} \\ \text{prn: 1}\end{bmatrix}_3$$

15.3.11 Result of parsing On the table Julia quickly ate the apple

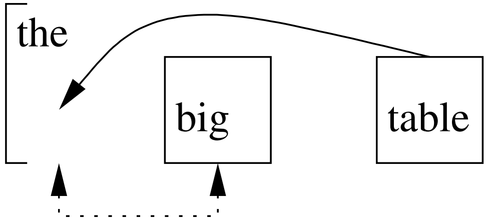
sur:	sur:	sur:	sur:	sur:
adj: *on table*	noun: *Julia*	adj: *quick*	verb: *eat*	noun: *apple*
cat: adj	cat: nm	cat: adv	cat: decl	cat: np
sem: def sg	sem: f	sem:	sem: past	sem: def sg
mdr:	mdr:	mdr:	mdr: on table quick	mdr:
mdd: eat	fnc: eat	mdd: eat	arg: Julia apple	fnc: eat
idy: 1	idy: 2	idy:	nc: pc:	idy: 3
prn: 1	prn: 1	prn: 1	prn: 1	prn: 1
1	4	5	6	7

15.4 Intensifiers in Noun Phrases and Prepositional Phrases

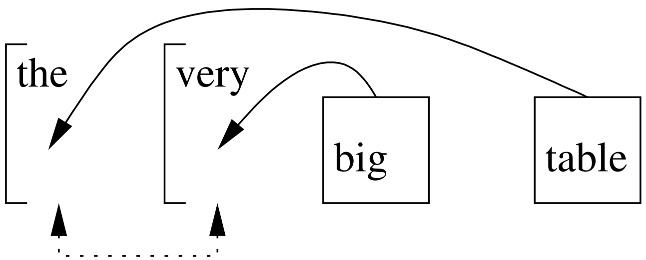
15.4.1 Wrappers in Noun Phrases



$$\begin{bmatrix}\text{noun: table}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr:}\end{bmatrix} \leftarrow$$

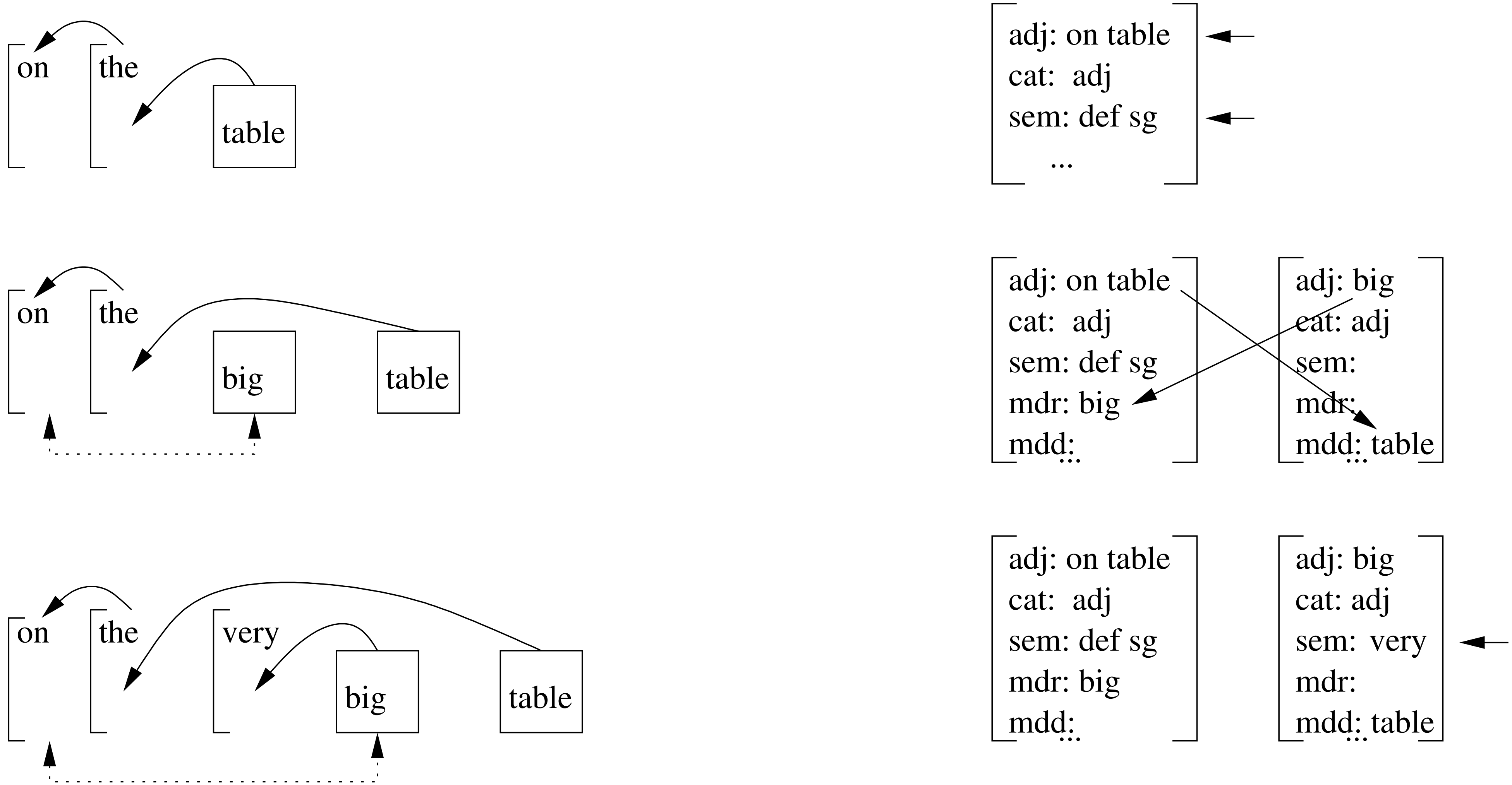


$$\begin{bmatrix}\text{noun: table}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr: big}\end{bmatrix} \quad \begin{bmatrix}\text{adj: big}\\ \text{cat: adj}\\ \text{sem:}\\ \text{mdd: table}\end{bmatrix}$$



$$\begin{bmatrix}\text{noun: table}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr: big}\end{bmatrix} \quad \begin{bmatrix}\text{adj: big}\\ \text{cat: adj}\\ \text{sem: very}\\ \text{mdd: table}\end{bmatrix} \leftarrow$$

