Improving the parsing of French coordination

through annotation standards and targeted features

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Problem

- Parsing Coordinated Structures (CS) in French
  1. *J'ai mangé une pomme rouge et mûre.*
  2. *J'ai mangé une pomme rouge et une orange.*
  3. *J'ai mangé une pomme rouge et Georges a bu du thé.*
- Additional complexity:
  - Intervening arguments and adjuncts
    - Sometimes containing coordination
  - Various forms of ellipsis
  - CS with 3 or more conjuncts
  - Modifiers shared by two or more conjuncts

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1. Annotation, Software and Error Classification
2. Targeted features
3. Targeted manual correction
4. Annotation schemes
5. Combining annotation and features

French SPMRL annotation for coordination

1. *Je vois Jean, Paul et Marie.* *(I see John, Paul and Mary)*

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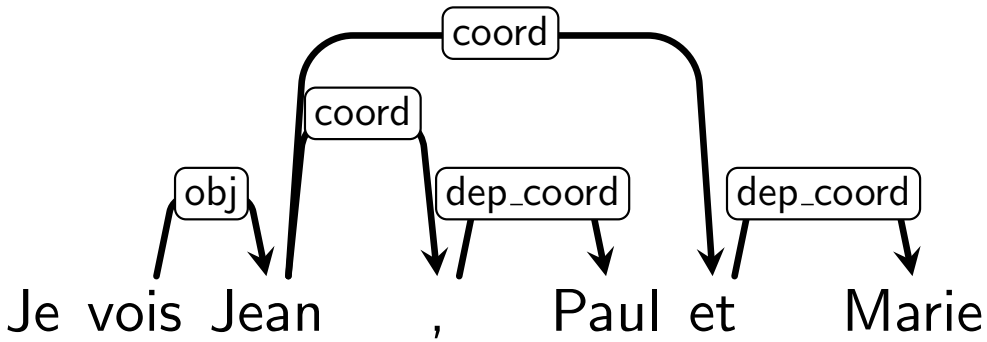

Software and data

- Talismane (Urieli, 2013)
  - Transition-based parser
  - Left-to-right linear shift-reduce parsing
  - Open source
  - http://redac.univ-tlse2.fr/talismane.html
- French Treebank (Abeillé et al., 2003)
  - Constituent annotation of the French national newspaper *Le Monde*
  - Converted to dependencies for the French SPMRL (Seddah et al., 2013)

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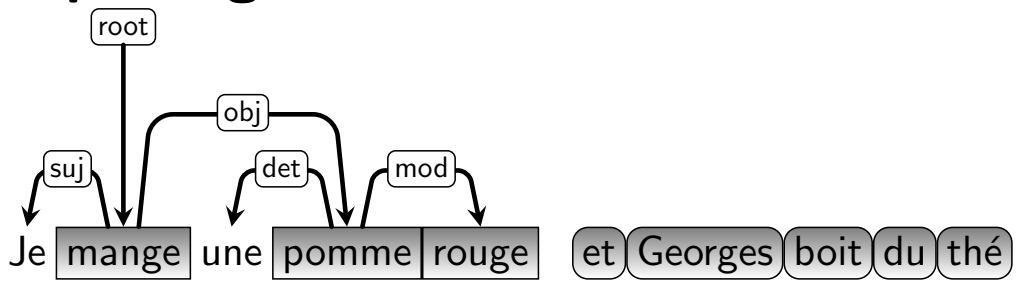

reduce $\rightarrow$

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$\text{right-arc}_{\text{coord}} \rightarrow$

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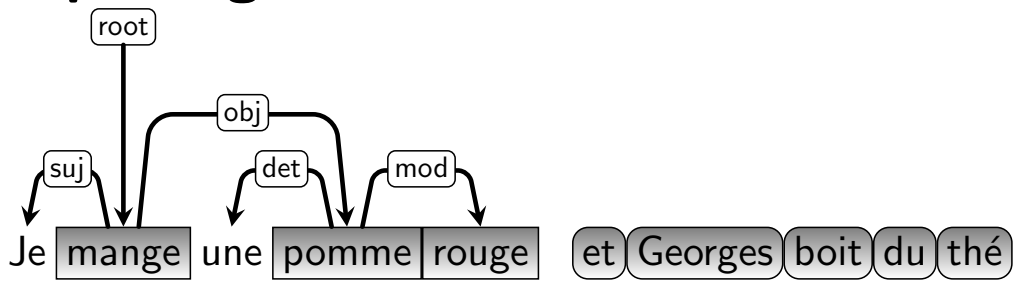

