

INTRODUCTION

An approach to build a named entities recognition system:

- efficient on speech
- robust to noise
- with tree structured outputs

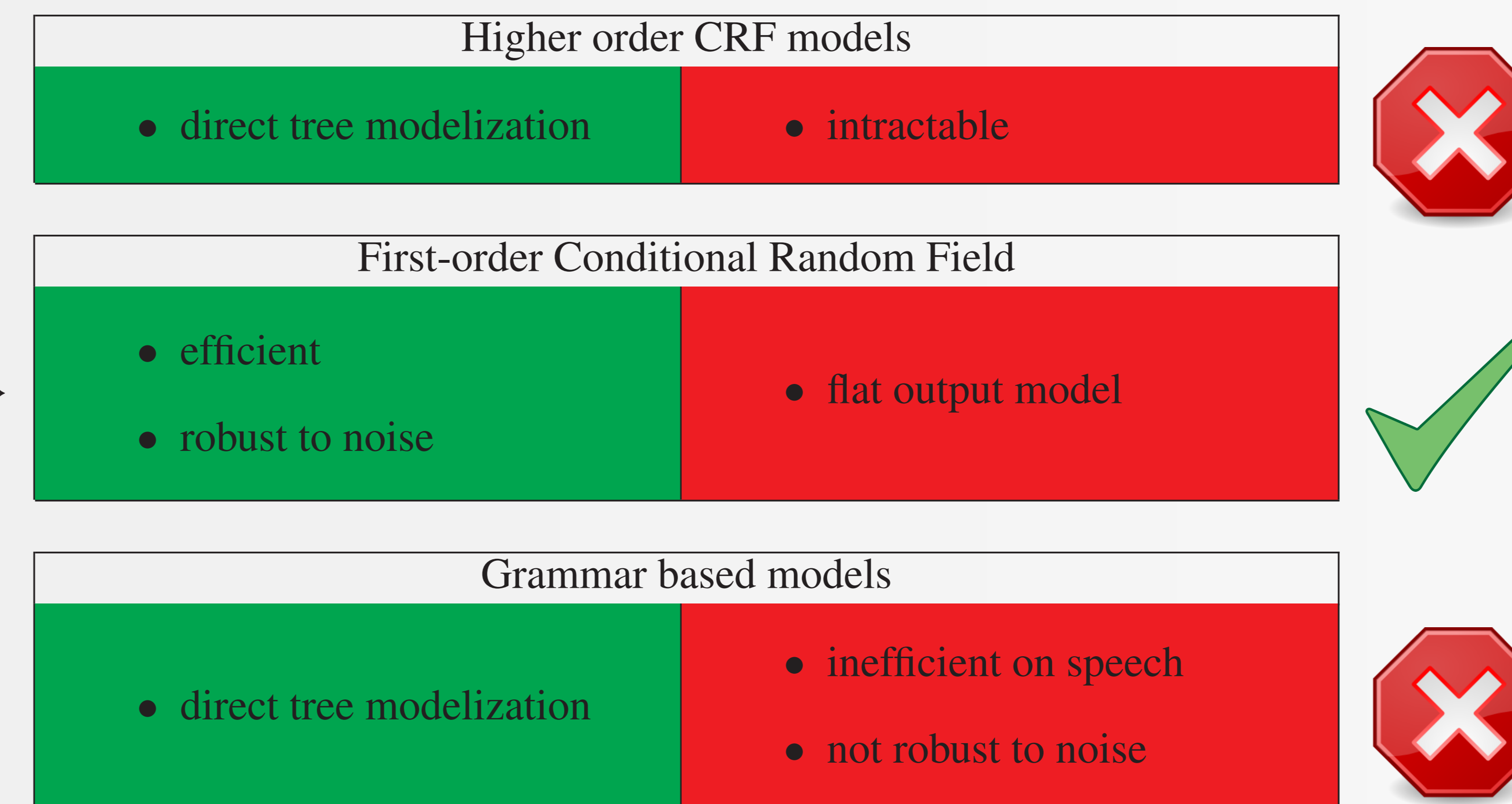
Main idea: *avoid cascade approach*

This system win the 2012 ETAPE NE evaluation campaign

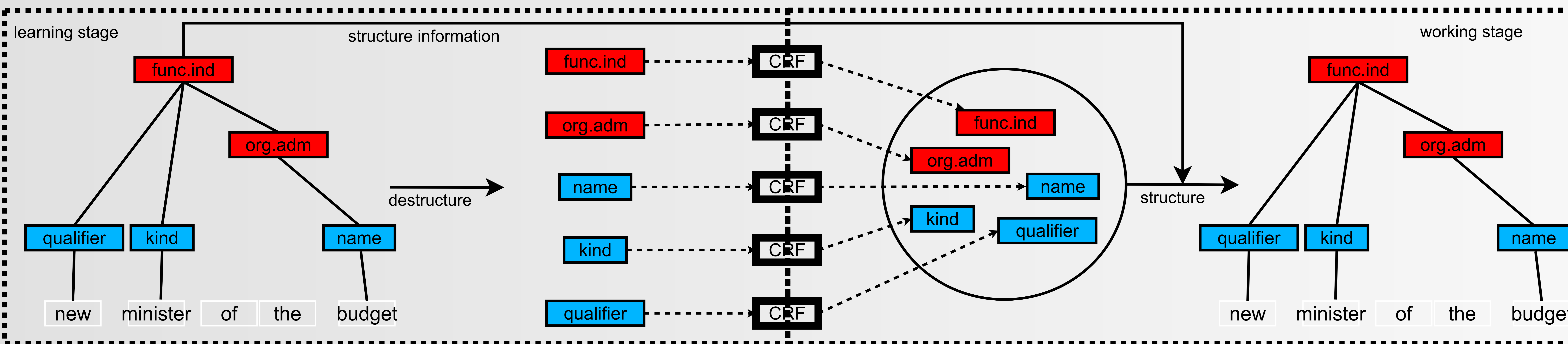
- make node hypothesis with standard CRF
- retrieve the tree-structure from nodes

PROBLEM AND SOLUTION PROPOSED

Problem	
input: speech transcriptions	output: tree structured NE
• spontaneous speech	• sequence
• WER [20, 40]% in average	• tree structure



GLOBAL STRATEGY



STEP 1: DE-STRUCTURING

1. forget structure
2. consider tree nodes independent
3. learn each of them separately

• avoid cascade processes and the impact of errors	• loose node dependencies information during node hypothetization
• binary problems: fast to train	

STEP 2: LEARN NODES: A BINARY CRF PER NODE

Exemple with "<loc.adm.town>-B" CRF:

label:	O	O	O	loc.adm.town-B	O	O	O
