

PATR-II

developed by: S. Shieber (et al.) at SRI

Implementations:

orig.	PATR-II	S. Shieber	Interlisp
	Z-PATR	S. Shieber	Zetalisp
	CL-PATR	S. Shieber	CommonLisp
	D-PATR	L. Karttunen	Interlisp-D
	P-PATR	S. Hirsh	Prolog
	SB-PATR	U. SaarbrückenLisp	

PATR-Rules

$X_0 \rightarrow X_1 X_2$

$$\left[\begin{array}{l} X_0: \left[\begin{array}{l} \text{cat: S} \\ \text{finite: } \langle 1 \rangle \end{array} \right] \\ X_1: \left[\begin{array}{l} \text{cat: NP} \\ \text{agr: } \langle 2 \rangle \end{array} \right] \\ X_2: \left[\begin{array}{l} \text{cat: VP} \\ \text{agr: } \langle 2 \rangle \\ \text{finite: } \langle 1 \rangle \end{array} \right] \end{array} \right]$$

$\langle X_0 \text{ cat} \rangle = \text{S}$

$\langle X_1 \text{ cat} \rangle = \text{NP}$

$\langle X_2 \text{ cat} \rangle = \text{VP}$

$\langle X_0 \text{ finite} \rangle = \langle X_2 \text{ finite} \rangle$

$\langle X_1 \text{ agr} \rangle = \langle X_2 \text{ agr} \rangle$

PATR Grammar I

$S \rightarrow NP VP$

$X_0 \rightarrow X_1 X_2$

$$\left[\begin{array}{l} X_0: \left[\begin{array}{l} \text{cat: S} \\ \text{head: } \langle 1 \rangle \left[\text{subject: } \langle 2 \rangle \right] \end{array} \right] \\ X_1: \langle 2 \rangle \left[\text{cat: NP} \right] \\ X_2: \left[\begin{array}{l} \text{cat: VP} \\ \text{head: } \langle 1 \rangle \end{array} \right] \end{array} \right]$$

$NP \rightarrow \text{Det } N$

$X_0 \bar{\omega} X_1 X_2$

$$\left[\begin{array}{l} X_0: \left[\begin{array}{l} \text{cat: NP} \\ \text{head: } \langle 1 \rangle \end{array} \right] \\ X_1: \left[\begin{array}{l} \text{cat: Det} \\ \text{nominal: } \langle 2 \rangle \end{array} \right] \\ X_2: \langle 2 \rangle \left[\begin{array}{l} \text{cat: N} \\ \text{head: } \langle 1 \rangle \end{array} \right] \end{array} \right]$$

$VP \rightarrow V$

$X_0 \rightarrow X_1$

$$\left[\begin{array}{l} X_0: \left[\begin{array}{l} \text{cat: VP} \\ \text{head: } \langle 1 \rangle \end{array} \right] \\ X_1: \left[\begin{array}{l} \text{cat: V} \\ \text{head: } \langle 1 \rangle \end{array} \right] \end{array} \right]$$

PATR Grammar I (Lexicon)

$$a := \left[\begin{array}{l} \text{cat: Det} \\ \text{nomin al: } \left[\text{h ead: } \left[\text{a gr: } \left[\begin{array}{l} \text{p er: 3} \\ \text{n u m: s g} \end{array} \right] \right] \right] \end{array} \right]$$

$$\text{b oy} := \left[\begin{array}{l} \text{cat: N} \\ \text{h ead: } \left[\text{a gr: } \left[\text{n u m: s g} \right] \right] \end{array} \right]$$

$$\text{s in g s} := \left[\begin{array}{l} \text{cat: V} \\ \text{h ead: } \left[\begin{array}{l} \text{form: finite} \\ \text{subject: } \left[\text{h ead: } \left[\text{a gr: } \left[\begin{array}{l} \text{p er: 3} \\ \text{n u m: s g} \end{array} \right] \right] \right] \right] \end{array} \right] \end{array} \right]$$