15.4.2 Wrappers in Prepositional Phrases



15.4.3 Lexical Analysis of intensifier very and detensifier rather

$$\begin{bmatrix}\text{sur: very}\\ \text{adj: a\_1}\\ \text{cat: int}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix} \qquad \begin{bmatrix}\text{sur: rather}\\ \text{adj: a\_1}\\ \text{cat: int}\\ \text{sem: rather}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}$$

15.4.4 Combining The and very with DET+INT

DET+INT {INT+ADJ}

$$
\begin{bmatrix}\text{noun: N\_}n\\ \text{cat: N}'\text{ X}\\ \text{mdr:}\\ \text{idy:}\end{bmatrix}
\begin{bmatrix}\text{adj: A\_}n\\ \text{mdd:}\\ \text{cat:}\end{bmatrix}
\quad
\begin{array}{l}\text{acopy nw.adj ss.mdr}\\ \text{ecopy ss.noun nw.mdd}\\ \text{acopy ss.idy nw.mdd}\\ \text{replace adn nw.cat}\\ \text{copy}_{ss}\text{ copy}_{nw}\end{array}
$$

$$
\begin{bmatrix}\text{sur: the}\\ \text{noun: n\_1}\\ \text{cat: nn}'\text{ np}\\ \text{sem: def}\\ \text{mdr:}\\ \text{fnc:}\\ \text{idy:}\\ \text{prn:}\end{bmatrix}_1
\begin{bmatrix}\text{sur: very}\\ \text{adj: a\_1}\\ \text{cat: adj}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}_3
\Longrightarrow
\begin{bmatrix}\text{sur:}\\ \text{noun: n\_1}\\ \text{cat: nn}'\text{ np}\\ \text{sem: def}\\ \text{mdr: a\_1}\\ \text{fnc:}\\ \text{idy: 1}\\ \text{prn:}\end{bmatrix}_1
\begin{bmatrix}\text{sur:}\\ \text{adj: a\_1}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: n\_1 1}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}_2
$$

15.4.5 Combining The very and big with INT+ADJ

INT+ADJ {DET+NN,DET+ADN,DET+INT,ADV+NOM,ADVNOM+FV,%V+ADV,S+IP}

$$\begin{bmatrix}\text{adj: A\_}n\\ \text{cat: ADJ}\end{bmatrix} \quad \begin{bmatrix}\text{adj: }\beta\\ \text{cat: ADJ}\end{bmatrix} \qquad \begin{array}{l}\text{replace } \beta \text{ A\_}n\\ \text{copy}_{ss}\end{array}$$

$$\begin{bmatrix}\text{sur:}\\ \text{noun: n\_1}\\ \text{cat: nn}'\text{ np}\\ \text{sem: def}\\ \text{mdr: a\_1}\\ \text{fnc:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{adj: a\_1}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: n\_1 1}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}_2 \begin{bmatrix}\text{sur: big}\\ \text{adj: }\textit{big}\\ \text{cat: adj}\\ \text{sem:}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}_3 \Longrightarrow \begin{bmatrix}\text{sur:}\\ \text{noun: n\_1}\\ \text{cat: nn}'\text{ np}\\ \text{sem: def}\\ \text{mdr: big}\\ \text{fnc:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{big}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: n\_1 1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_2$$

15.4.6 Combining The very big and table with DET+NN

DET+NN {NOM+FV, ADJ+NOM, FV+NP, %NP+PREP, %V+ADV, V+INT, S+IP}

$$\begin{bmatrix}\text{noun: N\_}n\\ \text{cat: N}'\text{ X}\\ \text{sem: Y}\end{bmatrix} \quad \begin{bmatrix}\text{noun: }\alpha\\ \text{cat: N}\\ \text{sem: Z}\end{bmatrix} \quad \begin{array}{l}\text{delete N}'\text{ ss.cat}\\ \text{acopy nw.sem ss.sem}\\ \text{replace }\alpha\text{ N\_}n\\ \text{copy}_{ss}\end{array}$$

$$\begin{bmatrix}\text{sur:}\\ \text{noun: n\_1}\\ \text{cat: nn}'\text{ np}\\ \text{sem: def}\\ \text{mdr: big}\\ \text{fnc:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{big}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: n\_1 1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur: table}\\ \text{noun: }\textit{table}\\ \text{cat: sn}\\ \text{sem: sg}\\ \text{mdr:}\\ \text{fnc:}\\ \text{idy:}\\ \text{prn:}\end{bmatrix}_4 \Longrightarrow \begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{table}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr: big}\\ \text{fnc:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{big}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: table 1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_2$$