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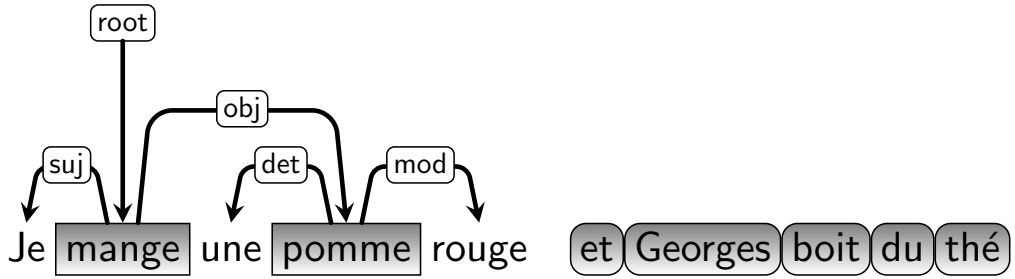

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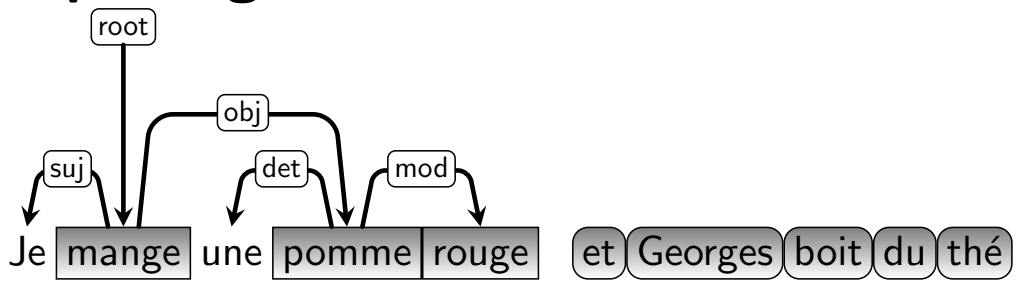

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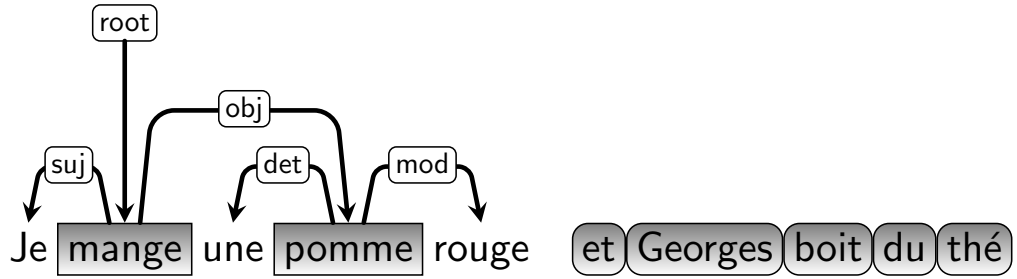