PATR Grammar II

$S \rightarrow X \text{ VP}$

$X_0 \rightarrow X_1 X_2$

$$\left[\begin{array}{l} X_0: \left[\begin{array}{l} \text{cat: S} \\ \text{head:} \langle 1 \rangle [\text{form: finite}] \end{array} \right] \\ X_1: \langle 2 \rangle \\ X_2: \left[\begin{array}{l} \text{cat: VP} \\ \text{head:} \langle 1 \rangle \\ \text{subcat:} \left[\begin{array}{l} \text{first:} \langle 2 \rangle \\ \text{rest: end} \end{array} \right] \end{array} \right] \end{array} \right]$$

$NP \rightarrow \text{Det N}$

$X_0 \rightarrow X_1 X_2$

$$\left[\begin{array}{l} X_0: \left[\begin{array}{l} \text{cat: NP} \\ \text{head:} \langle 1 \rangle \end{array} \right] \\ X_1: \left[\begin{array}{l} \text{cat: Det} \\ \text{subcat:} \left[\text{first:} \langle 2 \rangle \right] \end{array} \right] \\ X_2: \langle 2 \rangle \left[\begin{array}{l} \text{cat: N} \\ \text{head:} \langle 1 \rangle \end{array} \right] \end{array} \right]$$

PATR Grammar II

VP \rightarrow VP X

X₀ \rightarrow X₁ X₂

$$\left[\begin{array}{l} X_0: \left[\begin{array}{l} \text{cat: VP} \\ \text{head:} \langle 1 \rangle \\ \text{subcat:} \langle 3 \rangle \end{array} \right] \\ \\ X_1: \left[\begin{array}{l} \text{cat: VP} \\ \text{head:} \langle 1 \rangle \\ \text{subcat:} \left[\begin{array}{l} \text{first:} \langle 2 \rangle \\ \text{rest:} \langle 3 \rangle \end{array} \right] \end{array} \right] \\ \\ X_2: \langle 2 \rangle \end{array} \right]$$

PATR Grammar II (Lexicon)

$$a := \left[\begin{array}{l} \text{cat: Det} \\ \text{subcat: } \left[\begin{array}{l} \text{first: } \left[\text{head: } \left[\text{agr: } \left[\begin{array}{l} \text{per: 3} \\ \text{num: sg} \end{array} \right] \right] \right] \\ \text{rest: end} \end{array} \right] \end{array} \right]$$

$$b\ o\ y := \left[\begin{array}{l} \text{cat: N} \\ \text{head: } \left[\text{agr: } \left[\text{num: sg} \right] \right] \end{array} \right]$$

$$s\ i\ n\ g\ s := \left[\begin{array}{l} \text{cat: VP} \\ \text{head: } \left[\text{form: finite} \right] \\ \text{subcat: } \left[\begin{array}{l} \text{first: } \left[\begin{array}{l} \text{cat: NP} \\ \text{head: } \left[\text{agr: } \left[\begin{array}{l} \text{per: 3} \\ \text{num: sg} \end{array} \right] \right] \right] \end{array} \right] \\ \text{rest: end} \end{array} \right] \end{array} \right]$$

PATR Grammar II (Lexicon)

gives :=

	[cat: VP]
		head: [form: finite]	
subcat:	[first: [cat: NP]]
		rest:	[
			first: [cat: NP]
			rest:
			first: [cat: NP
			head: [agr: [per: 3
			num: sg]]]
			rest: end
]
]
]

PATR Grammar III

$S \rightarrow X \text{ VP}$

$X_0 \rightarrow X_1 \text{ X}_2$

$$\left[\begin{array}{l} X_0: \left[\begin{array}{l} \text{cat: S} \\ \text{head:} \langle 1 \rangle [\text{form: finite}] \\ \text{sem:} \langle 3 \rangle \end{array} \right] \\ \\ X_1: \langle 2 \rangle \\ \\ X_2: \left[\begin{array}{l} \text{cat: VP} \\ \text{head:} \langle 1 \rangle \\ \text{subcat:} \left[\begin{array}{l} \text{first:} \langle 2 \rangle \\ \text{rest: end} \end{array} \right] \\ \text{sem:} \langle 3 \rangle \end{array} \right] \end{array} \right]$$

