

Übung 3

Chart – Parser

Aufgabe – Chart Parser (siehe Vorlesung)

$$G = (V_N, V_T, R, S)$$

$$V_N = \{S, NP, VP, N, V, ART, PP, P\}$$

$S \rightarrow NP VP$

$NP \rightarrow N$

$NP \rightarrow ART N$

$VP \rightarrow V NP$

$VP \rightarrow V NP PP$

$PP \rightarrow P NP$

$N \rightarrow Hans$

$N \rightarrow Peter$

$V \rightarrow suchte$

...

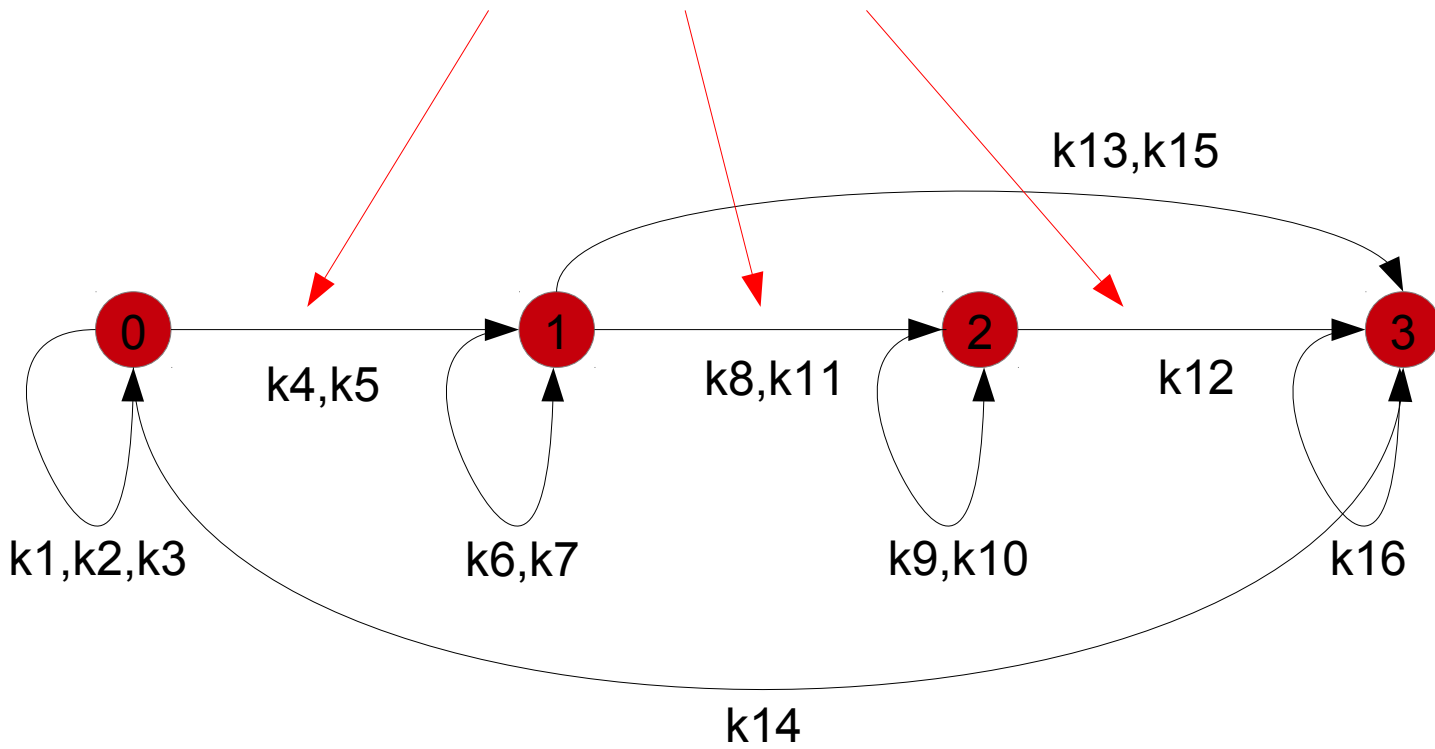
$$V_T = \{Hans, suchte, Peter, \dots\}$$

Hans suchte Peter.

