PASSAGE:

From French Parser Evaluation to Large Sized Treebanks

http://atoll.inria.fr/passage

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From EASy to Passage

EASy (2003–2006)
French Technolangue program
First French parsing evaluation campaign
15 parsers

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PASSAGE (2007–2009)
French ANR MDCA
Evaluation & much more
Dynamic Treebank

Benefits from **EASy** :

- Existence of several parsers for French
- These parsers are able to produce EASy annotations

Entering a virtuous loop between tools and resources

Corpus
brut
100Mwords

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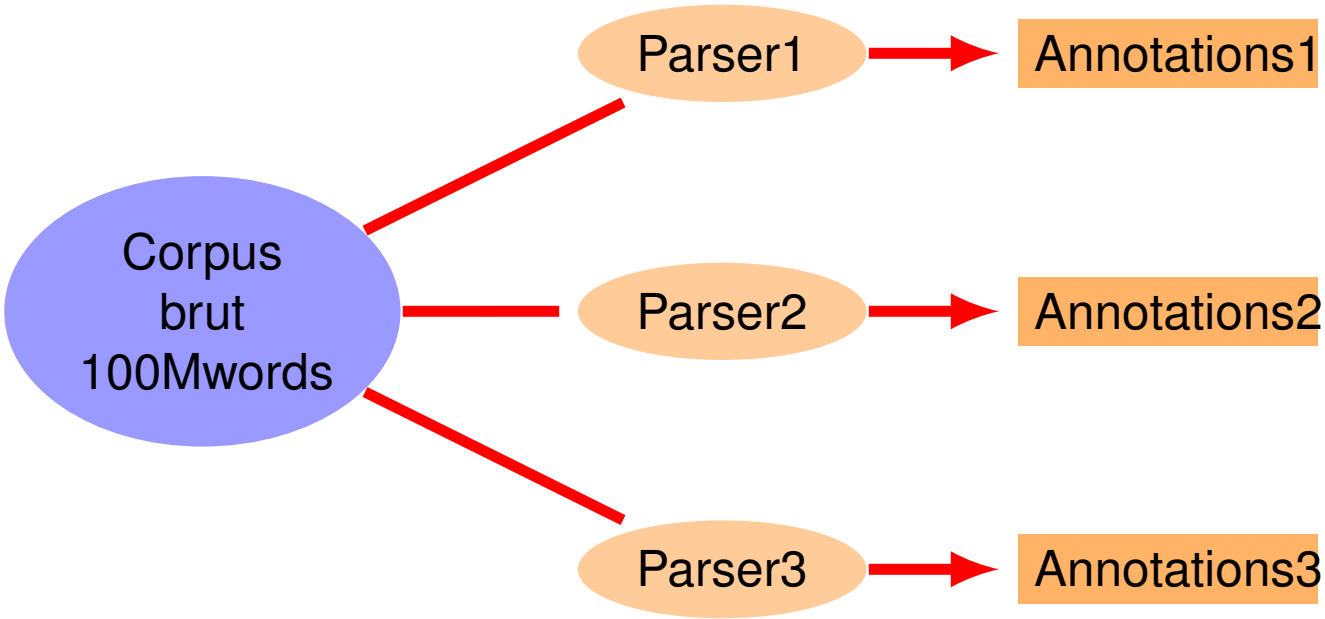

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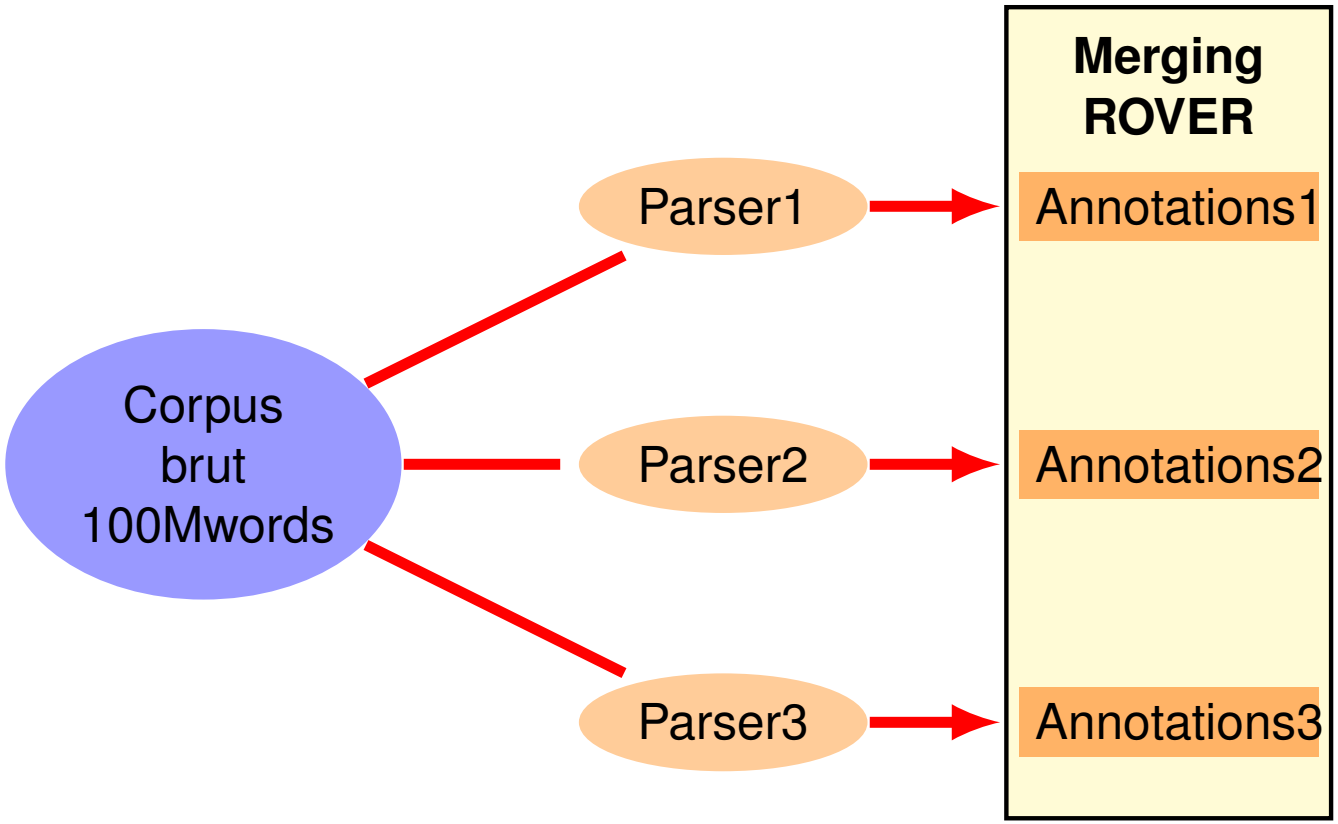