$\text{NP} \rightarrow \text{Det N}$

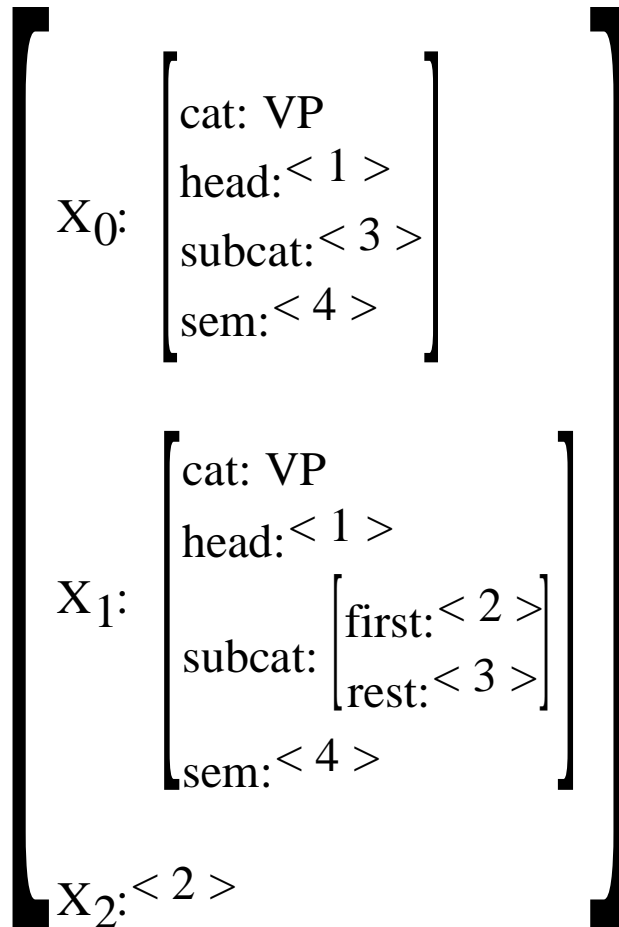
$X_0 \rightarrow X_1 \text{ X}_2$

$$\left[\begin{array}{l} X_0: \left[\begin{array}{l} \text{cat: NP} \\ \text{head:} \langle 1 \rangle \\ \text{sem:} \langle 3 \rangle \end{array} \right] \\ \\ X_1: \left[\begin{array}{l} \text{cat: Det} \\ \text{subcat:} \left[\text{first:} \langle 2 \rangle \right] \\ \text{sem:} \langle 3 \rangle \end{array} \right] \\ \\ X_2: \langle 2 \rangle \left[\begin{array}{l} \text{cat: N} \\ \text{head:} \langle 1 \rangle \end{array} \right] \end{array} \right]$$

PATR Grammar III

VP \rightarrow VP X

X₀ \rightarrow X₁ X₂



PATR Grammar III (Lexicon)

a := $\left[\begin{array}{l} \text{cat: Det} \\ \text{subcat: } \left[\begin{array}{l} \text{first: } \left[\begin{array}{l} \text{head: agr: } \left[\begin{array}{l} \text{per: 3} \\ \text{num: sg} \end{array} \right] \right] \\ \text{sem: } \langle 1 \rangle \end{array} \right] \\ \text{rest: end} \end{array} \right] \\ \text{sem: } \left[\begin{array}{l} \text{quant: exist} \\ \text{var: x} \\ \text{restr: } \langle 1 \rangle \end{array} \right] \end{array} \right]$

boy := $\left[\begin{array}{l} \text{cat: N} \\ \text{head: agr: } \left[\text{num: sg} \right] \\ \text{sem: boy'} \end{array} \right]$

PATR Grammar III (Lexicon)

sings :=

	[cat: VP]
		head: [form: finite]	
		subcat:	[
		first:	[
			cat: NP
		head:	[
		agr:	[
			per: 3
			num: sg
]
		sem: <1>]
		rest: end	
]
		sem:	[
		rel: sing']
		agent: <1>]

PATR Grammar III (Lexicon)