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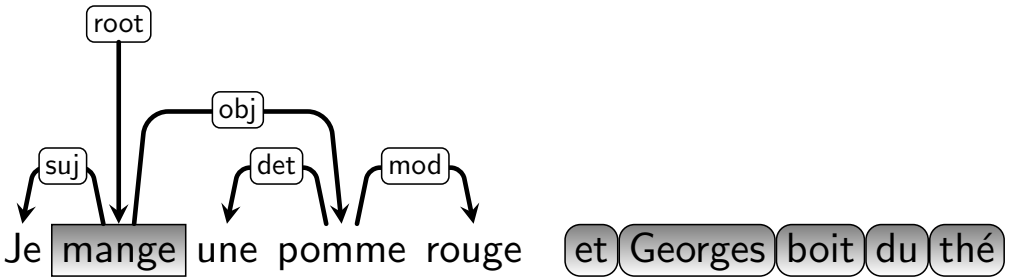
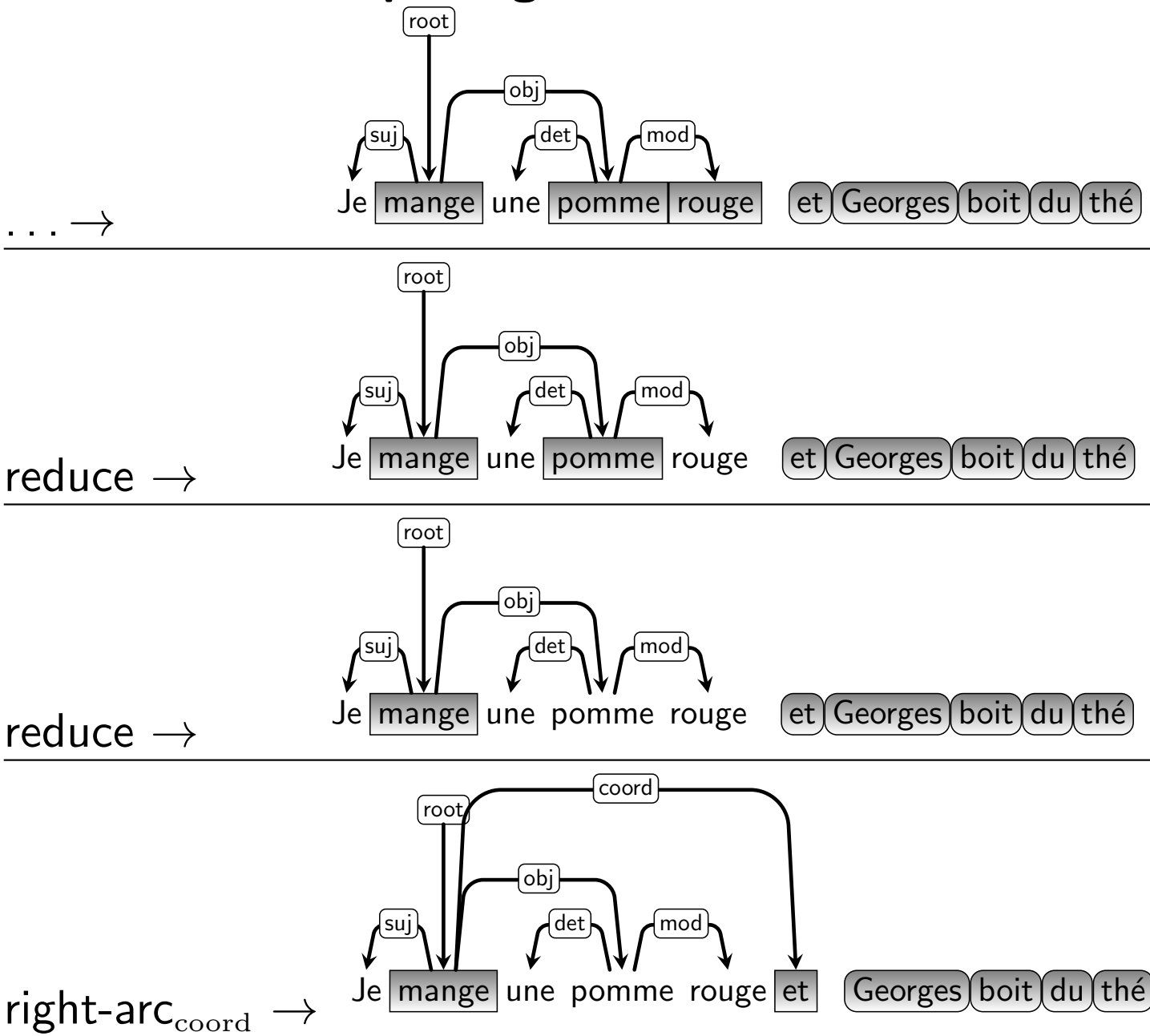
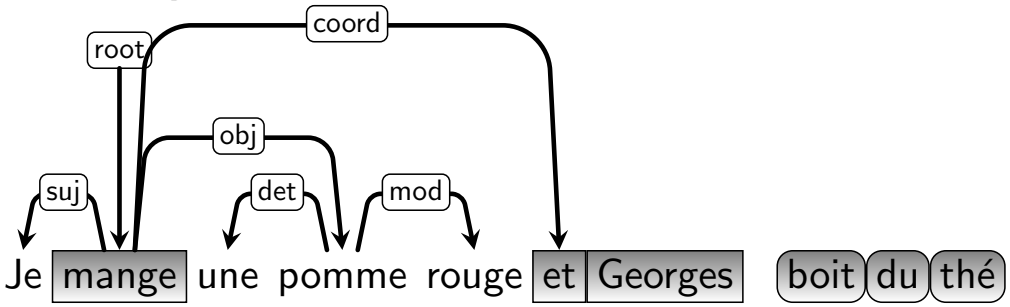


right-arc$_{coord}$ →

Transition based parsing: coordination



Transition based parsing: coordination 2



shift $\rightarrow$

left-arc$_{\text{suj}}$ $\rightarrow$

right-arc$_{\text{dep_coord}}$ $\rightarrow$

Transition based parsing: coordination 2

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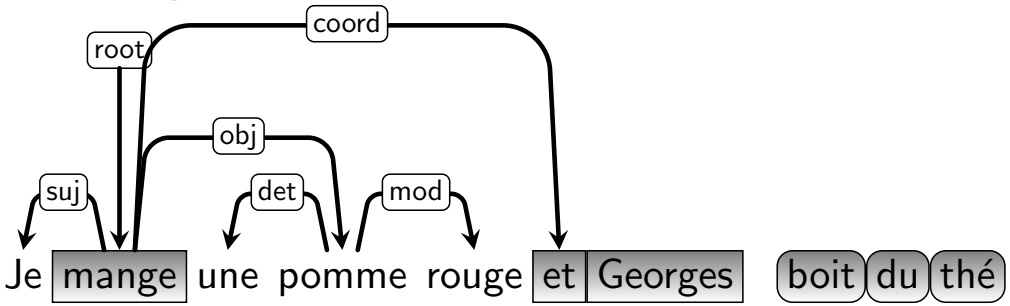