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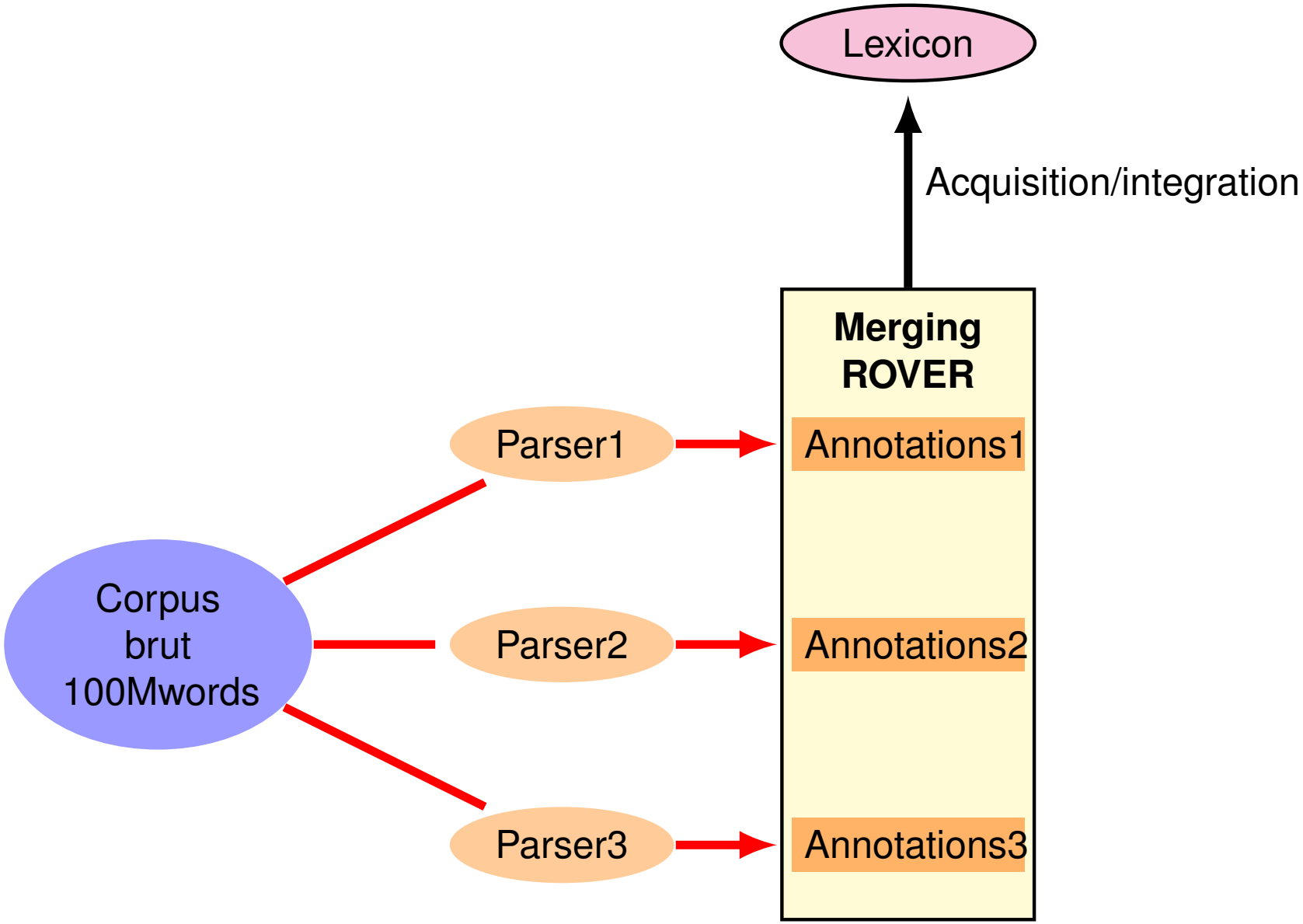

