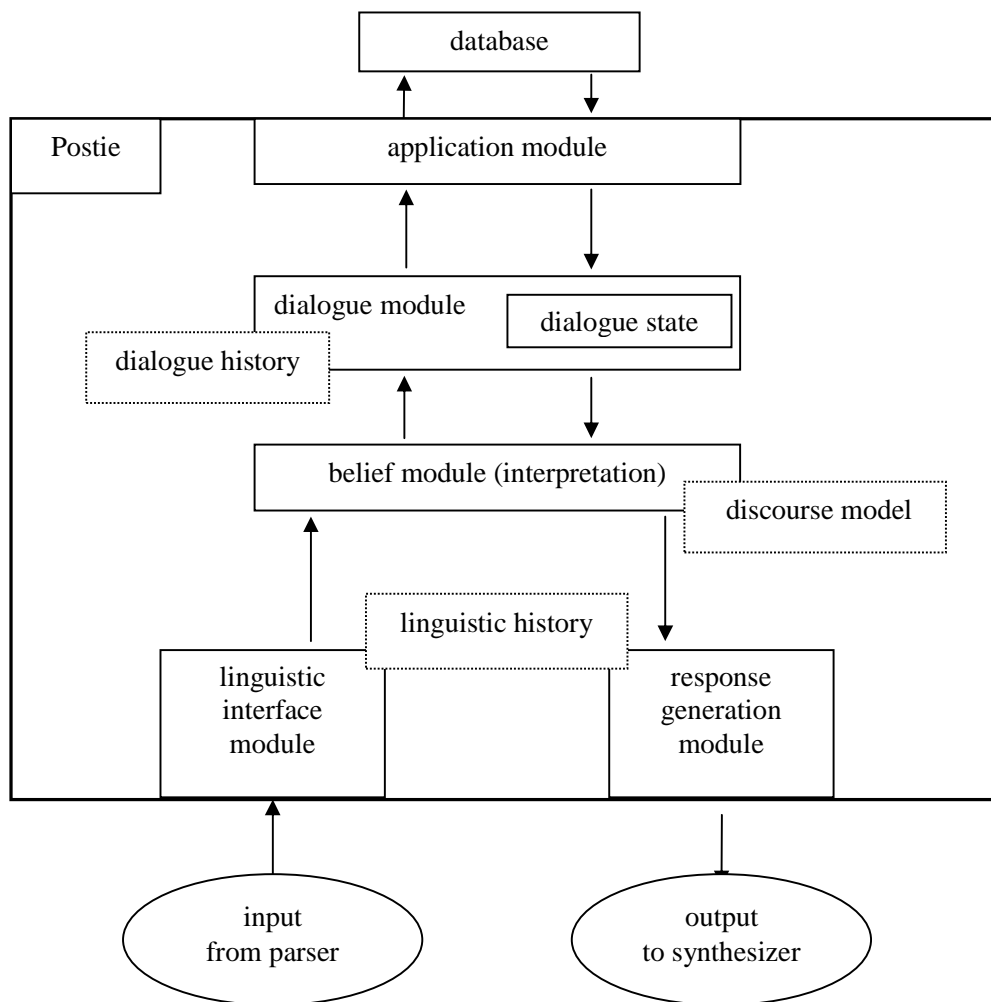


Functional structure of the dialog system

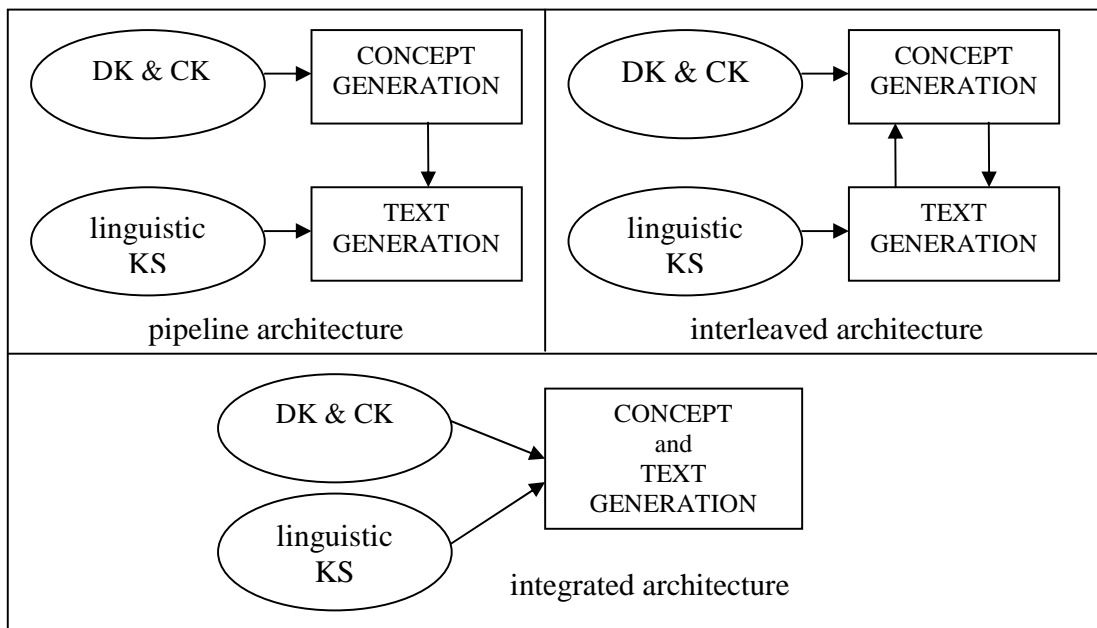


Dialogue manager architecture

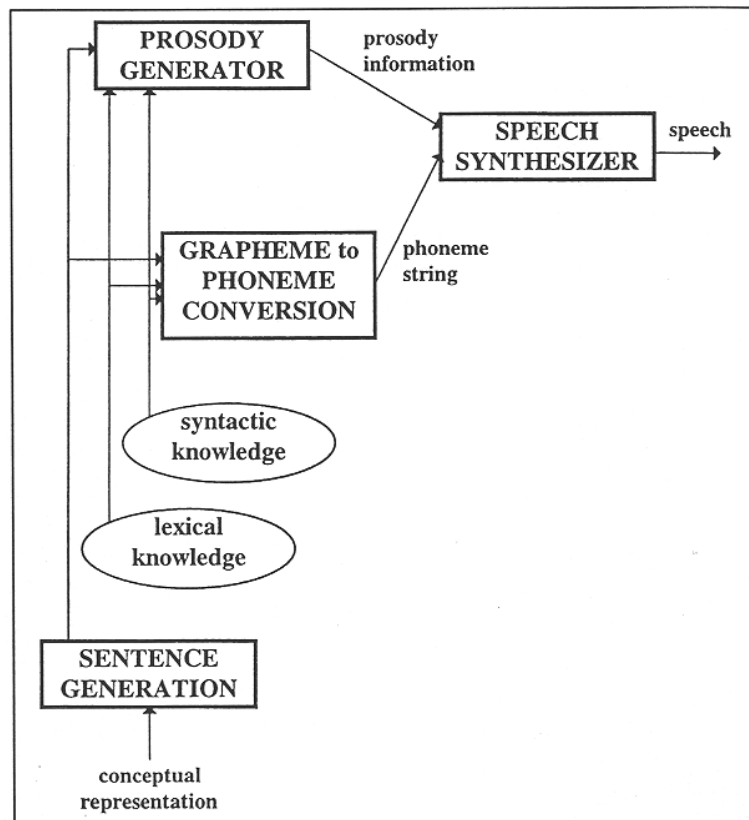
Utterance: Not London, Luton.

$$\left\langle \begin{bmatrix} id : A \\ type : location \\ thecity : \begin{bmatrix} id : B \\ type : city \\ value : london \end{bmatrix} \\ mode : \begin{bmatrix} number : sg \\ pol : neg \end{bmatrix} \end{bmatrix} \right\rangle$$