Nr.	neue Kante	Prozedur	Kanten/Regeln
k1	[0, 0, S, ε, NP VP]	INIT	$S \rightarrow NP VP$
k2	[0, 0, NP, ε, N]	EXPAND	$NP \rightarrow N$
k3	[0, 0, NP, ε, ART N]	EXPAND	$NP \rightarrow ART N$
k4	[0, 1, NP, N, ε]	SCAN	k2
k5	[0, 1, S, NP, VP]	COMPLETE	k1, k4
k6	[1, 1, VP, ε, V NP PP]	EXPAND	$VP \rightarrow V NP PP$
k7	[1, 1, VP, ε, V NP]	EXPAND	$VP \rightarrow V NP$
k8	[1, 2, VP, V, NP PP]	SCAN	k6
k9	[2, 2, NP, ε, N]	EXPAND	$NP \rightarrow N$
k10	[2, 2, NP, ε, ART N]	EXPAND	$NP \rightarrow ART N$
k11	[1, 2, VP, V, NP]	SCAN	k7
k12	[2, 3, NP, N, ε]	SCAN	k9
k13	[1, 3, VP, V NP, ε]	COMPLETE	k11, k12
k14	[0, 3, S, NP VP, ε]	COMPLETE	k5, k13
k15	[1, 3, VP, V NP, PP]	COMPLETE	k8, k12
k16	[3, 3, PP, ε, P NP]	EXPAND	$PP \rightarrow P NP$

Chart

Hans suchte Peter.



Merkmalsstrukturen – Subsumtion – Unifikation

Aufgabe 1 – Merkmalsstrukturen

$$S_a = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{NUM } sg] \end{bmatrix} \quad S_b = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{GEN } f] \end{bmatrix} \quad S_c = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{NUM } pl] \end{bmatrix}$$

$$S_d = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & \begin{bmatrix} \text{NUM } sg \\ \text{GEN } f \end{bmatrix} \end{bmatrix} \quad S_2 = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & \begin{bmatrix} \text{NUM } pl \\ \text{GEN } f \end{bmatrix} \end{bmatrix}$$

$$S_1 = [\text{CAT } NP]$$

$$S_e = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & \begin{bmatrix} \text{NUM } sg \\ \text{GEN } f \\ \text{KAS } dat \end{bmatrix} \end{bmatrix}$$

Aufgabe 1 – Subsumtion

$$S_1 = [\text{CAT } NP]$$

$$S_a = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{NUM } sg] \end{bmatrix}$$

$$S_b = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{GEN } f] \end{bmatrix}$$

$$S_c = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{NUM } pl] \end{bmatrix}$$

$$S_1 \sqsubseteq S_a$$

$$S_1 \sqsubseteq S_b$$

$$S_1 \sqsubseteq S_c$$

Aufgabe 1 – Subsumtion

$$S_a = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{NUM } sg] \end{bmatrix}$$

$$S_b = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{GEN } f] \end{bmatrix}$$

$$S_d = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & \begin{bmatrix} \text{NUM } sg \\ \text{GEN } f \end{bmatrix} \end{bmatrix}$$

$$S_a \sqsubseteq S_d$$

$$S_b \sqsubseteq S_d$$

Aufgabe 1 – Subsumtion

$$S_b = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{GEN } f] \end{bmatrix}$$

$$S_c = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & [\text{NUM } pl] \end{bmatrix}$$

$$S_2 = \begin{bmatrix} \text{CAT} & NP \\ \text{AGR} & \begin{bmatrix} \text{NUM } pl \\ \text{GEN } f \end{bmatrix} \end{bmatrix}$$

