12. DBS.1: Speaker-Mode

12.1 Definition of LA-think.1

12.1.1 Formal Definition of LA-think.1

LX: proplet tokens in the Word Bank 11.6.1

ST$_S$ =$_{def}$ {([verb: α] {1 V_N_V})}

V_N_V {2 V_V_V}

$$\begin{bmatrix}\text{verb: } \alpha\\ \text{arg: } \beta\\ \text{prn: i}\end{bmatrix} \begin{bmatrix}\text{noun: } \beta\\ \text{fnc: } \alpha\\ \text{prn: i}\end{bmatrix}$$

output position ss
switch to LA-speak.1 (optional, only in the speaker-mode)

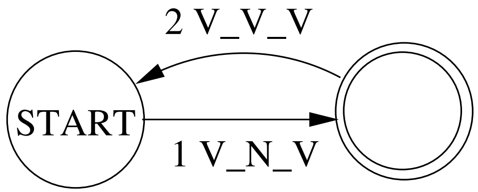
V_V_V {1 V_N_V}

$$\begin{bmatrix}\text{verb: } \alpha\\ \text{nc: j } \beta\\ \text{prn: i}\end{bmatrix} \begin{bmatrix}\text{verb: } \beta\\ \text{pc: i } \alpha\\ \text{prn: j}\end{bmatrix}$$

output position nw

ST$_F$ =$_{def}$ { ([verb: x] rp$_{\text{V_N_V}}$)}

12.1.2 Finite State Transition Network of LA-think.1



12.1.3 Schematic description of LA-think.1 navigation:

rule name	*sample navigation*	*rule package*
V_N_V	sleep_Julia_sleep	{V_V_V}
V_V_V	sleep_dream_dream	{V_N_V}

12.1.4 Deriving a VNVNVN sequence

sleep Julia+ sing John+ dream Susanne
VN VN VN

rule name	*navigation steps*	*result sequence*
V_N_V	sleep_Julia_sleep	VN
V_V_V	sleep_sing_sing	VNV
V_N_V	sing_John_sing	VNVN
V_V_V	sing_dream_dream	VNVNV
V_N_V	dream_Susanne_dream	VNVNVN

12.2 Navigating with LA-think.1

12.2.1 Providing an initial proplet for the navigation

$$\begin{bmatrix} \text{sur:} \\ \text{verb: } \textit{sleep} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: Julia} \\ \text{nc: 2 sing} \\ \text{pc:} \\ \text{prn: 1} \end{bmatrix}_1$$

12.2.2 Traversing the first proposition

1 V_N_V {2 V_V_V}

$$\begin{bmatrix} \text{verb: } \alpha \\ \text{arg: } \beta \\ \text{prn: i} \end{bmatrix} \quad \begin{bmatrix} \text{noun: } \beta \\ \text{fnc: } \alpha \\ \text{prn: i} \end{bmatrix}$$

output position ss
switch to LA-speak.1

$$\begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{sleep}\\ \text{cat: decl}\\ \text{sem: pres}\\ \text{mdr:}\\ \text{arg: Julia}\\ \text{nc: 2 sing}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: sleep}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_2 \Longrightarrow \begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{sleep}\\ \text{cat: decl}\\ \text{sem: pres}\\ \text{mdr:}\\ \text{arg: Julia}\\ \text{nc: 2 sing}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_1$$

Activated sequence:

$$\begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{sleep}\\ \text{cat: decl}\\ \text{sem: pres}\\ \text{mdr:}\\ \text{arg: Julia}\\ \text{nc: 2 sing}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: sleep}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_2$$