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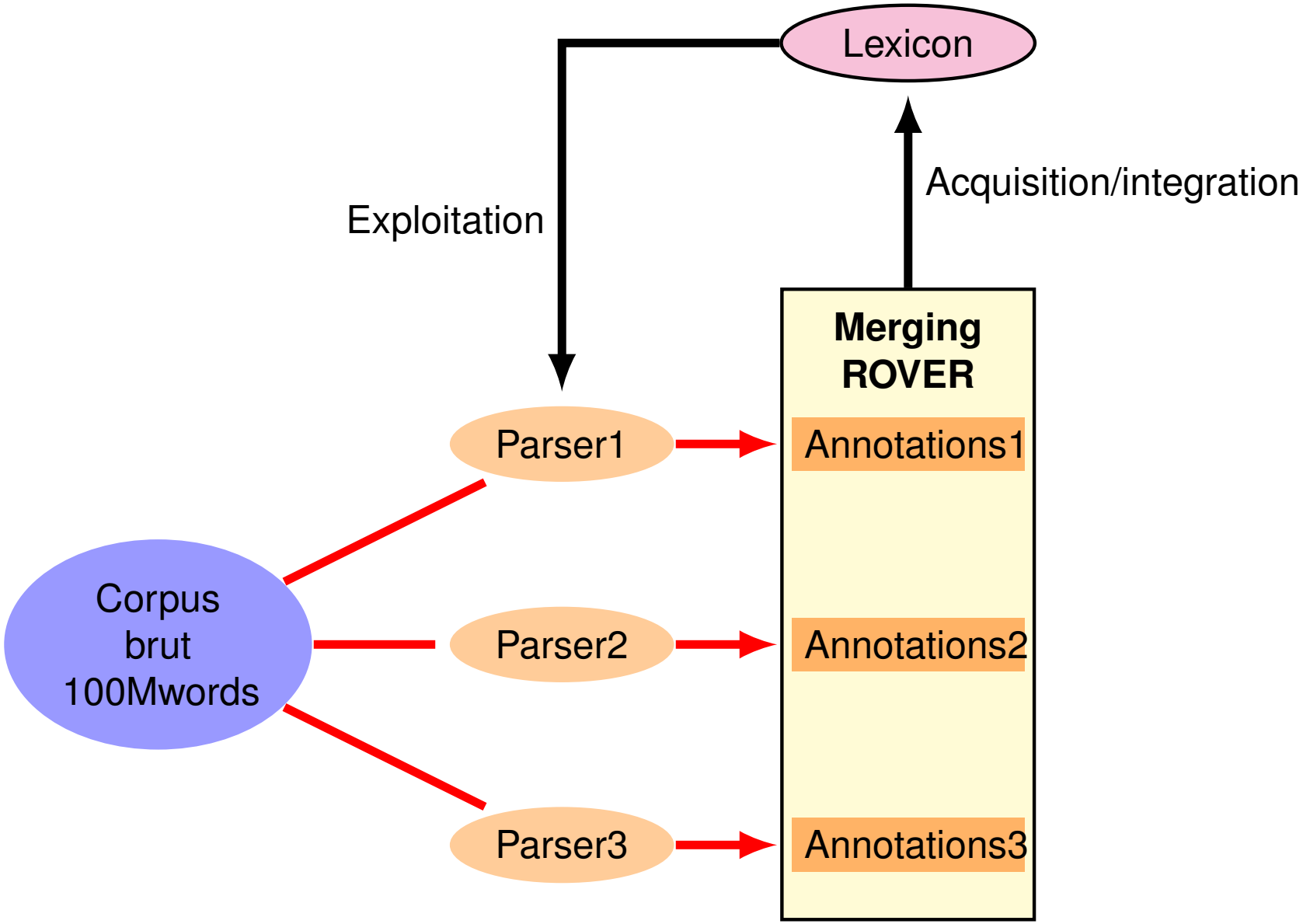

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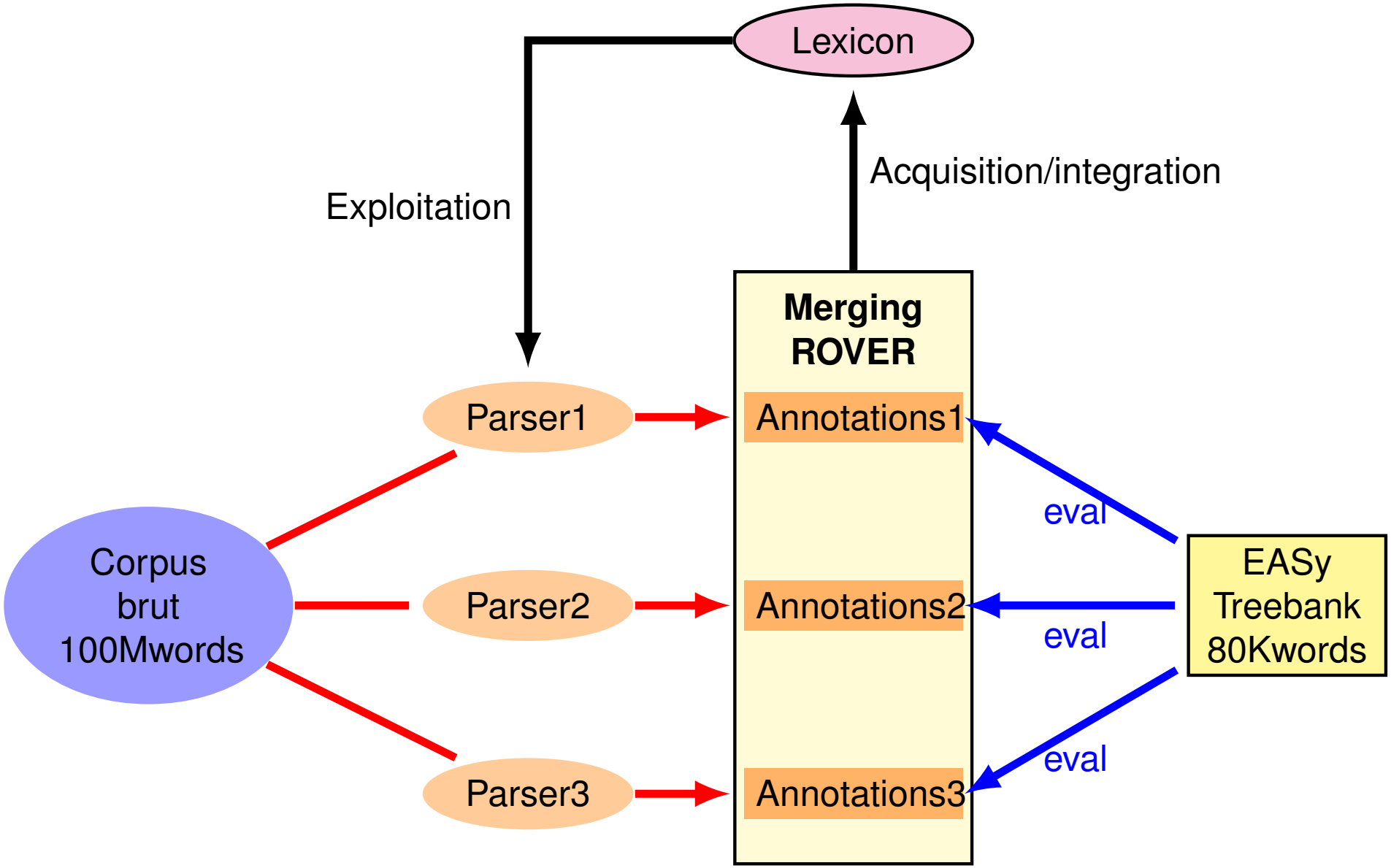