$$S_b \sqsubseteq S_2$$

$$S_c \sqsubseteq S_2$$

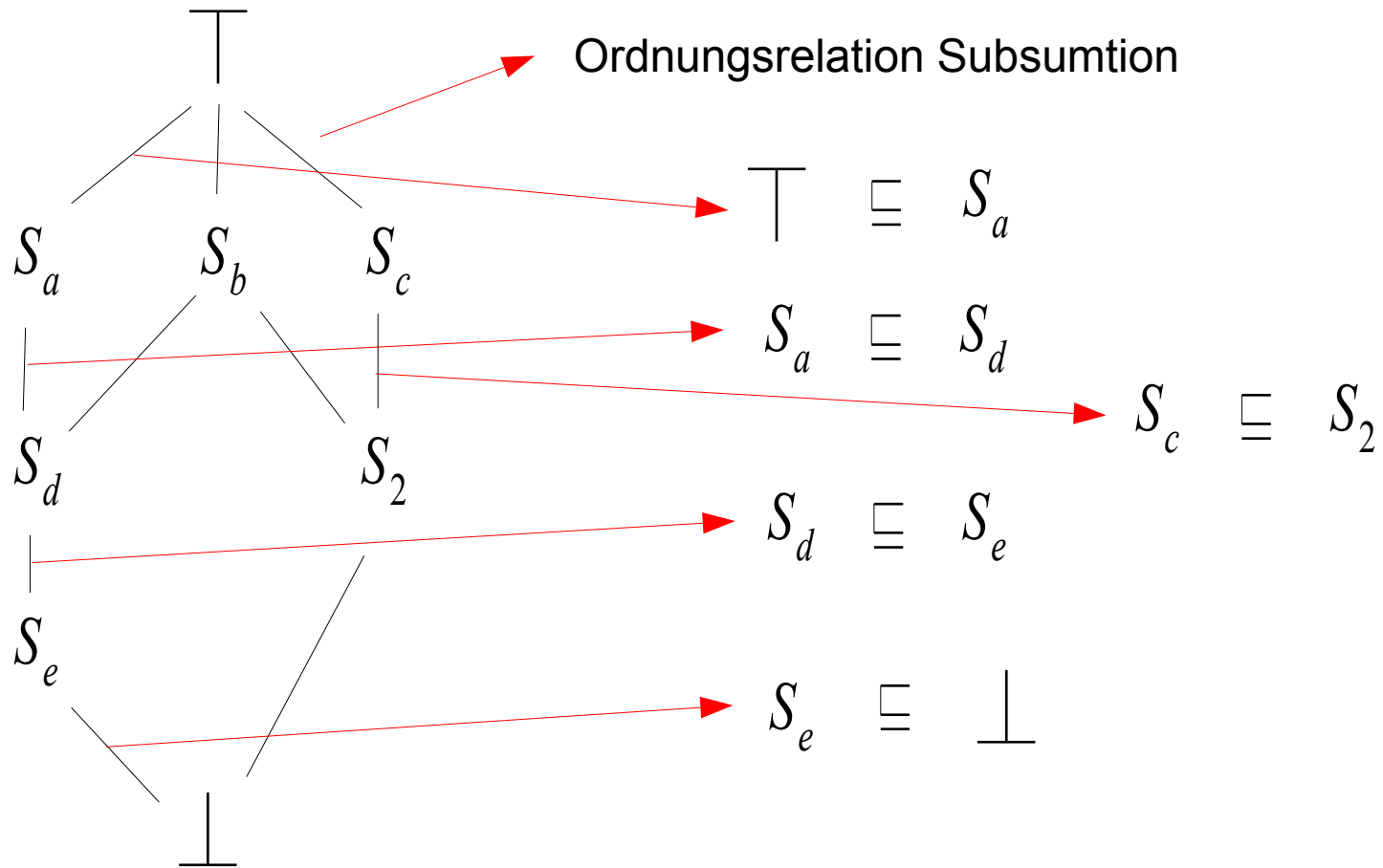
Aufgabe 1 – Subsumtion

$$S_d = \left[\begin{array}{c} \text{CAT} \\ \text{AGR} \end{array} \left[\begin{array}{cc} \text{NUM} & \text{sg} \\ \text{GEN} & f \end{array} \right] \right]$$

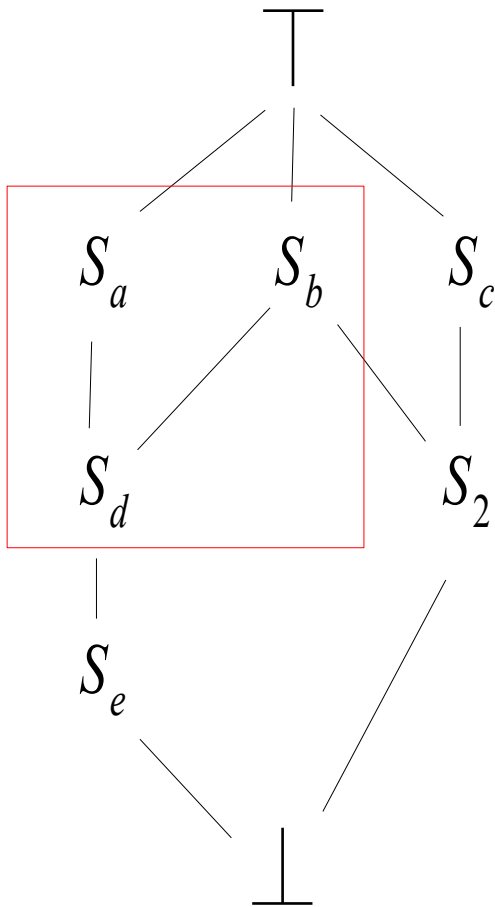
$$S_e = \left[\begin{array}{c} \text{CAT} \\ \text{AGR} \end{array} \left[\begin{array}{cc} \text{NUM} & \text{sg} \\ \text{GEN} & f \\ \text{KAS} & \text{dat} \end{array} \right] \right]$$