15.4.7 Combining the preposition on and the with PREP+NP

PREP+NP {PREP+NN,PREP+ADN,PREP+INT,%NP+PREP,%V+ADV,%PREPP+PREP,ADV+NOM,S+IP}

$$\begin{bmatrix} \text{adj: PREP N\_}n \\ \text{cat: adj} \\ \text{sem:} \end{bmatrix} \begin{bmatrix} \text{noun: } \alpha \\ \text{cat: Y NP} \\ \text{sem: X} \end{bmatrix} \quad \begin{array}{l} \text{replace } \alpha \text{ N\_}n \\ \text{acopy Y ss.cat:1} \\ \text{acopy nw.sem ss.sem} \\ \text{copy}_{ss} \end{array}$$

$$\begin{bmatrix} \text{sur: on} \\ \text{adj: } \textit{on} \text{ n\_1} \\ \text{cat: adj} \\ \text{sem:} \\ \text{mdr:} \\ \text{mdd:} \\ \text{idy:} \\ \text{prn: 1} \end{bmatrix}_1 \begin{bmatrix} \text{sur: the} \\ \text{noun: n\_2} \\ \text{cat: nn}' \text{ np} \\ \text{sem: def} \\ \text{mdr:} \\ \text{fnc:} \\ \text{idy:} \\ \text{prn:} \end{bmatrix}_2 \Longrightarrow \begin{bmatrix} \text{sur:} \\ \text{adj: } \textit{on} \text{ n\_2} \\ \text{cat: nn}' \text{ adj} \\ \text{sem: def} \\ \text{mdr:} \\ \text{mdd:} \\ \text{idy: 1} \\ \text{prn: 1} \end{bmatrix}_1$$

15.4.8 Combining On the and big with PREP+ADN

PREP+ADN {PREP+ADN, PREP+NN, PREP+INT}

$$\begin{bmatrix}\text{adj: PREP N\_}n\\ \text{cat: N}'\text{ ADJ}\\ \text{mdr:}\\ \text{idy: j}\end{bmatrix} \begin{bmatrix}\text{adj: }\alpha\\ \text{cat: adn}\\ \text{mdd:}\end{bmatrix} \quad \begin{array}{l}\text{acopy }\alpha\text{ ss.mdr}\\ \text{acopy ss.adj nw.mdd}\\ \text{ecopy ss.idy nw.mdd}\\ \text{copy}_{ss}\text{ copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{on}\text{ n\_2}\\ \text{cat: nn}'\text{ adj}\\ \text{sem: def}\\ \text{mdr:}\\ \text{mdd:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur: big}\\ \text{adj: }\textit{big}\\ \text{cat: adj}\\ \text{sem:}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}_3 \Longrightarrow \begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{on}\text{ n\_2}\\ \text{cat: nn}'\text{ adj}\\ \text{sem: def}\\ \text{mdr: big}\\ \text{mdd:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur: big}\\ \text{adj: }\textit{big}\\ \text{cat: adj}\\ \text{sem:}\\ \text{mdr: B}\\ \text{mdd: on n\_2 1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_3$$

15.4.9 Result of parsing On the big table

$$\begin{bmatrix}\text{sur:} \\ \text{adj: } \textit{on table} \\ \text{cat: adj} \\ \text{sem: def sg} \\ \text{mdr: big} \\ \text{mdd:} \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}_1 \quad \begin{bmatrix}\text{sur: big} \\ \text{adj: } \textit{big} \\ \text{cat: adj} \\ \text{sem:} \\ \text{mdr: B} \\ \text{mdd: on table 1} \\ \text{idy: B} \\ \text{prn: 1}\end{bmatrix}_3$$

15.4.10 Combining On the and very with PREP+INT

PREP+INT {INT+ADJ}

$$\begin{bmatrix}\text{adj: PREP N\_}n\\ \text{cat: N}'\text{ adj}\\ \text{mdr:}\\ \text{idy: j}\end{bmatrix}\begin{bmatrix}\text{adj: A\_}n\\ \text{cat: adj}\\ \text{mdd:}\end{bmatrix}\quad\begin{array}{l}\text{acopy nw.adj ss.mdr}\\ \text{acopy ss.adj nw.mdd}\\ \text{ecopy ss.idy nw.mdd}\\ \text{replace adn nw.cat}\\ \text{copy}_{ss}\text{ copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{on}\text{ n\_2}\\ \text{cat: nn}'\text{ adj}\\ \text{sem: def}\\ \text{mdr:}\\ \text{mdd:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1\begin{bmatrix}\text{sur: very}\\ \text{adj: a\_1}\\ \text{cat: adj}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}_3\Longrightarrow\begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{on}\text{ n\_2}\\ \text{cat: nn}'\text{ adj}\\ \text{sem: def}\\ \text{mdr: a\_1}\\ \text{mdd:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1\begin{bmatrix}\text{sur:}\\ \text{adj: a\_1}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: on n\_2 1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_3$$

15.4.11 Combining On the very and big with INT+ADJ

INT+ADJ {DET+NN, DET+ADN, DET+INT, ADV+NOM, ADVNOM+FV, %V+ADV, S+IP}

$$
\begin{bmatrix}\text{adj: A\_}n\\ \text{cat: ADJ}\end{bmatrix}
\quad
\begin{bmatrix}\text{adj: }\beta\\ \text{cat: ADJ}\end{bmatrix}
\qquad
\begin{array}{l}\text{replace } \beta \text{ A\_}n\\ \text{copy}_{ss}\end{array}
$$

$$
\begin{bmatrix}\text{sur:}\\ \text{adj: } \textit{on} \text{ n\_2}\\ \text{cat: nn}' \text{ adj}\\ \text{sem: def}\\ \text{mdr: a\_1}\\ \text{mdd:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_5
\begin{bmatrix}\text{sur:}\\ \text{adj: a\_1}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: on n\_2 1}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}_2
\begin{bmatrix}\text{sur: big}\\ \text{adj: } \textit{big}\\ \text{cat: adj}\\ \text{sem:}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}_2
\Longrightarrow
\begin{bmatrix}\text{sur:}\\ \text{adj: } \textit{on} \text{ n\_2}\\ \text{cat: nn}' \text{ adj}\\ \text{sem: def}\\ \text{mdr: big}\\ \text{mdd:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_5
\begin{bmatrix}\text{sur:}\\ \text{adj: } \textit{big}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: on n\_2 1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_3
$$