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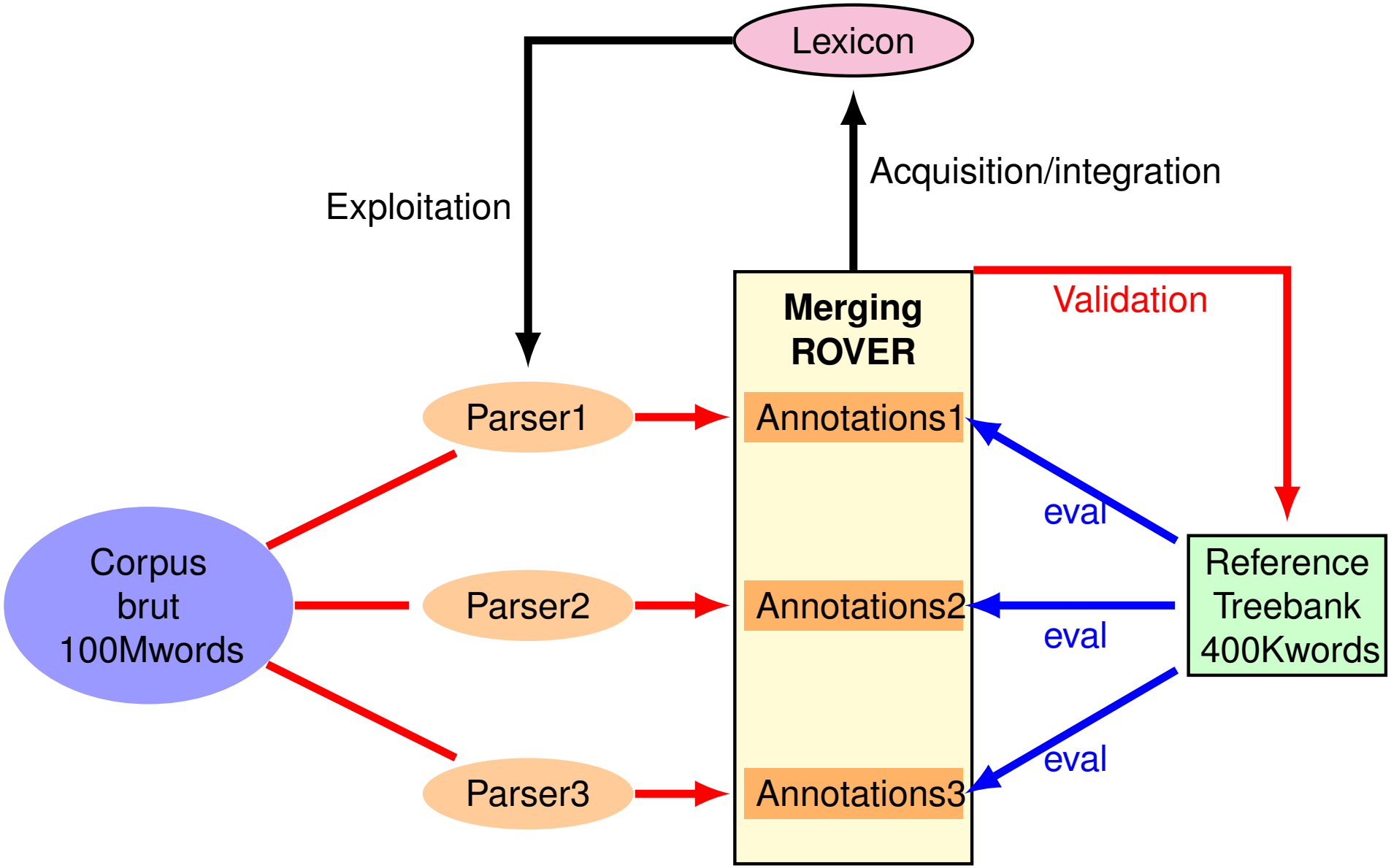

Consortium

ALPAGE
INRIA Paris7

TALARIS/LORIA

LIC2M/CEA-LIST

LIR/LIMSI

Consortium

ELDA

TAGMATICA

Tagmatica

ALPAGE
INRIA Paris7

LPL

TALARIS/LORIA

LIC2M/CEA-LIST

SYNAPSE

LIR/LIMSI

XRCE

LIRMM

10 parsers cooperating

An unique opportunity, source of diversity (formalisms, technologies, . . .)