12.2.3 Transition to the second proposition

2 V_V_V {1 V_N_V}

$$\begin{bmatrix}\text{verb: } \alpha \\ \text{nc: j } \beta \\ \text{prn: i}\end{bmatrix} \quad \begin{bmatrix}\text{verb: } \beta \\ \text{pc: i } \alpha \\ \text{prn: j}\end{bmatrix} \qquad \text{output position nw}$$

$$\begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{sleep} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: Julia} \\ \text{nc: 2 sing} \\ \text{pc:} \\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{sing} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: John} \\ \text{nc: 3 dream} \\ \text{pc: 1 sleep} \\ \text{prn: 2}\end{bmatrix}_3 \Longrightarrow \begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{sing} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: John} \\ \text{nc: 3 dream} \\ \text{pc: 1 sleep} \\ \text{prn: 2}\end{bmatrix}_3$$

Activated sequence:

$$\begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{sleep}\\ \text{cat: decl}\\ \text{sem: pres}\\ \text{mdr:}\\ \text{arg: Julia}\\ \text{nc: 2 sing}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: sleep}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{sing}\\ \text{cat: decl}\\ \text{sem: pres}\\ \text{mdr:}\\ \text{arg: John}\\ \text{nc: 3 dream}\\ \text{pc: 1 sleep}\\ \text{prn: 2}\end{bmatrix}_3$$

12.2.4 Activated sequence at the end of the navigation

$$\begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{sleep}\\ \text{cat: decl}\\ \text{sem: pres}\\ \text{mdr:}\\ \text{arg: Julia}\\ \text{nc: 2 sing}\\ \text{pc:}\\ \text{prn: 1}\end{bmatrix}_1 \begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{Julia}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: sleep}\\ \text{idy: 1}\\ \text{prn: 1}\end{bmatrix}_2 \begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{sing}\\ \text{cat: decl}\\ \text{sem: pres}\\ \text{mdr:}\\ \text{arg: John}\\ \text{nc: 3 dream}\\ \text{pc: 1 sleep}\\ \text{prn: 2}\end{bmatrix}_3 \begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{John}\\ \text{cat: nm}\\ \text{sem: m}\\ \text{mdr:}\\ \text{fnc: sing}\\ \text{idy: 2}\\ \text{prn: 2}\end{bmatrix}_4 \begin{bmatrix}\text{sur:}\\ \text{verb: }\textit{dream}\\ \text{cat: decl}\\ \text{sem: pres}\\ \text{mdr:}\\ \text{arg: Susanne}\\ \text{nc:}\\ \text{pc:2 sing}\\ \text{prn: 3}\end{bmatrix}_5 \begin{bmatrix}\text{sur:}\\ \text{noun: }\textit{Susanne}\\ \text{cat: nm}\\ \text{sem: f}\\ \text{mdr:}\\ \text{fnc: dream}\\ \text{idy: 3}\\ \text{prn: 3}\end{bmatrix}_6$$

12.3 Automatic Word Form Production

12.3.1 The function lex-n for the generation of proper names

If $\begin{bmatrix}\text{noun: } \alpha \\ \text{cat: nm}\end{bmatrix}$ matches an activated N proplet, then lex-n [noun: α] = α'.

If α =	then α' =
John	John
Julia	Julia
Susanne	Susanne

12.3.2 The function lex-fv for the generation of verb forms

If $\begin{bmatrix}\text{verb: } \alpha \\ \text{arg: } \beta \text{ z} \\ \text{sem: pres}\end{bmatrix}$ $\begin{bmatrix}\text{noun: } \beta \\ \text{cat: nm}\end{bmatrix}$ match an activated VN sequence, then lex-fv [verb: α] = α'+s.

If α =	then α' =
dream	dream
sing	sing
sleep	sleep

12.3.3 The function lex-p for the generation of a full stop

If $\begin{bmatrix}\text{verb: } \alpha \\ \text{cat: decl} \\ \text{arg: } \beta\end{bmatrix}$ $\begin{bmatrix}\text{noun: } \beta \\ \text{verb: } \alpha\end{bmatrix}$ match an activated VN sequence, then lex-p [verb: α] = . (full stop).