class:	ici	FIRSTNAME	<unk>	CITY	NPSIG	numéro	un
word:	ici	jacques	doutisoro	lomé	africa	numéro	un
position:	-3	-2	-1	0	+1	+2	+3

Extract word + robust multilevel 3grams in [-2, +2]:

1. *a priori* knowledge (cities, countries, etc.)
2. or the word itself, if W has a high Mutual Information with label
3. otherwise Part-Of-Speech

STEP 3: STRUCTURING

$CRF_{qualifier}$:	O	0	O	O	O
$CRF_{pers.ind}$:	O	pers.ind-B	pers.ind-I	O	O
$CRF_{name.last}$:	O	O	name.last-B	O	O
⋮					
CRF_x :
⋮					
$CRF_{name.first}$:	O	name.first-B	O	O	O
$CRF_{loc.adm.town}$:	O	O	O	loc.adm.town-B	O
words:	ici	jacques	doutisoro	lomé	africa
ouput:	ici	<p><n>	jacques	<n>	<n>
			doutisoro	<n>	<p>
				<l>	lomé
				</l>	
					africa

CONCLUSION

I proposed a NER recognition system:

- able to deal with tree-structured output → **3% absolute improvement vs. second best system on manual transcription**
- robust to process automatic transcriptions → **up to 12% on automatic transcriptions**