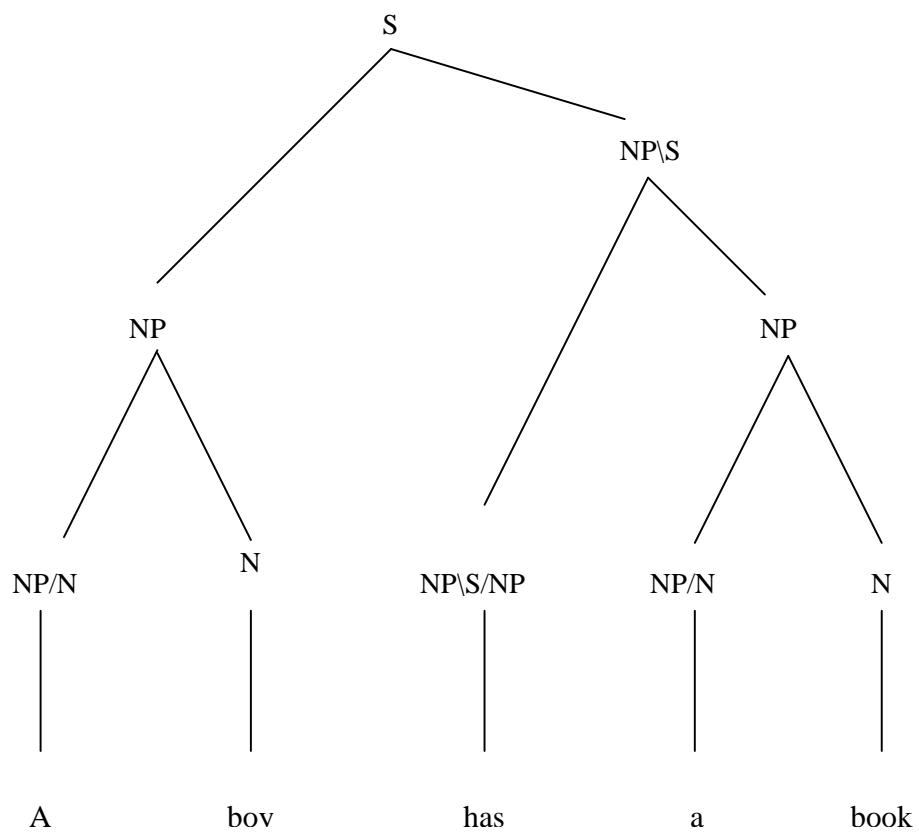
$$\left\langle \begin{bmatrix} type : dbflight \\ sourcecity : london \end{bmatrix} \right\rangle$$



Language generation architectures



Use of prosody for response generation



Immediate constituent tree with CG categories

Sign (feature structure):

a) sign

$$\begin{bmatrix} ORTH : orth \\ CAT : cat \\ SEM : sem \end{bmatrix}$$

b) cat attribute

$$\begin{bmatrix} CAT - TYPE : cat - type \\ M - FEATS : m - feats \end{bmatrix}$$

c) complex category

$$\begin{bmatrix} RES : cat \\ DIR : dir \\ ACT : sign \end{bmatrix}$$

d) example

$$\begin{bmatrix} ORTH : \langle love \rangle \\ CAT : \begin{bmatrix} RES : \begin{bmatrix} RES : sent \\ ACT : \begin{bmatrix} np - sign \\ CAT : nom \end{bmatrix} \end{bmatrix} \\ ACT : \begin{bmatrix} np - sign \\ CAT : np[acc] \end{bmatrix} \end{bmatrix} \\ SEM : a formula based on predicates \end{bmatrix}$$

Unification

$$\begin{bmatrix} CAT : NP \\ AGREEMENT : [CASE : NOM] \end{bmatrix}$$
$$\begin{bmatrix} CAT : NP \\ AGREEMENT : [NUMBER : PL] \end{bmatrix}$$

$$\begin{bmatrix} CAT : NP \\ AGREEMENT : \begin{bmatrix} CASE : NOM \\ NUMBER : PL \end{bmatrix} \end{bmatrix}$$

Allen a Perrault

$\text{INFORM}(i, j, \Phi)$

$\text{PRE} : \text{know}_i \Phi \wedge \text{want}_i (\text{INFORM}(i, j, \Phi))$

$\text{EF} : \text{know}_j \Phi$

$\text{BD} : \text{bel}_j \text{want}_i \text{know}_j \Phi$

plan:

<YNANSWER, NOT(Country(Departureplace(ac871)) = canada)>

<WHANSWER, Country(Departureplace(ac871)) = france>

<WHANSWER, Departureplace(ac871) = paris>

rule:

COMEFROM $\lambda x : \text{Departure}(\text{elem}_1(x)) = \text{elem}_2(x)$

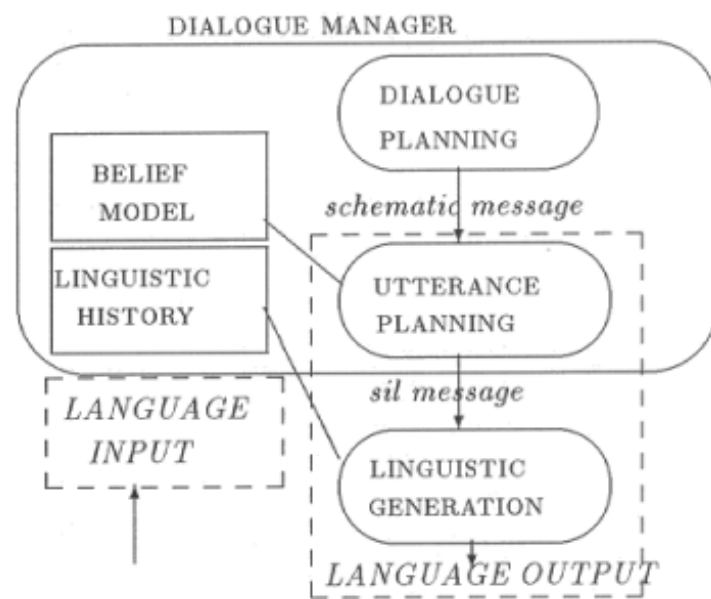
$\lambda x : \text{Country}(\text{Departure}(\text{elem}_1(x))) = \text{elem}_2(x)$

Country(Departureplace(ac871)) = canada

COMEFROM(<AC871, CANADA>)

(COMEFROM(<AC871, CANADA>), [mood: declar, concord: neg])

“AC871 does not come from CANADA”



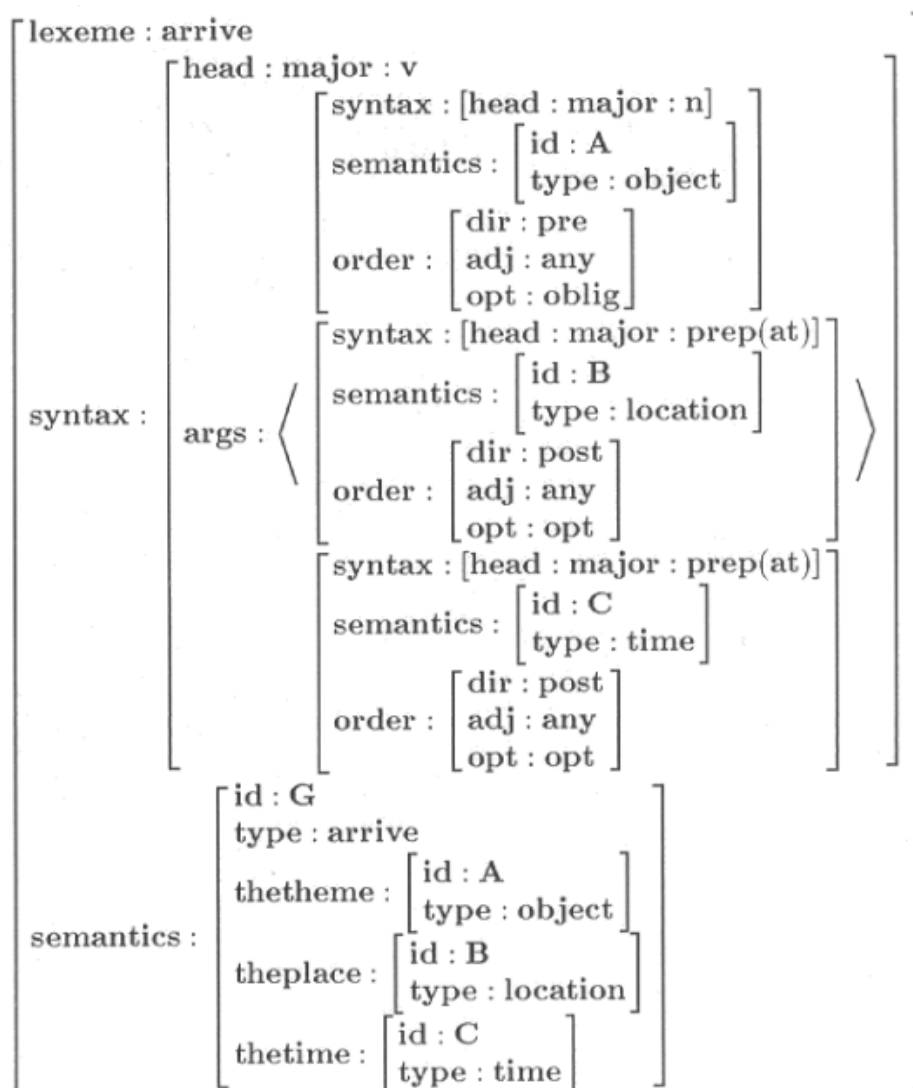
SUNDIAL utterance generation

Utterance:

You want to travel from London to Paris. What date do you want to travel on?

$$\left[\begin{array}{l} \text{id : ufo4} \\ \text{card : 2} \\ \text{ufo_1 : } \left[\begin{array}{l} \text{id : ufo5} \\ \text{dialogue : } [\text{dact : confirm}] \\ \text{semantics : } \left[\begin{array}{l} \text{id : dbflight1} \\ \text{goalcity : paris} \\ \text{sourcecity : london} \end{array} \right] \end{array} \right] \\ \text{ufo_2 : } \left[\begin{array}{l} \text{id : ufo6} \\ \text{dialogue : } [\text{dact : open_request}] \\ \text{semantics : } \left[\begin{array}{l} \text{id : dbflight1} \\ \text{date : -} \end{array} \right] \end{array} \right] \end{array} \right]$$

Lexeme arrive in UCG



DATR:

VERB:

<syn cat> == verb

<syn type> == main

Travel:

<> == VERB

<mor root> == travel

Word1:

<> == Travel

<syn form> == present participle

<mor form> == <mor root> ing.

Word2

<> == Travel

<syn form> == passive participle

<mor form> == <mor root> ed

Raisers

a)

$$\left[\begin{array}{l} \text{id : go1} \\ \text{type : go} \\ \text{thesource : } \left[\begin{array}{l} \text{id : location2} \\ \text{type : location} \\ \text{thecity : } \left[\begin{array}{l} \text{id : city2} \\ \text{type : city} \\ \text{value : london} \end{array} \right] \end{array} \right] \end{array} \right]$$

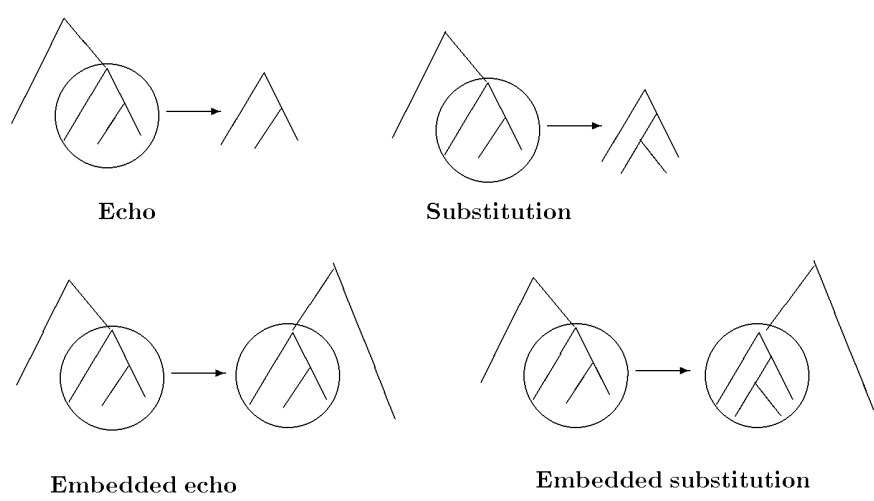
travellondon : v : GO →
travel : v : GO
london : n : LOCATION →

b)

$$\left[\begin{array}{l} \text{syntax : } \left[\begin{array}{l} \text{head : [major : prep(from)]} \\ \text{args : } \left\langle \left[\begin{array}{l} \text{syntax : } \left[\begin{array}{l} \text{head : [major : n]} \\ \text{args : []} \end{array} \right] \right\rangle \right] \end{array} \right] \\ \text{semantics : C} \end{array} \right]$$

travelfromlondon : v : GO →
travel : v : GO
fromlondon : prep : LOCATION →
from : prep : LOCATION
london: n : LOCATION →

Recycling



Some features for Czech

Feature	Domain	Meaning
Aux	{plus, minus}	modals, auxiliaries
Case	{nom, gen, dat, acc, voc, loc, instr}	nominative, genitive, dative, accusative, vocative, locative, instrumental
Gen	{masc, fem, ntr}	gender: masculine, feminine, neutral
Num	(sg, pl)	number: singular, plural
Pers	(1, 2, 3)	person
Inf	Set of verbs	infinitive of verb