12.4 Definition of LA-speak.1

12.4.1 Formal Definition of LA-speak.1

LX: proplet tokens in the activated sequence

$ST_S =_{def} \{([\text{verb: } \alpha]\ \{1\ \text{-NoP}\})\ \}$

-NoP {2 -FVERB}

$\begin{bmatrix}\text{noun: } \beta \\ \text{cat: nm} \\ \text{prn: i}\end{bmatrix}$ lex-n $[\text{noun: } \beta]$

-FVERB {3 -STOP}

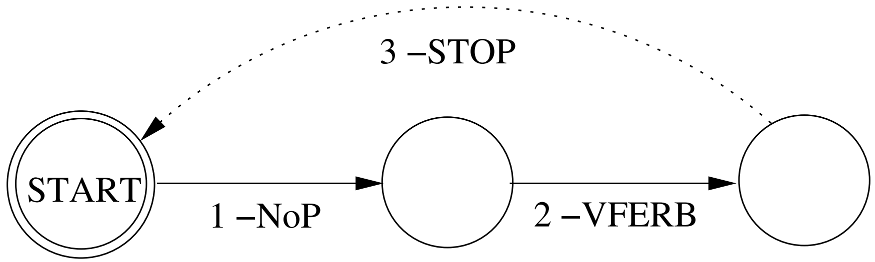
$\begin{bmatrix}\text{verb: } \alpha \\ \text{cat: decl} \\ \text{arg: } \beta \\ \text{prn: i}\end{bmatrix}$ lex-fv $[\text{verb: } \alpha]$

-STOP {1 -NoP}

$\begin{bmatrix}\text{verb: } \beta \\ \text{cat: decl} \\ \text{arg: } \alpha \\ \text{prn: i}\end{bmatrix}$ lex-p $[\text{verb: } \beta\ ]$ switch to LA-think.1

ST$_F =_{def} \{([\text{cat:decl}]\ \text{rp}_{-\text{STOP}})\}$

12.4.2 Finite State Transition Network of LA-speak.1



12.5 Producing a Sequence of Sentences

12.5.1 Realizing Julia of the first proposition

1 -NoP {2 -FVERB}

$$\begin{bmatrix}\text{noun: } \beta \\ \text{cat: nm} \\ \text{prn: i}\end{bmatrix} \qquad \text{lex-n } \begin{bmatrix}\text{noun: } \beta\end{bmatrix}$$

$$\begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{sleep} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: Julia} \\ \text{nc: 2 sing} \\ \text{pc:} \\ \text{prn: 1}\end{bmatrix} \begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: sleep} \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix} \Longrightarrow \begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{sleep} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: Julia} \\ \text{nc: 2 sing} \\ \text{pc:} \\ \text{prn: 1}\end{bmatrix} \begin{matrix}\text{sur:}\textbf{Julia} \Leftarrow ! \\ \begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: sleep} \\ \text{idy: 1} \\ \text{prn: 1}\end{bmatrix}\end{matrix}$$

12.5.2 Realizing sleeps of the first proposition

2 -FVERB {3 -STOP}

$$\begin{bmatrix} \text{verb: } \alpha \\ \text{arg: } \beta \\ \text{cat: decl} \\ \text{prn: i} \end{bmatrix} \qquad \text{lex-fv} \begin{bmatrix} \text{verb: } \alpha \end{bmatrix}$$

$$\begin{bmatrix} \text{sur:} \\ \text{verb: } \textit{sleep} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: Julia} \\ \text{nc: 2 sing} \\ \text{pc:} \\ \text{prn: 1} \end{bmatrix} \begin{bmatrix} \text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: sleep} \\ \text{idy: 1} \\ \text{prn: 1} \end{bmatrix} \Longrightarrow \overset{\text{sur: }\textbf{sleeps} \Leftarrow !}{\begin{bmatrix} \text{sur:} \\ \text{verb: } \textit{sleep} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: Julia} \\ \text{nc: 2 sing} \\ \text{pc:} \\ \text{prn: 1} \end{bmatrix}} \begin{bmatrix} \text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: sleep} \\ \text{idy: 1} \\ \text{prn: 1} \end{bmatrix}$$