Parsers	From	Nature
FRMG	INRIA	TIG/TAG+DyALog
SxLFG	INRIA	LFG+Syntax
LLP2	LORIA	TAG
LIMA	CEA-LIST	Rule system
TagParser	TAGMATICA	Induction + rules
GP1 & GP2	LPL	Property grammars
Cordial	SYNAPSE	Rule-based
SYGMART	LIRMM	
XIP	XRCE	Rule-based cascade

Exploiting large corpora

Treebanks are very valuable for NLP but rare and costly to develop.

On the other hand, easy to access large amount of electronic French documents :

Corpus	Size	Type
EASy Corpus	1Mwords	multi-styles
Wikipedia Fr	$\sim$ 86Mwords	collaborative encyclopedia
Wikisources	$\sim$ 80Mwords	free literacy
Monde Diplomatique	18Mwords	journalistic
FRANTEXT	20Mwords	free literacy
Europarl	28Mwords	European Parliament debates
JRC-Acquis	39Mwords	European Law
Corpus Ester	1Mwords	Speech transcription
Total (current)	$>$ **270 Mmots**	

EASy annotations

Based on 6 kinds of chunks and 14 kinds of dependencies

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Type	Explanation
GN	Nominal Chunk
NV	Verbal Kernel
GA	Adjectival Chunk
GR	Adverbial Chunk
GP	Prepositional Chunk
PV	Prep. Verbal Kernel

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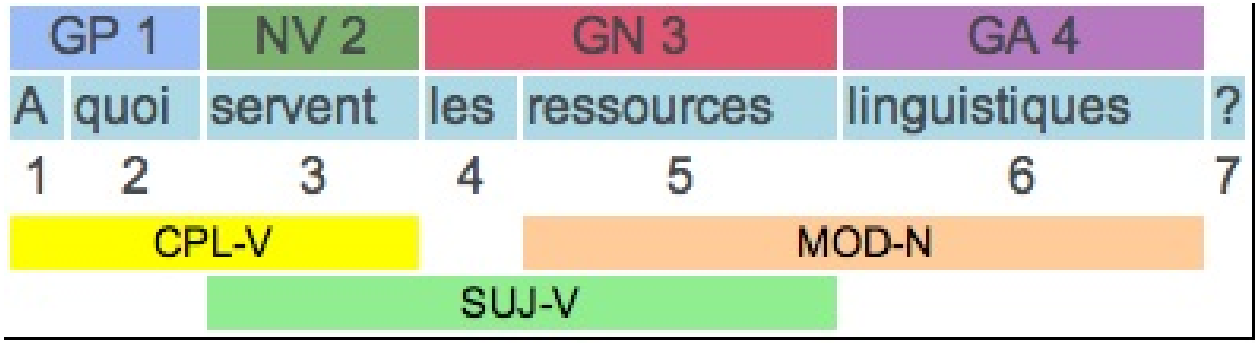
Type	Anchors	Explanation
SUJ-V	suject,verb	Subject-verb dep.
AUX-V	auxiliary, verb	Aux-verb dep.
COD-V	object, verb	direct objects
CPL-V	complement, verb	other verb complements
MOD-V	modifier, verb	verb modifiers
COMP	complementizer, verb	subordinate sentences
ATB-SO	attribute, verb	verb attribute
MOD-N	modifier, noun	noun modifier
MOD-A	mod., adjective	adjective modifier
MOD-R	mod., adverb	adverb modifier
MOD-P	mod., prep.	prep. modifier
COORD	coord., left, right	coordination
APPOS	first, second	apposition
JUXT	first, second	juxtaposition

EASy annotations (cont'd)



Evaluating the parsers

Expertise of **EASy** :

- **[EASy]** End of 2004 (1week)
  Best results (f-measure) : Chunks $>$ 80% Dependencies $>$ 50%

- **[Passage1]** Fall 2007 (2months, closed on Dec. 21st 2007)
  Best results (f-measure) : Chunks $>$ 90% Dependencies $>$ 60%
  - Objective : calibrate the ROVER

- **[Passage2]** End of 2009
  - To be done on new data (from the reference treebank)
  - Objective : To assess the evolutions of the parsers

Data sets

EASy corpus (1Mw)
40K tokenized sentences

journalistic, literacy,
oral, mail, medical, ...

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easytest
400 new annotated sentences

passagedev (900Kw)
un-tokenized text

wikipedia
wikinews
wikibooks
europarl
jrc-acquis
ester
lemonde

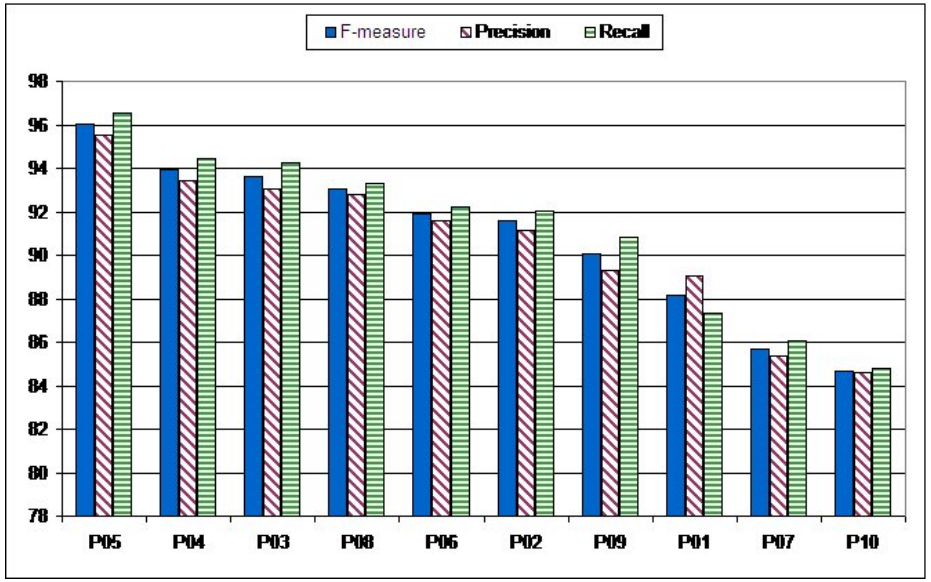
WEB-based evaluation server

- Use of a WEB-based evaluation server
  - Centralized information/data
  - Allow multiple evaluations
  - Instant feedback for participants
    precision, recall, f-measure, plots, logs, ...