TO BE ROBUST TO NOISE ⇒

AVOID CASCADE APPROACHES

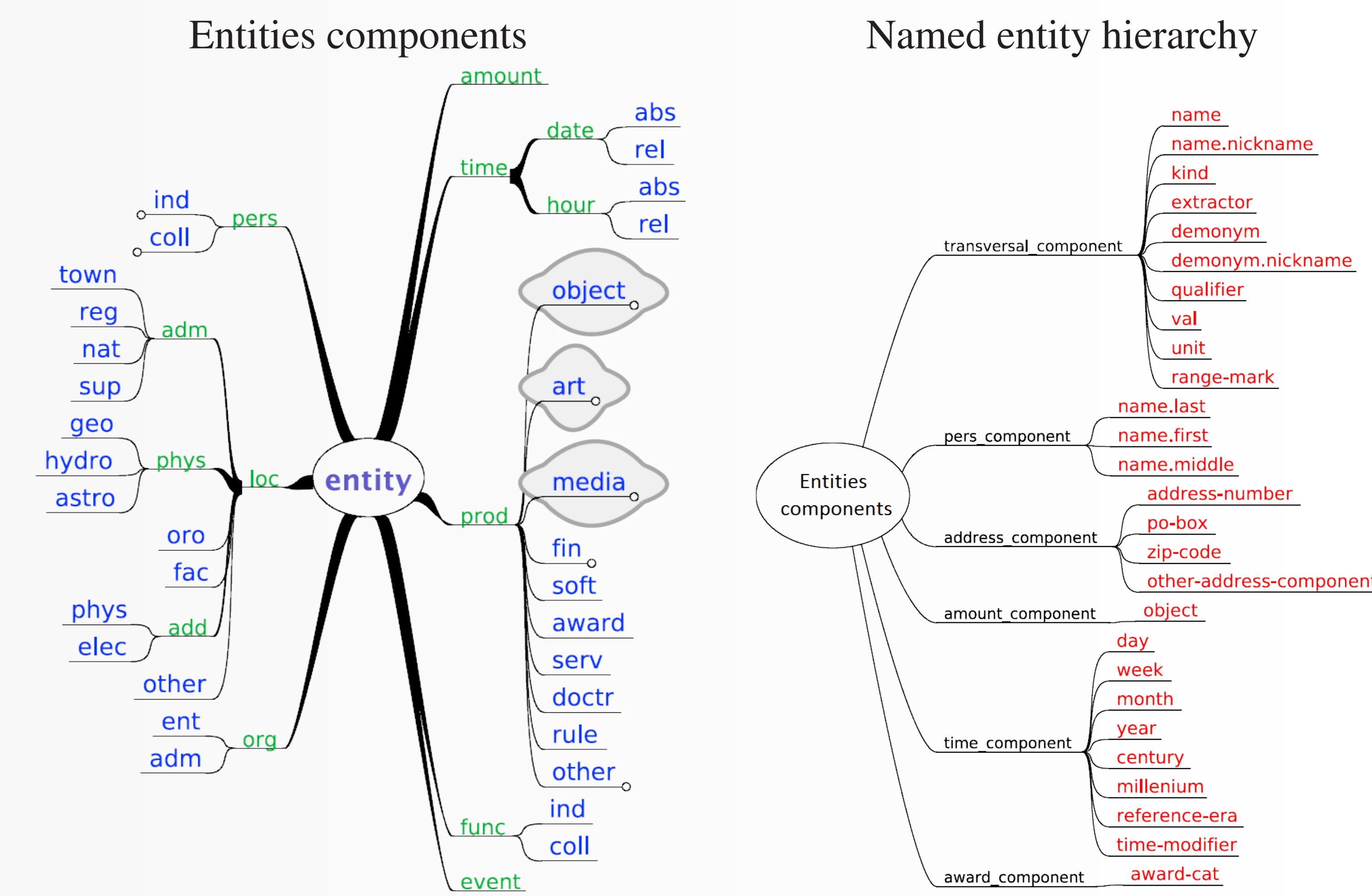
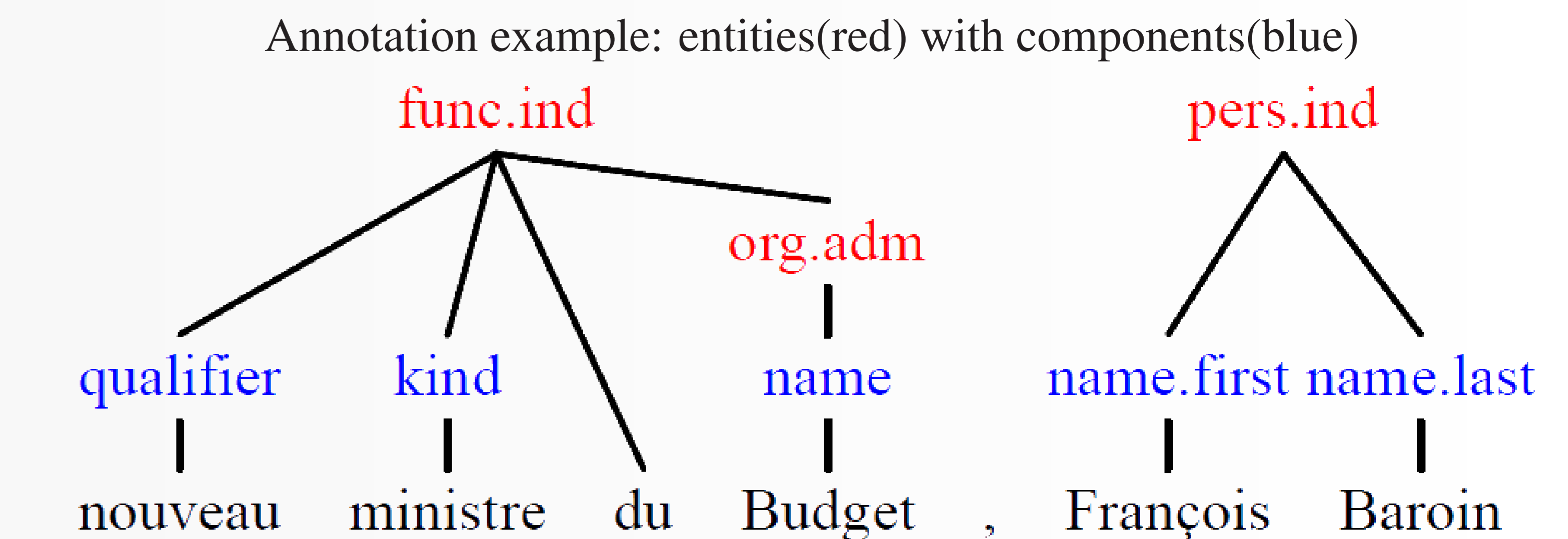
REFERENCES

