Robin Möllemann Problem Set 04 20.11.11

1

⟦[S [NP [N **Ann**]][VP [V **loves**][NP [N **Jan**]]]]⟧

= ⟦[VP [V **loves**][NP [N **Jan**]]]⟧ (⟦[NP [N **Ann**]]⟧) S1

= ⟦[VP [V **loves**][NP [N **Jan**]]]⟧ (⟦[N **Ann**]⟧) S2

= ⟦[VP [V **loves**][NP [N **Jan**]]]⟧ (⟦**Ann**⟧) S4

= ⟦[V **loves**]⟧ (⟦NP[N **Jan**]]⟧)(⟦**Ann**⟧) S6

= ⟦[V **loves]**⟧ (⟦**Jan**⟧)(⟦**Ann**⟧)
S6,2,4

= ⟦**loves**⟧ (⟦**Jan**⟧)(⟦**Ann**⟧) S5

= [λx D_e . [λy D_e . y loves x]](Jan)(Ann)
= [λy D_e . y loves Jan](Ann)
= Ann loves Jan
The sentence „Ann loves Jan“ is true iff Ann loves Jan.

2

(3) TN: If α is a terminal node, ⟦α⟧ is specified in the lexicon.

(4) NN: If α is a non-branching node and β its daughter, ⟦α⟧ = ⟦β⟧ .

(5) FA: If α is a branching node, {β, γ} the set of its daughters and ⟦β⟧ is a funtion whose domain contans ⟦γ⟧ , then ⟦α⟧ = ⟦β⟧ (⟦γ⟧).

3 iff (i) ⟦γ⟧ is in the domain of the function ⟦β⟧ and (ii) β and γ are in the domain of ⟦ ⟧ .

4 ⟦α⟧ = ⟦β⟧ (⟦γ⟧) if β is a function and γ within its domain, ⟦α⟧ = ⟦γ⟧ (⟦β⟧), if γ is a function and β within its domain

5

⟦[S [NP [N **Ann**]][VP [V **loves**][NP [N **Jan**]]]]⟧

= ⟦[VP [V **loves**][NP [N **Jan**]]]⟧ (⟦[NP [N **Ann**]]⟧) FA

= ⟦**loves**⟧ (⟦**Jan**⟧)(⟦**Ann**⟧) NNx5

= [λx D_e . [λy D_e . y loves x]](Jan)(Ann) TN
= [λy D_e . y loves Jan](Ann)
= Ann loves Jan
The sentence „Ann loves Jan“ is true iff Ann loves Jan.

6 The main difference between type-driven interpretation and syntax-driven interpretation is, that type-driven interpretation uses general rules independent of what the mother node is (NP, VP, S and so on), and syntax-driven interpretation uses special rules for each mother node. Hence rules S2-5 can are rule 4 (NN) and rules S1 and S6 are rule 5 (FA). Also the rules of syntax-driven interpretation are commutative, while the rules of type-driven interpretation aren't. The merit of using type-driven interpretation rules is, that a single rule for every „type“ of mother node is no longer necessary.

7

A ⟦**of**⟧ = λx D_e . x

B ⟦**is**⟧ = λf $D_{<e,t>}$. f

C ⟦**a**⟧ = λf $D_{<e,t>}$. f

D ⟦**cat**⟧ = λx D_e . x is a cat

E ⟦**proud**⟧ = λx D_e . x is proud or λx D_e . [λy D_e . x is proud of y]

F ⟦**in**⟧ = λx D_e . x is in or λx D_e . [λy D_e . y is in x]

G ⟦**Texas**⟧ = Texas

H ⟦**Joe**⟧ = Joe

I ⟦**Mary**⟧ = Mary

8

A

⟦[S [NP [N **Joe**]][VP [V **is**][NP [D **a**][N **cat**]]]]⟧

= ⟦[VP [V **is**][NP [D **a**][N **cat**]]]⟧ (⟦[NP [N **Joe**]]⟧) FA

= ⟦[V **is**]⟧ (⟦[NP [D **a**][N **cat**]]⟧)(⟦[NP [N **Joe**]]⟧) FA

= ⟦[V **is**]⟧ (⟦[D **a**]⟧ (⟦[N **cat**]⟧))(⟦[NP [N **Joe**]]⟧ ⟧) FA

= ⟦**is**⟧ (⟦**a**⟧ (⟦**cat**⟧))(⟦**Joe**⟧) NNx5

= [λf $D_{<e,t>}$. f]([λf $D_{<e,t>}$. f]([λx D_e . x is a cat]))(Joe) TN

= [λf $D_{<e,t>}$. f]([λx D_e . x is a cat])(Joe)

= [λx D_e . x is a cat](Joe)

= Joe is a cat

B

⟦[S [NP [N **Joe**]][VP [V **proud**][PP [P **of**][NP [N **Mary**]]]]]⟧

= ⟦[VP [V **proud**][PP [P **of**][NP [N **Mary**]]]]⟧ (⟦[NP [N **Joe**]]⟧) FA

= ⟦[V **proud**]⟧ (⟦[NP [N **Joe**]]⟧)(⟦[PP [P **of**][NP [N **Mary**]]]⟧) FA

= ⟦[V **proud**]⟧ (⟦[NP [N **Joe**]]⟧)(⟦[P **of**]⟧ (⟦[NP [N **Mary**]]⟧)) FA

= ⟦**proud**⟧ (⟦**Joe**⟧)(⟦**of**⟧ (⟦**Mary**⟧))

NNx6

= [λx D_e . [λy D_e . x is proud of y]](Joe)([λx D_e . x](Mary)) TN

= [λy D_e . Joe is proud of y]]([λx D_e . x](Mary))

= Joe is proud of [λx D_e . x](Mary)