15.4.12 Combining On the very big and table with PREP+NN

PREP+NN {ADV+NOM, NOM+FV, FV+NP, %NP+PREP, %V+ADV, %PREPP+PREP, S+IP}

$$\begin{bmatrix}\text{adj: PREP N\_}n\\ \text{cat: N}'\text{ adj}\\ \text{sem: Y}\end{bmatrix} \quad \begin{bmatrix}\text{noun: }\alpha\\ \text{cat: N}\\ \text{sem: Z}\end{bmatrix}$$

delete N′ ss.cat
acopy nw.sem ss.sem
replace α N_n
copy$_{ss}$

$$\begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{on}\text{ n\_2}\\ \text{cat: nn}'\text{ adj}\\ \text{sem: def}\\ \text{mdr: big}\\ \text{mdd:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{big}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: on n\_2 1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_3 \begin{bmatrix}\text{sur: table}\\ \text{noun: }\textit{table}\\ \text{cat: sn}\\ \text{sem: sg}\\ \text{mdr:}\\ \text{fnc:}\\ \text{idy:}\\ \text{prn:}\end{bmatrix}_5 \Longrightarrow \begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{on table}\\ \text{cat: adj}\\ \text{sem: def sg}\\ \text{mdr: big}\\ \text{mdd:}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{adj: }\textit{big}\\ \text{cat: adn}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: on table 1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_3$$

15.4.13 Result of parsing On the very big table

$$\begin{bmatrix} \text{sur:} \\ \text{adj: } \textit{on table} \\ \text{cat: adj} \\ \text{sem: def sg} \\ \text{mdr: big} \\ \text{mdd:} \\ \text{idy: 1} \\ \text{prn: 1} \end{bmatrix}_1 \begin{bmatrix} \text{sur:} \\ \text{adj: } \textit{big} \\ \text{cat: adn} \\ \text{sem: very} \\ \text{mdr: B} \\ \text{mdd: on table 1} \\ \text{idy: B} \\ \text{prn: 1} \end{bmatrix}_3$$

15.5 Elementary Adverbs with Intensifiers

15.5.1 Combining Very and quickly with INT+ADJ

INT+ADJ {DET+NN, DET+ADN, DET+INT, ADV+NOM, ADVNOM+FV, %V+ADV, S+IP}

$$
\begin{bmatrix}\text{adj: A\_}n\\ \text{cat: ADJ}\end{bmatrix}
\quad
\begin{bmatrix}\text{adj: }\beta\\ \text{cat: ADJ}\end{bmatrix}
\qquad
\begin{array}{l}\text{replace }\beta\text{ A\_}n\\ \text{copy}_{ss}\end{array}
$$

$$
\begin{bmatrix}\text{sur: very}\\ \text{adj: a\_1}\\ \text{cat: adj}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_1
\begin{bmatrix}\text{sur: quickly}\\ \text{adj: }\textit{quick}\\ \text{cat: adv}\\ \text{sem:}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}
\Longrightarrow
\begin{bmatrix}\text{sur:}\\ \text{adj: quick}\\ \text{cat: adj}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_1
$$

15.5.2 Result of parsing Very quickly Julia ate the apple

$$
\begin{bmatrix}\text{sur:}\\ \text{adj: quick}\\ \text{cat: adv}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: eat}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_1
\begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_3
\begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{eat}\\ \text{cat: v}\\ \text{sem: past}\\ \text{mdr: quick}\\ \text{arg: Julia apple}\\ \text{nc:}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_4
\begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{apple}\\ \text{cat: np}\\ \text{sem: def sg}\\ \text{mdr:}\\ \text{fnc: eat}\\ \text{idy: 2}\\ \text{prn: 1}\end{bmatrix}_5
$$

15.5.3 Combining Julia and very with NOM+INT

NOM+INT {INT+ADJ}

$$\begin{bmatrix}\text{noun: } \beta \\ \text{cat: NP} \\ \text{fnc:}\end{bmatrix} \quad \begin{bmatrix}\text{adj: A\_}n \\ \text{cat: adj} \\ \text{mdd:}\end{bmatrix} \quad \begin{array}{l}\text{acopy v\_1 nw.mdd} \\ \text{ecopy v\_1 ss.fnc} \\ \text{replace adv nw.cat} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc:} \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur: very} \\ \text{adj: a\_1} \\ \text{cat: adj} \\ \text{sem: very} \\ \text{mdr: B} \\ \text{mdd:} \\ \text{idy: B} \\ \text{prn: 1}\end{bmatrix}_2 \Longrightarrow \begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: v\_1} \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:} \\ \text{adj: a\_1} \\ \text{cat: adv} \\ \text{sem: very} \\ \text{mdr: B} \\ \text{mdd: v\_1} \\ \text{idy: B} \\ \text{prn: 1}\end{bmatrix}_2$$

15.5.4 Combining Julia very and quickly with INT+ADJ

INT+ADJ {DET+NN, DET+ADN, DET+INT, ADV+NOM, ADVNOM+FV, %V+ADV, S+IP}

$$\begin{bmatrix}\text{adj: A\_}n\\ \text{cat: ADJ}\end{bmatrix} \quad \begin{bmatrix}\text{adj: }\beta\\ \text{cat: ADJ}\end{bmatrix} \qquad \begin{array}{l}\text{replace } \beta \text{ A\_}n\\ \text{copy}_{ss}\end{array}$$

$$\begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: v\_1}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{adj: a\_1}\\ \text{cat: adv}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: v\_1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur: quickly}\\ \text{adj: } \textit{quick}\\ \text{cat: adv}\\ \text{sem:}\\ \text{mdr: B}\\ \text{mdd:}\\ \text{idy: B}\\ \text{prn:}\end{bmatrix}_3 \Longrightarrow \begin{bmatrix}\text{sur:}\\ \text{noun: } \textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: v\_1}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{adj: quick}\\ \text{cat: adv}\\ \text{sem: very}\\ \text{mdr: B}\\ \text{mdd: v\_1}\\ \text{idy: B}\\ \text{prn: 1}\end{bmatrix}_2$$