12.5.3 Realizing the punctuation sign of the first proposition

3 -STOP {1-NoP}

$$\begin{bmatrix} \text{verb: } \alpha \\ \text{cat: decl} \\ \text{arg: } \beta \\ \text{prn: i} \end{bmatrix} \qquad \begin{array}{l} \text{lex-p } [\text{verb: } \alpha] \\ \text{switch to LA-think.1} \end{array}$$

$$\begin{bmatrix} \text{sur:} \\ \text{verb: } \textit{sleep} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: Julia} \\ \text{nc: 2 sing} \\ \text{pc:} \\ \text{prn: 1} \end{bmatrix} \begin{bmatrix} \text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: sleep} \\ \text{idy: 1} \\ \text{prn: 1} \end{bmatrix} \Longrightarrow \begin{array}{l} \text{sur: . } \Leftarrow ! \\ \begin{bmatrix} \text{sur:} \\ \text{verb: } \textit{sleep} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: Julia} \\ \text{nc: 2 sing} \\ \text{pc:} \\ \text{prn: 1} \end{bmatrix} \end{array} \begin{bmatrix} \text{sur:} \\ \text{noun: } \textit{Julia} \\ \text{cat: nm} \\ \text{sem: f} \\ \text{mdr:} \\ \text{fnc: sleep} \\ \text{idy: 1} \\ \text{prn: 1} \end{bmatrix}$$

12.5.4 Realizing John of the second proposition

1 -NoP {2 -FVERB}

$$
\begin{bmatrix}\text{noun: } \beta \\ \text{cat: nm} \\ \text{prn: i}\end{bmatrix}
\qquad\qquad \text{lex-n } \begin{bmatrix}\text{noun: } \beta\end{bmatrix}
$$

$$
\begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{sing} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: John} \\ \text{nc: 3 dream} \\ \text{pc: 1 sleep} \\ \text{prn: 2}\end{bmatrix}
\begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{John} \\ \text{cat: nm} \\ \text{sem: m} \\ \text{mdr:} \\ \text{fnc: sing} \\ \text{idy: 2} \\ \text{prn: 2}\end{bmatrix}
\Longrightarrow
\begin{bmatrix}\text{sur:} \\ \text{verb: } \textit{sing} \\ \text{cat: decl} \\ \text{sem: pres} \\ \text{mdr:} \\ \text{arg: John} \\ \text{nc: 3 dream} \\ \text{pc: 1 sleep} \\ \text{prn: 2}\end{bmatrix}
\begin{array}{l}\text{sur: } \textbf{John} \Leftarrow ! \\ \begin{bmatrix}\text{sur:} \\ \text{noun: } \textit{John} \\ \text{cat: nm} \\ \text{sem: m} \\ \text{mdr:} \\ \text{fnc: sing} \\ \text{idy: 2} \\ \text{prn: 2}\end{bmatrix}\end{array}
$$

12.6 Summarizing the DBS.1 System

1. **Word form recognition** (Sections 11.1 and 11.2)
   takes unanalyzed surfaces of natural language as input, and produces corresponding analyzed lexical entries (types, isolated proplets) as output. For simplicity, it is based here on a lookup from a full-form lexicon.
2. **LA-hear.1** (Sections 11.3 and 11.4)
   takes the output of automatic word form recognition as input, and produces sets of connected proplets serving as the input sign's semantic representation.
3. **Word Bank** (Section 11.6)
   takes the output of LA-hear.1 as input, and stores it automatically by using the core values of the proplets as the key.
4. **LA-think.1** (Section 12.1)
   takes the proplets of the Word Bank as input, navigates autonomously through the content of the Word Bank, and activates the proplets traversed.
5. **LA-speak.1** (Section 12.3)
   matches the proplets activated by LA-think.1, and produces unanalyzed surfaces of natural language with the help of
6. **Word form production** (Section 12.3)
   which takes proplets as input and renders suitable surfaces as output. For simplicity it is based here on full-form patterns and lexicalization tables.