= Joe is proud of Mary

C

⟦[S [NP [N **Joe**]][VP [V **is**][PP [P **in**][NP [N **Texas**]]]]]⟧

= ⟦[VP [V **is**][PP [P **in**][NP [N **Texas**]]]]⟧ (⟦[NP [N **Joe**]]⟧) FA

= ⟦[V **is**]⟧ (⟦[PP [P **in**][NP [N **Texas**]]]⟧)(⟦[NP [N **Joe**]]⟧) FA

= ⟦[V **is**]⟧ (⟦[P **in**]⟧ (⟦[NP [N **Texas**]]⟧))(⟦[NP [N **Joe**]]⟧) FA

= ⟦**is**⟧ (⟦**in**⟧ (⟦**Texas**⟧))(⟦**Joe**⟧)

NNx6

= [λf $D_{<e,t>}$. f]([λx D_e . [λy D_e . y is in x]](Texas))(Joe) TN

= [λf $D_{<e,t>}$. f]([λy D_e . y is in Texas])(Joe)

= [λy D_e . y is in Texas](Joe)

= Joe is in Texas

9

$\llbracket$[S [NP [N **Kaline**]][VP [V **is**][NP [D **a**][N [N [A **gray**][N **cat**]][PP [P **in**][NP [N **Texas**]]]]]]]$\rrbracket$

= $\llbracket$[VP [V **is**][NP [D **a**][N [N [A **gray**][N **cat**]][PP [P **in**][NP [N **Texas**]]]]]]$\rrbracket$($\llbracket$[NP [N **Kaline**]]$\rrbracket$) FA

= $\llbracket$[V **is**]$\rrbracket$($\llbracket$[NP [D **a**][N [N [A **gray**][N **cat**]][PP [P **in**][NP [N **Texas**]]]]]$\rrbracket$)($\llbracket$[NP [N **Kaline**]]$\rrbracket$) FA

= $\llbracket$[V **is**]$\rrbracket$($\llbracket$[D **a**]$\rrbracket$($\llbracket$[N [N [A **gray**][N **cat**]][PP [P **in**][NP [N **Texas**]]]]$\rrbracket$))($\llbracket$[NP [N **Kaline**]]$\rrbracket$) FA

= $\llbracket$[V **is**]$\rrbracket$($\llbracket$[D **a**]$\rrbracket$($\llbracket$[N [A **gray**][N **cat**]]$\rrbracket$($\llbracket$[PP [P **in**][NP [N **Texas**]]]$\rrbracket$)))($\llbracket$[NP [N **Kaline**]]$\rrbracket$) FA

= $\llbracket$[V **is**]$\rrbracket$($\llbracket$[D **a**]$\rrbracket$($\llbracket$[N [A **gray**][N **cat**]]$\rrbracket$($\llbracket$[P **in**]$\rrbracket$($\llbracket$[NP [N **Texas**]]$\rrbracket$))))($\llbracket$[NP [N **Kaline**]]$\rrbracket$) FA

= $\llbracket$[V **is**]$\rrbracket$($\llbracket$[D **a**]$\rrbracket$([$\lambda x \in D_e$. $\llbracket$**gray**$\rrbracket$(x) = 1 and $\llbracket$**cat**$\rrbracket$(x) = 1]($\llbracket$[P **in**]$\rrbracket$($\llbracket$[NP [N **Texas**]]$\rrbracket$))))($\llbracket$[NP [N **Kaline**]]$\rrbracket$) PM

= $\llbracket$**is**$\rrbracket$($\llbracket$**a**$\rrbracket$([$\lambda x \in D_e$. $\llbracket$**gray**$\rrbracket$(x) = 1 and $\llbracket$**cat**$\rrbracket$(x) = 1]($\llbracket$**in**$\rrbracket$($\llbracket$**Texas**$\rrbracket$))))($\llbracket$**Kaline**$\rrbracket$) NN

= [$\lambda x \in D_e$. x]([$\lambda f \in D_{<e,t>}$. f]([$\lambda x \in D_e$. [$\lambda x \in D_e$. x is gray](x) = 1 and [$\lambda x \in D_e$. x is a cat](x) = 1]([$\lambda x \in D_e$. [$\lambda y \in D_e$. y is in x]](Texas))))(Kaline) TN

= [$\lambda x \in D_e$. x]([$\lambda f \in D_{<e,t>}$. f]([$\lambda x \in D_e$. [$\lambda x \in D_e$. x is gray](x) = 1 and [$\lambda x \in D_e$. x is a cat](x) = 1]([$\lambda y \in D_e$. y is in Texas])))(Kaline)

= [$\lambda x \in D_e$. x]([$\lambda f \in D_{<e,t>}$. f]([$\lambda x \in D_e$. x is gray = 1 and x is a cat = 1]([$\lambda y \in D_e$. y is in Texas])))(Kaline)

= [$\lambda x \in D_e$. x]([$\lambda f \in D_{<e,t>}$. f]([$\lambda x \in D_e$. x is gray and is a cat]([$\lambda y \in D_e$. y is in Texas])))(Kaline)

= [$\lambda x \in D_e$. x]([$\lambda f \in D_{<e,t>}$. f]([$\lambda y \in D_e$. y is in Texas] is gray and is a cat))(Kaline)

= [$\lambda x \in D_e$. x]([$\lambda f \in D_{<e,t>}$. f]([$\lambda y \in D_e$. y is in Texas and is gray and is a cat]))(Kaline)

= [$\lambda x \in D_e$. x]([$\lambda y \in D_e$. y is in Texas and is gray and is a cat])(Kaline)

= [$\lambda y \in D_e$. y is in Texas and is gray and is a cat](Kaline)

= Kaline is in Texas and is gray and is a cat