15.5.5 Combining Julia ate the apple and very with V+INT

V+INT {INT+ADJ}

$$\begin{bmatrix}\text{verb: } \alpha \\ \text{mdr: }\end{bmatrix} \quad \begin{bmatrix}\text{adj: A\_}n \\ \text{cat: adj} \\ \text{mdd: }\end{bmatrix} \quad \begin{array}{l}\text{acopy } \alpha \text{ nw.mdd} \\ \text{acopy nw.adj ss.mdr} \\ \text{replace adv nw.cat} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$$\begin{bmatrix}\text{sur: } \\ \text{verb: } \textit{eat} \\ \text{cat: v} \\ \text{sem: past} \\ \text{mdr: } \\ \text{arg: Julia apple} \\ \text{nc: } \\ \text{pc: } \\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur: very} \\ \text{adj: a\_1} \\ \text{cat: adj} \\ \text{sem: very} \\ \text{mdr: B} \\ \text{mdd: } \\ \text{idy: B} \\ \text{prn: 1}\end{bmatrix}_5 \Longrightarrow \begin{bmatrix}\text{sur: } \\ \text{verb: } \textit{eat} \\ \text{cat: v} \\ \text{sem: past} \\ \text{mdr: a\_1} \\ \text{arg: Julia apple} \\ \text{nc: } \\ \text{pc: } \\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur: } \\ \text{adj: a\_1} \\ \text{cat: adv} \\ \text{sem: very} \\ \text{mdr: B} \\ \text{mdd: eat} \\ \text{idy: B} \\ \text{prn: 1}\end{bmatrix}_5$$

15.5.6 Combining Julia ate the apple very and quickly with INT+ADJ

INT+ADJ {DET+NN, DET+ADN, DET+INT, ADV+NOM, ADVNOM+FV, %V+ADV, S+IP}

$$
\begin{bmatrix}\text{adj: A\_}n \\ \text{cat: ADJ}\end{bmatrix}
\quad
\begin{bmatrix}\text{adj: }\beta \\ \text{cat: ADJ}\end{bmatrix}
\qquad
\begin{array}{l}\text{replace } \beta \text{ A\_}n \\ \text{copy}_{ss}\end{array}
$$

$$
\begin{bmatrix}
\text{sur:} \\
\text{verb: } \textit{eat} \\
\text{cat: v} \\
\text{sem: past} \\
\text{mdr: a\_1} \\
\text{arg: Julia apple} \\
\text{nc:} \\
\text{pc:} \\
\text{prn: 1}
\end{bmatrix}_2
\begin{bmatrix}
\text{sur:} \\
\text{adj: a\_1} \\
\text{cat: adv} \\
\text{sem: very} \\
\text{mdr: B} \\
\text{mdd: eat} \\
\text{idy: B} \\
\text{prn: 1}
\end{bmatrix}_5
\begin{bmatrix}
\text{sur: quickly} \\
\text{adj: } \textit{quick} \\
\text{cat: adv} \\
\text{sem:} \\
\text{mdr: B} \\
\text{mdd:} \\
\text{idy: B} \\
\text{prn:}
\end{bmatrix}_6
\Longrightarrow
\begin{bmatrix}
\text{sur:} \\
\text{verb: } \textit{eat} \\
\text{cat: v} \\
\text{sem: past} \\
\text{mdr: quick} \\
\text{arg: Julia apple} \\
\text{nc:} \\
\text{pc:} \\
\text{prn: 1}
\end{bmatrix}_2
\begin{bmatrix}
\text{sur:} \\
\text{adj: quick} \\
\text{cat: adv} \\
\text{sem: very} \\
\text{mdr: B} \\
\text{mdd: eat} \\
\text{idy: B} \\
\text{prn: 1}
\end{bmatrix}_5
$$

15.6 Definition of LA-hear.3

15.6.1 Lexicon and preamble of LA-hear3

1. Lexicon of LA-hear.3:
   lexicon of LA-hear.1 and LA-hear.2 plus first entry of 15.1.1 and entries of 15.4.3.
2. Preamble of LA-hear3:
   variable definitions, restrictions, and agreement conditions of LA-hear.1 (cf. 11.2.2) and LA-hear.2 (cf. 13.2.1) plus

   PREP ϵ {*on, in, above, below, ...*}
   ADJ ϵ {adj, adn, adv}
   ADV ϵ {adj, adv}
   ADN ϵ {adj, adn}
   A_*n* = simultaneous substitution variable for an adjective

15.6.2 Formal Definition of LA-hear.3

ST$_S$ =$_{def}$ { ([cat: X] {1 DET+NN, 2 DET+ADN, 3 DET+INT, 4 NOM+ADV, 5 NOM+INT,
6 NOM+FV, 7 INT+ADJ, 8 PREP+NP, 9 ADV+NOM}) }

DET+NN {10 NOM+FV, 11 FV+NP, 12 S+IP, 13 %NP+PREP, 14 %V+ADV, 15 V+INT}

$$\begin{bmatrix}\text{noun: N\_}n\\ \text{cat: N}'\ \text{X}\\ \text{sem: Y}\end{bmatrix} \begin{bmatrix}\text{noun: }\alpha\\ \text{cat: N}\\ \text{sem: Z}\end{bmatrix}$$

delete N$'$ ss.cat
acopy nw.sem ss.sem
replace α N_n
copy$_{ss}$

DET+ADN {16 DET+NN, 17 DET+ADN, 18 DET+INT}

$$\begin{bmatrix}\text{noun: N\_}n\\ \text{cat: N}'\ \text{X}\\ \text{mdr:}\\ \text{idy:}\end{bmatrix} \begin{bmatrix}\text{adj: }\alpha\\ \text{cat: adn}\\ \text{mdd:}\end{bmatrix}$$

acopy α ss.mdr
ecopy ss.noun nw.mdd
acopy ss.idy nw.mdd
copy$_{ss}$ copy$_{nw}$

$ **DET+INT** {19 INT+ADJ}

$$\begin{bmatrix}\text{noun: N\_}n\\ \text{cat: N}'\ \text{X}\\ \text{mdr:}\\ \text{idy:}\end{bmatrix} \begin{bmatrix}\text{adj: A\_}n\\ \text{mdd:}\end{bmatrix}$$

acopy nw.adj ss.mdr
ecopy ss.noun nw.mdd
acopy ss.idy nw.mdd
copy$_{ss}$ copy$_{nw}$