- Procedure :
  - Server opened for 2 months
  - Participants upload their outputs
  - Each output submitted is evaluated automatically on the **easydev** data set
    $\Longrightarrow$ immediate feedback
  - Results are kept on the server (max. of ten kept)
  - Before the end, each participant selects a primary submission
  - After the closing, access on the server to the results for the primary submission on the **easytest** data set.

- Conclusion : a very positive initiative
  - Participant P5 submitted more than 50 runs, improving f-measure on chunks from 92.5% to 96% in a few weeks
  - $\Longrightarrow$ the server has been re-opened for new submissions

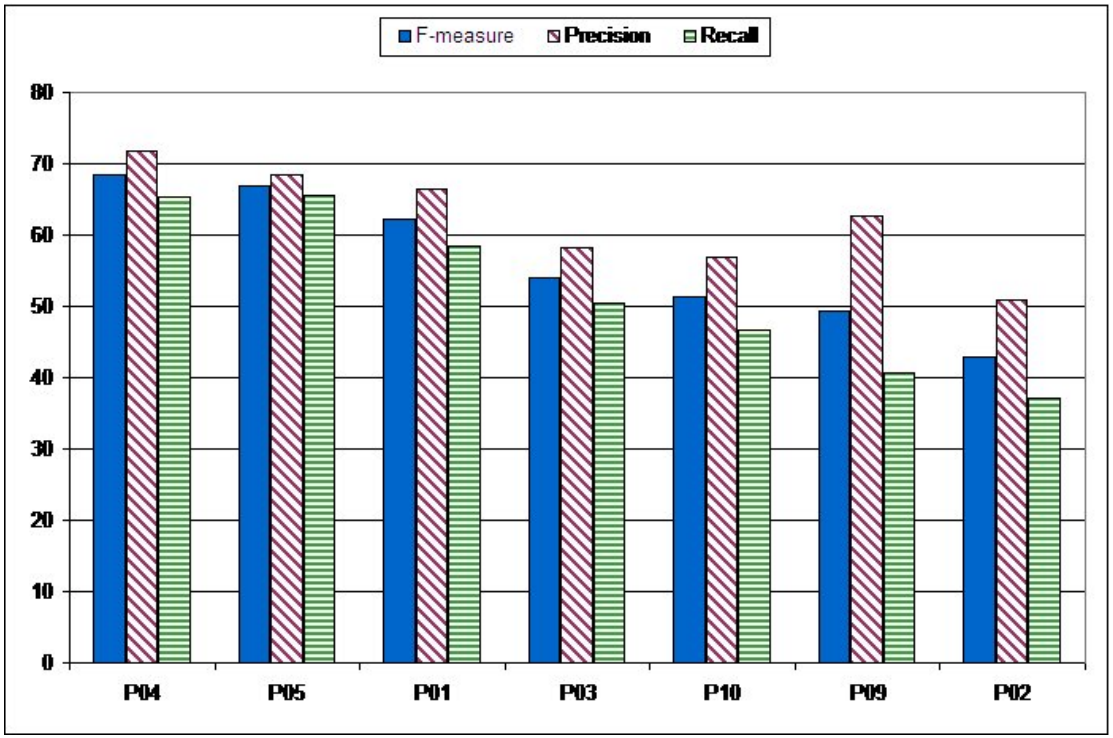
Results on Chunks and Relations (on Test data)



Chunks

- 10 systems
- F-measure :