$$S_d \sqsubseteq S_e$$

Aufgabe 1 – Subsumtion

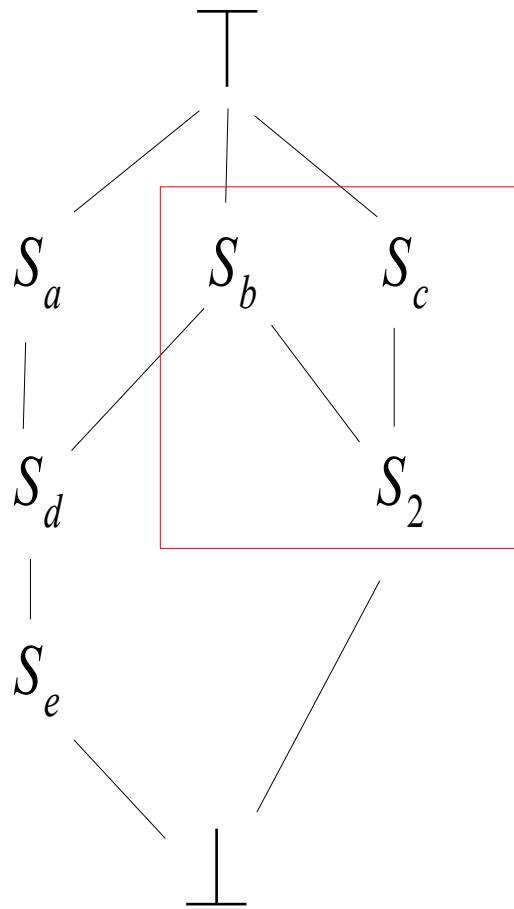


Aufgabe 1 – Unifikation



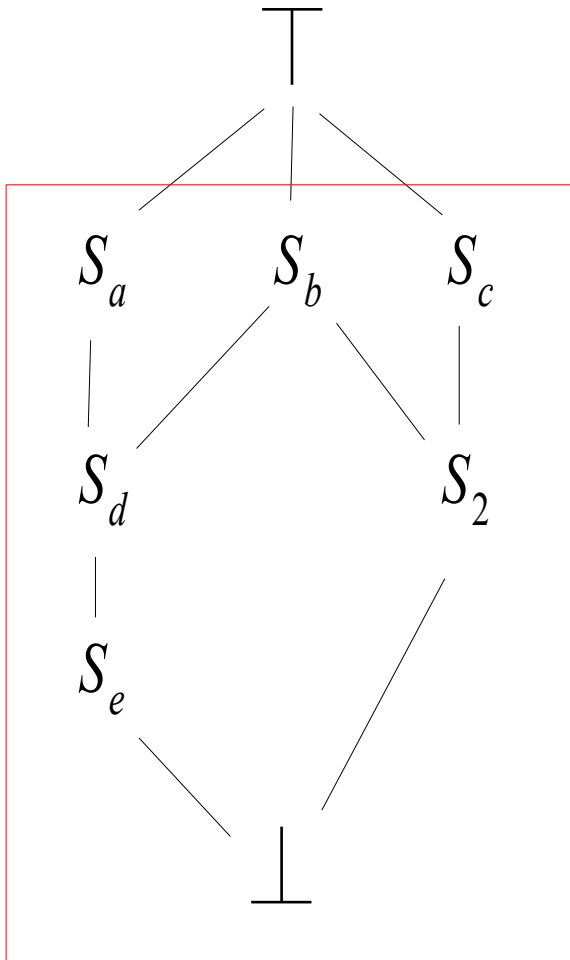
$$S_d = S_a \sqcup S_b$$

Aufgabe 1 – Unifikation



$$S_2 = S_b \sqcup S_c$$

Aufgabe 1 – Unifikation



$$\perp = S_a \sqcup S_c$$

Aufgabe 2 – Subsumtion

$$S_1 = \left[\begin{array}{cc} \text{KAT} & \text{VP} \end{array} \right]$$

$$S_2 = \left[\begin{array}{cc} \text{KAT} & \text{VP} \\ \text{KGR} & \left[\begin{array}{cc} \text{NUM} & \text{SG} \end{array} \right] \end{array} \right]$$