$ **NOM+ADV** {20 ADVNOM+FV}

$$\begin{bmatrix}\text{noun: } \beta\\ \text{cat: NP}\\ \text{fnc:}\end{bmatrix}\begin{bmatrix}\text{adj: } \alpha\\ \text{cat: adv}\\ \text{mdd:}\end{bmatrix}\begin{array}{l}\text{acopy v\_1 nw.mdd}\\ \text{acopy v\_1 ss.fnc}\\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$ **NOM+INT** {21 INT+ADJ}

$$\begin{bmatrix}\text{noun: } \beta\\ \text{cat: NP}\\ \text{fnc:}\end{bmatrix}\begin{bmatrix}\text{adj: A\_}n\\ \text{cat: adj}\\ \text{mdd:}\end{bmatrix}\begin{array}{l}\text{acopy v\_1 nw.mdd}\\ \text{acopy v\_1 ss.fnc}\\ \text{replace adv nw.cat}\\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

NOM+FV {22 FV+NP, 23 AUX+NFV, 24 S+IP}

$$\begin{bmatrix}\text{noun: } \alpha\\ \text{cat: NP}\\ \text{fnc:}\\ \text{prn: k}\end{bmatrix}\begin{bmatrix}\text{verb: } \beta\\ \text{cat: NP}' \text{ X VT}\\ \text{arg:}\\ \text{nc:}\\ \text{pc:}\end{bmatrix}\begin{array}{l}\text{delete NP}' \text{ nw.cat}\\ \text{acopy } \alpha \text{ nw.arg}\\ \text{ecopy } \beta \text{ ss.fnc}\\ \text{ecopy PC nw.pc}\\ \text{acopy PCV nw.pc}\\ \text{set } \beta \text{ NCV}\\ \text{copy}_{ss}\text{ copy}_{nw}\end{array}$$

$ **INT+ADJ** {25 DET+NN, 26 DET+ADN, 27 DET+INT, 28 ADV+NOM, 29 ADVNOM+FV, 30 %V+ADV, 31 S+IP}

$$\begin{bmatrix}\text{adj: A\_}n\\ \text{cat: ADJ}\end{bmatrix}\begin{bmatrix}\text{adj: }\beta\\ \text{cat: ADJ}\end{bmatrix}\quad\begin{array}{l}\text{replace }\beta\text{ A\_}n\\ \text{copy}_{ss}\end{array}$$

$ **PREP+NP** {32 PREP+NN, 33 PREP+ADN, 34 PREP+INT, 35 %NP+PREP, 36 %V+ADV, 37 %PREPP+PREP, 38 ADV+NOM, 39 S+IP}

$$\begin{bmatrix}\text{adj: PREP N\_}n\\ \text{cat: adj}\\ \text{sem:}\end{bmatrix}\begin{bmatrix}\text{noun: }\alpha\\ \text{cat: Y NP}\\ \text{sem: X}\end{bmatrix}\quad\begin{array}{l}\text{replace }\alpha\text{ N\_}n\\ \text{acopy Y ss.cat:1}\\ \text{acopy nw.sem ss.sem}\\ \text{copy}_{ss}\end{array}$$

$ **ADV+NOM** {40 NOM+ADV, 41 ADVNOM+FV, 42 DET+NN, 43 DET+ADN, 44 DET+INT}

$$\begin{bmatrix}\text{adj: }\alpha\\ \text{cat: ADV}\\ \text{mdd:}\end{bmatrix}\begin{bmatrix}\text{noun: }\beta\\ \text{cat: Y NP}\\ \text{fnc:}\end{bmatrix}\quad\begin{array}{l}\text{acopy v\_}n\text{ ss.mdd}\\ \text{acopy v\_}n\text{ nw.fnc}\\ \text{replace adv ss.cat}\\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

FV+NP {45 DET+NN, 46 DET+ADN, 47 DET+INT, 48 FV+NP, 49 %NP+PREP, 50 %V+ADV, 51 V+INT, 52 S+IP}

$$\begin{bmatrix}\text{verb: } \beta \\ \text{cat: NP}' \text{ X VT} \\ \text{arg:}\end{bmatrix} \begin{bmatrix}\text{noun: } \alpha \\ \text{cat: Y NP} \\ \text{fnc:}\end{bmatrix} \quad \begin{array}{l}\text{delete NP}' \text{ ss.cat} \\ \text{acopy } \alpha \text{ ss.arg} \\ \text{ecopy } \beta \text{ nw.fnc} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

S+IP {53 IP+START}

$$\begin{bmatrix}\text{verb: } \alpha \\ \text{cat: VT} \\ \text{prn: k}\end{bmatrix} \begin{bmatrix}\text{cat: VT}' \text{ SM}\end{bmatrix} \quad \begin{array}{l}\text{replace SM VT} \\ \text{set k PC} \\ \text{set } \alpha \text{ PCV} \\ \text{copy}_{ss}\end{array}$$