f	#sys
> 90%	7
> 80%	3

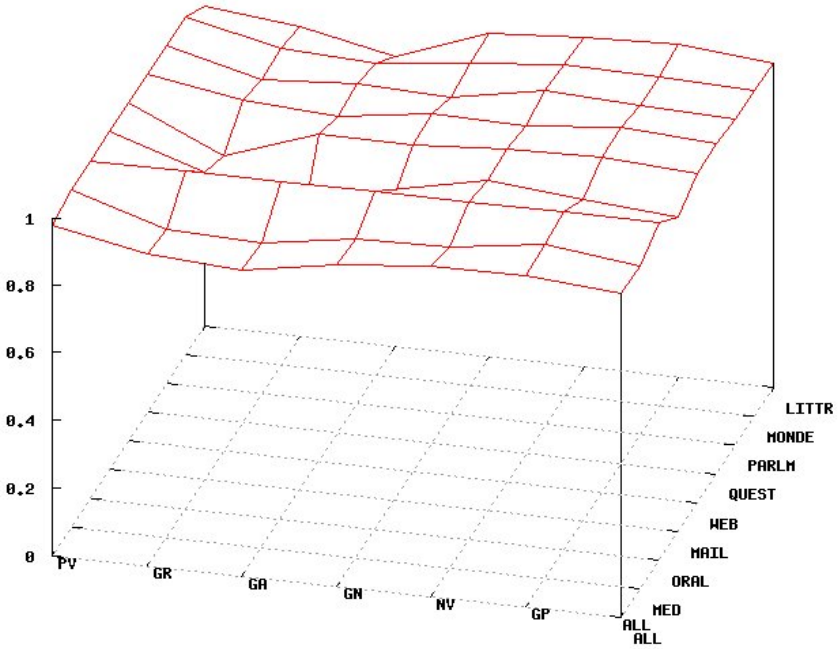


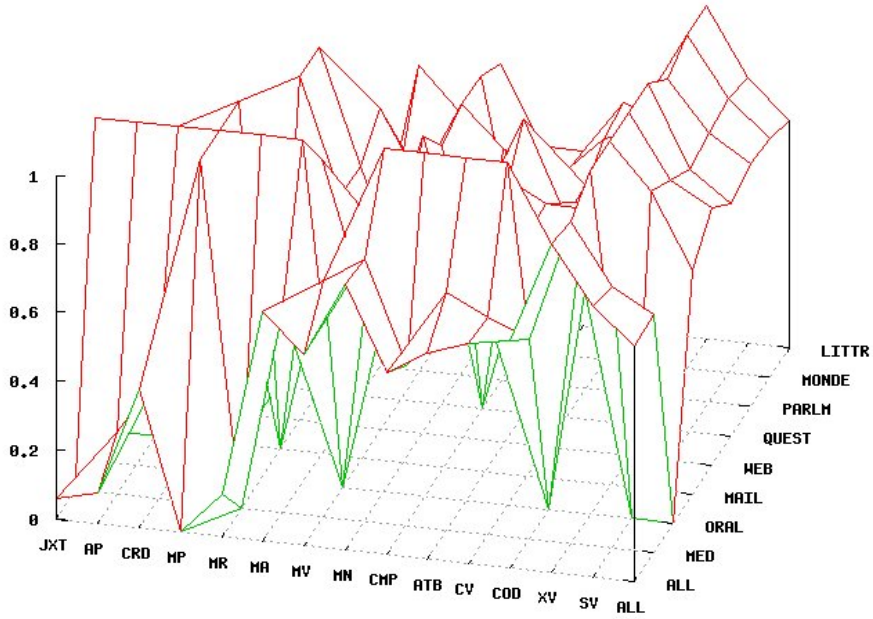
Relations

- 7 systems
- F-measure :

f	#sys
> 60%	3
> 50%	2
> 40%	2

Result landscape (easytest data set)



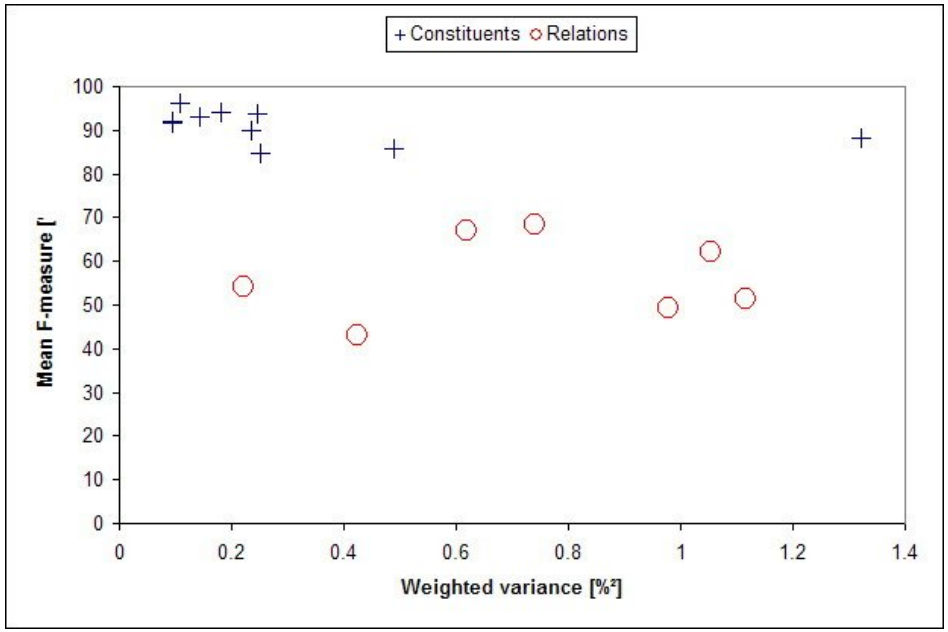


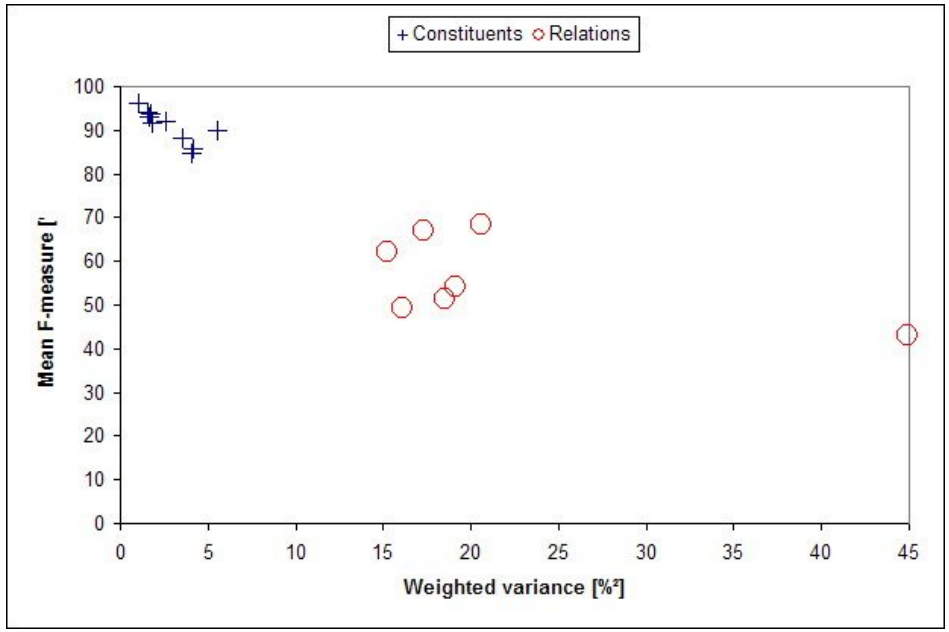
- Performance on Chunks seems very stable wrt corpus and wrt types for this specific system.
- Performances on Relations are less stable, more dependent on relation types

Do we retrieve these properties for the other systems ?