$$S_3 = \left[\begin{array}{cc} \text{KAT} & \text{VP} \\ \text{KGR} & \left[\begin{array}{cc} \text{NUM} & \text{SG} \\ \text{PERS} & 2 \end{array} \right] \end{array} \right]$$

$$S_1 \sqsubseteq S_2 \sqsubseteq S_3 \sqsubseteq S_4 \sqsubseteq S_5$$

$$S_4 = \left[\begin{array}{cc} \text{KAT} & \text{VP} \\ \text{KGR} & \left[\begin{array}{cc} \text{NUM} & \text{SG} \\ \text{PERS} & 2 \end{array} \right] \\ \text{OBJ} & \left[\begin{array}{cc} \text{KGR} & \left[\begin{array}{cc} \text{NUM} & \text{SG} \\ \text{PERS} & 2 \end{array} \right] \end{array} \right] \end{array} \right]$$

$$S_5 = \left[\begin{array}{cc} \text{KAT} & \text{VP} \\ \text{KGR} & \boxed{1} \left[\begin{array}{cc} \text{NUM} & \text{SG} \\ \text{PERS} & 2 \end{array} \right] \\ \text{OBJ} & \left[\begin{array}{cc} \text{KGR} & \boxed{1} \end{array} \right] \end{array} \right]$$

Aufgabe 3 – Unifikation

$$\left[\begin{array}{c} \text{KAT} \\ \text{NP} \end{array} \right] \sqcup \left[\begin{array}{c} \text{KGR} \\ \left[\begin{array}{c} \text{NUM} \\ \text{GEN} \end{array} \right] \\ \left[\begin{array}{c} \text{SG} \\ \text{FEM} \end{array} \right] \end{array} \right] = \left[\begin{array}{c} \text{KAT} \\ \text{NP} \\ \text{KGR} \\ \left[\begin{array}{c} \text{NUM} \\ \text{GEN} \end{array} \right] \\ \left[\begin{array}{c} \text{SG} \\ \text{FEM} \end{array} \right] \end{array} \right]$$

Aufgabe 4 – Unifikation

$$\left[\begin{array}{l} \text{KAT} \quad \text{VP} \\ \text{KGR} \quad \left[\begin{array}{l} \text{NUM} \quad \text{SG} \end{array} \right] \\ \text{OBJ} \quad \left[\begin{array}{l} \text{KAT} \quad \text{NP} \\ \text{KGR} \quad \left[\begin{array}{l} \text{KAS} \quad \text{AKK} \end{array} \right] \end{array} \right] \end{array} \right] \sqcup \left[\text{KGR} \quad \left[\begin{array}{l} \text{NUM} \quad \text{PL} \end{array} \right] \right] = \perp$$

Aufgabe 5 – Unifikation

$$\begin{bmatrix} \text{KGR} & \begin{bmatrix} \text{NUM} & \text{sg} \end{bmatrix} \\ \text{SUBJ} & \begin{bmatrix} \text{KGR} & \begin{bmatrix} \text{NUM} & \text{sg} \end{bmatrix} \end{bmatrix} \end{bmatrix} \sqcup \begin{bmatrix} \text{SUBJ} & \begin{bmatrix} \text{KGR} & \begin{bmatrix} \text{PERS} & 3 \end{bmatrix} \end{bmatrix} \end{bmatrix} = \\ \begin{bmatrix} \text{KGR} & \begin{bmatrix} \text{NUM} & \text{sg} \end{bmatrix} \\ \text{SUBJ} & \begin{bmatrix} \text{KGR} & \begin{bmatrix} \text{NUM} & \text{sg} \\ \text{PERS} & 3 \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Aufgabe 6 – Unifikation

$$\begin{bmatrix} \text{KGR} & \boxed{1} & \begin{bmatrix} \text{NUM} & \text{sg} \end{bmatrix} \\ \text{SUBJ} & \begin{bmatrix} \text{KGR} & \boxed{1} \end{bmatrix} \end{bmatrix} \sqcup \begin{bmatrix} \text{SUBJ} & \begin{bmatrix} \text{KGR} & \begin{bmatrix} \text{PERS} & 3 \end{bmatrix} \end{bmatrix} \end{bmatrix} =$$
$$\begin{bmatrix} \text{KGR} & \boxed{1} & \begin{bmatrix} \text{NUM} & \text{sg} \\ \text{PERS} & 3 \end{bmatrix} \\ \text{SUBJ} & \begin{bmatrix} \text{KGR} & \boxed{1} \end{bmatrix} \end{bmatrix}$$