$ **%NP+PREP** {54 PREP+NP}

$$\begin{bmatrix}\text{noun: } \alpha \\ \text{cat: N} \\ \text{mdr:} \\ \text{idy: j}\end{bmatrix} \begin{bmatrix}\text{adj: PREP N\_}n \\ \text{cat: adj} \\ \text{mdd:}\end{bmatrix} \quad \begin{array}{l}\text{ecopy nw.adj ss.mdr} \\ \text{\%ecopy } \alpha \text{ nw.mdd} \\ \text{acopy ss.idy nw.mdd} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$ **%V+ADV** {55 PREP+NP, 56 %V+ADV, 57 S+IP}

$$\begin{bmatrix}\text{verb: } \alpha \\ \text{cat: v} \\ \text{mdr: }\end{bmatrix} \begin{bmatrix}\text{adj: } \beta \text{ X} \\ \text{cat: ADV} \\ \text{mdd: }\end{bmatrix} \begin{array}{l}\text{acopy nw.adj ss.mdr} \\ \text{ecopy } \alpha \text{ nw.mdd} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$ **V+INT** {58 INT+ADJ}

$$\begin{bmatrix}\text{verb: } \alpha \\ \text{mdr: }\end{bmatrix} \begin{bmatrix}\text{adj: A\_}n \\ \text{cat: adj} \\ \text{mdd: }\end{bmatrix} \begin{array}{l}\text{acopy } \alpha \text{ nw.mdd} \\ \text{acopy nw.adj ss.mdr} \\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$ **PREP+NN** {59 ADV+NOM, 60 NOM+FV, 62 FV+NP, 62 %NP+PREP,
63 %V+ADV, 64 % PREPP+PREP, 65 S+IP}

$$\begin{bmatrix}\text{adj: PREP N\_}n \\ \text{cat: N}' \text{ adj} \\ \text{sem: Y}\end{bmatrix} \begin{bmatrix}\text{noun: } \alpha \\ \text{cat: N} \\ \text{sem: Z}\end{bmatrix} \begin{array}{l}\text{delete N}' \text{ ss.cat} \\ \text{acopy nw.sem ss.sem} \\ \text{replace } \alpha \text{ N\_}n \\ \text{copy}_{ss}\end{array}$$

$ **PREP+ADN** {66 PREP+ADN, 67 PREP+NN, 68 PREP+INT}

$$\begin{bmatrix}\text{adj: PREP N\_}n \\ \text{cat: N}' \text{ ADJ} \\ \text{mdr: } \\ \text{idy: j}\end{bmatrix} \begin{bmatrix}\text{adj: } \alpha \\ \text{cat: adn} \\ \text{mdd: }\end{bmatrix} \begin{array}{l}\text{acopy } \alpha \text{ ss.mdr} \\ \text{acopy ss.adj nw.mdd} \\ \text{ecopy ss.idy nw.mdd} \\ \text{copy}_{ss} \text{ copy}_{nw}\end{array}$$

$ **PREP+INT** {69 INT+ADJ}

$$\begin{bmatrix}\text{adj: PREP N\_}n\\ \text{cat: N}'\text{ adj}\\ \text{mdr:}\\ \text{idy: j}\end{bmatrix}\begin{bmatrix}\text{adj: A\_}n\\ \text{cat: adj}\\ \text{mdd:}\end{bmatrix}\begin{array}{l}\text{acopy nw.adj ss.mdr}\\ \text{acopy ss.adj nw.mdd}\\ \text{ecopy ss.idy nw.mdd}\\ \text{replace adn nw.cat}\\ \text{copy}_{ss}\ \text{copy}_{nw}\end{array}$$

$ **%PREPP+PREP** {70 PREP+NP}

$$\begin{bmatrix}\text{adj: PREP }\alpha\\ \text{cat: adj}\\ \text{mdr:}\\ \text{idy: j}\end{bmatrix}\begin{bmatrix}\text{adj: PREP N\_}n\\ \text{cat: adj}\\ \text{mdd:}\end{bmatrix}\begin{array}{l}\text{\%ecopy nw.adj ss.mdr}\\ \text{\%ecopy ss.adj nw.mdd}\\ \text{acopy ss.idy nw.mdd}\\ \text{copy}_{ss}\text{copy}_{nw}\end{array}$$

$ **ADVNOM+FV** {71 FV+NP, 72 AUX+NFV, 73 %V+ADV, 74 S+IP}

$$\begin{bmatrix}\text{adj: }\alpha\\ \text{cat: adv}\\ \text{mdd: V\_}n\end{bmatrix}\begin{bmatrix}\text{noun: }\beta\\ \text{cat: NP}\\ \text{fnc: V\_}n\end{bmatrix}\begin{bmatrix}\text{verb: }\gamma\\ \text{cat: NP}'\text{ X VT}\\ \text{mdr:}\\ \text{arg:}\\ \text{pc:}\end{bmatrix}\begin{array}{l}\text{delete NP}'\text{ nw.cat}\\ \text{acopy }\beta\text{ nw.arg}\\ \text{replace }\gamma\text{ V\_}n\\ \text{acopy }\alpha\text{ nw.mdr}\\ \text{ecopy PC nw.pc}\\ \text{acopy PCV nw.pc}\\ \text{set }\gamma\text{ NCV}\\ \text{copy}_{ss}\ \text{copy}_{nw}\end{array}$$

AUX+NFV {75 AUX+NFV, 76 FV+NP, 77 S+IP}

$$\begin{bmatrix}\text{verb: V\_}n\\ \text{cat: AUX}'\ \text{V}\\ \text{sem: X}\end{bmatrix} \begin{bmatrix}\text{verb: }\alpha\\ \text{cat: Y AUX}\\ \text{sem: Z}\end{bmatrix} \quad \begin{array}{l}\text{replace Y AUX}'\\ \text{acopy nw.sem ss.sem}\\ \text{replace } \alpha \text{ V\_}n\\ \text{copy}_{ss}\end{array}$$