System stability (easytest data set)

Tested using weighted variance





Important to assess the level of stability (confidence) for each system wrt

- corpus type (variances very good, specially for chunks),
- annotation type (larger variances, specially for relations)
- and possibly more specific contexts.

The ROVER : combining the annotations

Using a **ROVER** (*Recognizer output voting error reduction*) to combine the various sets of annotations :

- tried in speech, tagging, translation, ...
- based on majority vote
- pondering parser weights using evaluation results per kind of chunks & relations, corpus style, ...
- feedback on agreement between basic and weighted majority
- control through manual validation
- iterative process

Issues : ensure the coherence of the ROVER annotations

- on chunks : already good results from the parsers and mostly local effects (chunks are small)
- on dependencies : more complex have to enforce dependency properties (single governor, *projectivity*, ...)
- on relationships between chunks and dependencies

ROVER : preliminary algorithm

- apply next steps first on chunks,
  then on relations (constrained by selected chunks)
- confidence for an annotation *a* of type τ in corpus *c*
  produced by participant *i* with rank *r* :

$$\text{conf}^{(i)}(a) = (|\text{systems}| - (r-1)) * \text{prec}^{(i)}_{c,\tau}$$

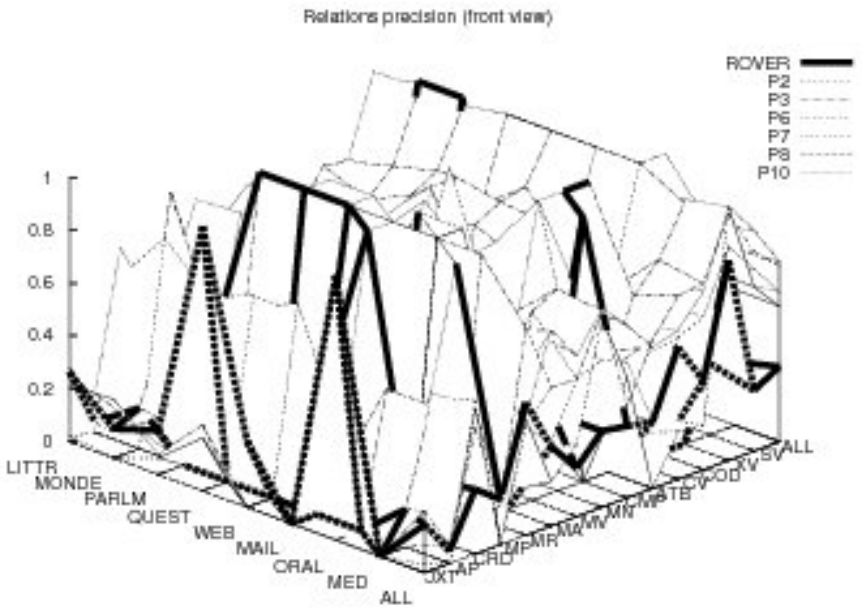
- annotation *a* is selected if

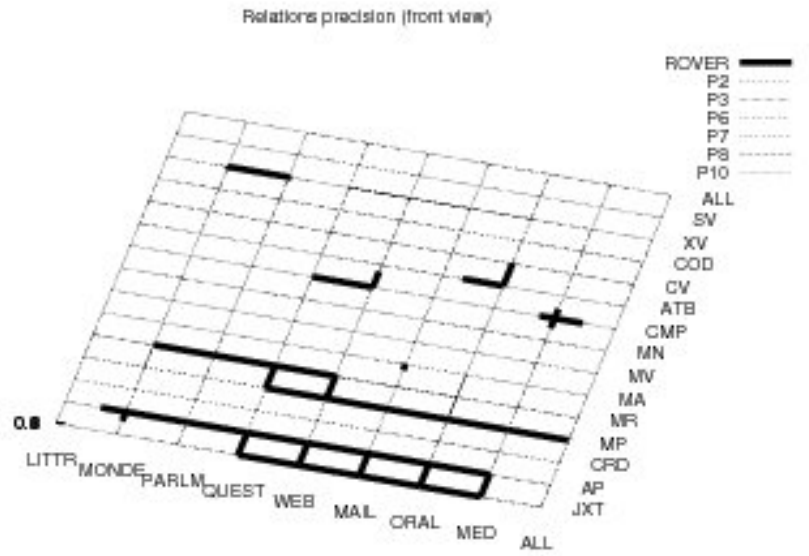
$$p(a) = \frac{\Sigma_i \text{conf}^{(i)}(a)}{|\{i | i \text{ returns } a\}|} \geq \max_i(\text{prec}_{c,\tau})$$

- still very preliminary : many parameters to try
  selection order, confidence weighting, selection threshold, consistence modeling, annotation similarities, ...

- the current algorithm favors precision over recall (maybe to be changed)

ROVER : preliminary results (on 6 participants)





- **bold** : where ROVER has winning precision
- but even when not the best one, not far from the best participant
- and get a confidence level for each annotation

Next steps

- applying machine learning techniques to fine tune the ROVER
  but already encouraging results

- deploying a larger scale infrastructure to work on large corpora
  couping WEB-based evaluation server + ROVER
  + prototype WEB service EASYREF (to view and edit annotations)
  $\Longrightarrow$ iterative collaborative controlled process

- progressively covering the full **Passage** corpus (>100Mwords)

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Thank you !