[1] Sophie Rosset, Cyril Grouin, and Pierre Zweigenbaum. *Entités nommées structurées : guide d'annotation Quaero*, 2011.

ETAPE DATA

ETAPE data is composed of transcription with NE annotation:

1. 42h of TV shows
2. 250h of radio
3. NEs have tree structure (compositional+hiarchical) [1]



4 BEST ETAPE SYSTEMS

sys1 bottom-up cascade approach:

1. CRF for labelling the components
2. PCFG for semantic tree reconstruction

sys2 top-down cascade approach:

1. 2 CRF for labelling the entities (one for each tree level)
2. local boosting classifier to retrieve components knowing the entities

sys3 rule-based system with knowledge sources

sys4 use a data mining approach to extract NE annotation rules

ETAPE NE CAMPAIGN RESULTS IN SER

sys	Manual Trans.	Automatic transcriptions with WER of				
		23%	24%	25%	30%	Rover
sys0	33.81	58.35	63.40	62.53	52.71	55.51
sys1	36.44	68.57	67.73	75.02	60.44	67.16
sys2	43.58	74.55	71.93	85.60	69.24	69.54
sys3	42.89	74.93	70.77	86.10	66.23	68.65
sys4	41.01	71.01	66.89	90.32	65.37	65.97
sys5	55.63	107.71	82.67	142.96	97.19	94.24
sys6	62.76	80.84	77.97	82.71	76.63	76.45
sys7	84.78	101.45	95.03	100.72	97.28	98.82

EVALUATION

The system has participated to the ETAPE NE evaluation campaign

- 8 participants
- evaluated in Slot Error Rate (~Word Error Rate) → the lower is the better
- on manual transcriptions
- + 4 automatic transcriptions with different WER
- + a rover combination of them