IP+START {1 DET+NN, 2 DET+ADN, 3 DET+INT, 4 NOM+ADV, 5 NOM+INT, 6 NOM+FV, 7 INT+ADJ, 8 PREP+NP, 9 ADV+NOM}

$$\begin{bmatrix}\text{verb: }\alpha\\ \text{cat: SM}\\ \text{nc:}\end{bmatrix} \begin{bmatrix}\text{noun: }\beta\\ \text{cat: NP}\\ \text{prn:}\end{bmatrix} \quad \begin{array}{l}\text{increment nw.prn}\\ \text{ecopy k ss.nc}\\ \text{acopy `NCV' ss.nc}\\ \text{copy}_{ss}\ \text{copy}_{nw}\end{array}$$

$\textbf{ST}_F =_{def} \{ (\begin{bmatrix}\text{cat: decl}\end{bmatrix} \text{ rp}_{\text{S+IP}})\}$

15.6.3 Transitions handled by rule packages

rule name	*rule package*	*applications of rules in rule package*
IP+START:	DET+NN	The + table
(= ST_S)	DET+ADN	The + beautiful (table)
	DET+INT	The + very (beautiful table)
	NOM+ADV	Julia + quickly (ate an apple)
	NOM+INT	Julia + very (quickly ate an apple)
	NOM+FV	Julia + read (the book)
	INT+ADJ	Very + quickly (Julia ate an apple)
	PREP+NP	On + the (table)
	ADV+NOM	Quickly + Julia (ate an apple)
DET+NN:	NOM+FV	the book + pleased (Julia)
	FV+NP	Julia gave the man + a (book)
	S+IP	Julia read the book + .
	%NP+PREP	the book + on (the table pleased Julia)
	%V+ADV	Julia read the book + on (the table)
	V+INT	Julia ate the apple + very (quickly)
DET+ADN:	DET+NN	the big + table
	DET+ADN	the big + beautiful (table)
	DET+INT	the big + very (beautiful table)

rule name	*rule package*	*applications of rules in rule package*
DET+INT:	INT+ADJ	the very + beautiful (table)
NOM+ADV:	ADVNOM+FV	Julia quickly + ate (an apple)
NOM+INT:	INT+ADJ	The young woman + very (quickly ate an apple)
NOM+FV:	FV+NP	Julia ate + the (apple)
	AUX+NFV	Julia has + eaten (an apple)
	S+IP	Julia slept + .
INT+ADJ:	DET+NN	the very beautiful + table
	DET+ADN	the very beautiful + big (table)
	DET+INT	the very beautiful + very (big table)
	ADV+NOM	very quickly + Julia
	ADVNOM+FV	Julia very quickly + ate (an apple)
	%V+ADV	Julia slept very soundly + on (the table)
	S+IP	Julia slept very soundly + .

rule name	*rule package*	*applications of rules in rule package*
PREP+NP:	PREP+NN	on the + table
	PREP+ADN	on the + big (table)
	PREP+INT	on the + very (big table)
	%NP+PREP	the letter for Julia + on (the table)
	%V+ADV	John read the letter for Julia + quickly
	%PREPP+PREP	the letter for Julia + from Hamburg
	ADV+NOM	for Mary + John bought a book
	S+IP	John read the letter for Julia + .
ADV+NOM	NOM+ADV	On the table Julia + quickly (ate an apple)
	ADVNOM+FV	Quickly Julia + ate (an apple)
	DET+NN	Quickly the + girl (ate an apple)
	DET+ADN	Quickly the + pretty (girl ate an apple)
	DET+INT	Quickly the + very (pretty girl ate an apple)
FV+NP:	DET+NN	John saw the + table
	DET+ADN	John saw the + beautiful (table)
	DET+INT	John saw the + very (beautiful table)
	FV+NP	John gave Julia + the (book)
	%NP+PREP	John saw Julia + from (Hamburg)
	%V+ADV	John saw Julia + from (Hamburg)
	V+INT	John saw Julia + very (often).
	S+IP	John saw Julia + .

rule name	*rule package*	*applications of rules in rule package*
S+IP:	IP+START	Julia was sleeping. + The (dog barked)
%NP+PREP:	PREP+NP	the book on + the (table)
%V+ADV:	PREP+NP	Julia ate the apple on + the (table)
	%V+ADV	Julia ate the apple quickly + on (the table)
	S+IP	Julia ate the apple quickly + .
V+INT:	INT+ADJ	Julia slept very + soundly
PREP+NN:	ADV+NOM	on the table + Julia (ate an apple)
	NOM+FV	the book on the table + pleased (Julia)
	FV+NP	Julia gave the man in the corner + a (book)
	%NP+PREP	Julia ate the apple on the table + behind (the tree)
	%V+ADV	Julia ate the apple on the table + behind (the tree)
	%PREPP+PREP	Julia ate the apple on the table + behind (the tree)
	S+IP	Julia ate the apple on the table + .
PREP+ADN	PREP+ADN	on the big + beautiful (table)
	PREP+NN	on the big + table
	PREP+INT	on the big + very (beautiful table)
PREP+INT	INT+ADJ	on the very + beautiful (table)

rule name	*rule package*	*applications of rules in rule package*
%PREPP+PREP	PREP+NP	Julia ate the apple on the table + behind (the tree)
ADVNOM+FV:	FV+NP	Julia quickly ate + an (apple)
	AUX+NFV	In this bed Julia will + sleep
	%V+ADV	Quickly Julia slipped + under (the covers)
	S+IP	In this bed Julia slept + .
AUX+NFV:	AUX+NFV	the car had been + speeding
	FV+NP	Julia had read + the (book)
	S+IP	Julia was sleeping + .
IP+START:	DET+NN	The + table
	DET+ADN	The + beautiful (table)
	DET+INT	The + very (beautiful table)
	NOM+ADV	Julia + quickly (ate an apple)
	NOM+INT	Julia + very (quickly ate an apple)
	NOM+FV	Julia + read (the book)
	INT+ADJ	Very + quickly (Julia ate an apple)
	PREP+NP	On + the (table)
	ADV+NOM	Quickly + Julia (ate an apple)