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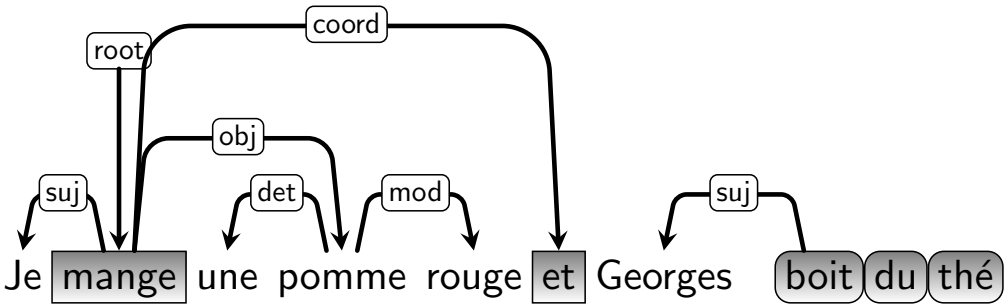

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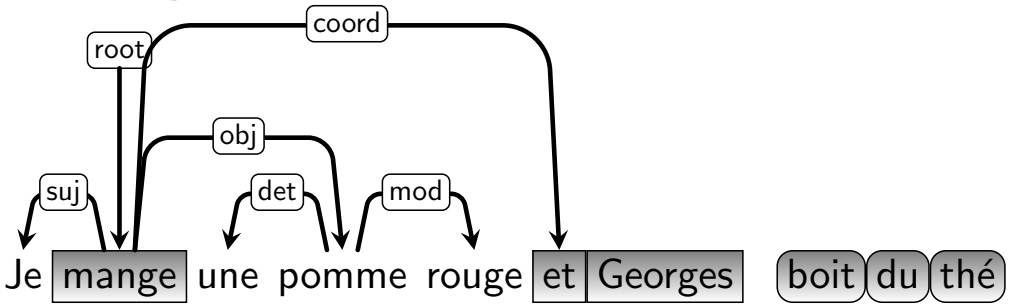

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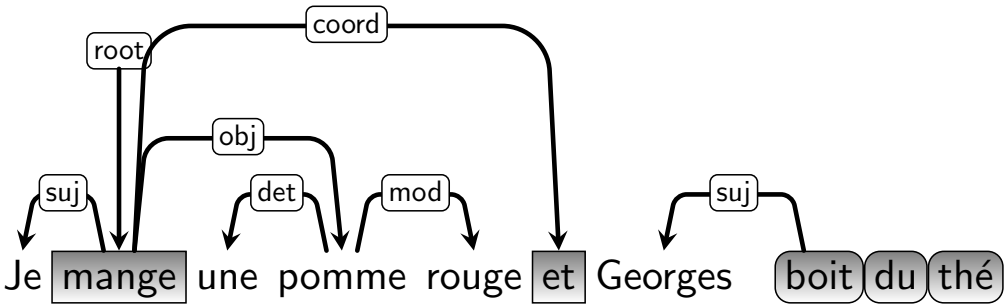

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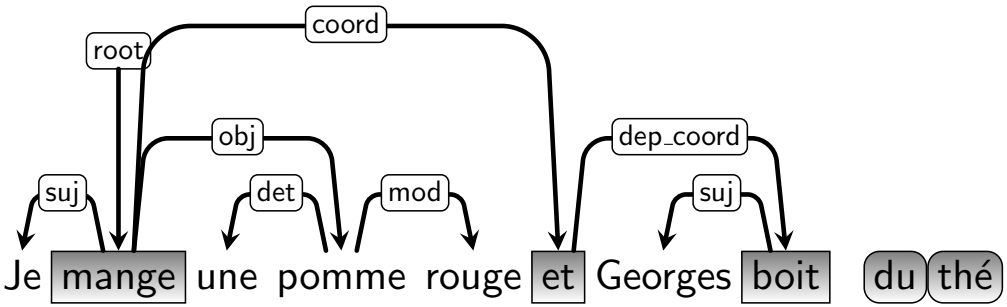

Initial error classification

Initial f-score for coordination in dev corpus: 84.15%.

Out of 240 errors analysed:

- Pos-tag mismatch (30%)
- Preposition mismatch (and other simple parallelism) (8%)
- Annotation errors (24%)
  - of which 60% were correctly analysed by Talismane
- Artefacts of annotation scheme (14%)
  - 3^{rd} conjunct attached to 2^{nd} instead of 1^{st}
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- Other complex cases (ellipsis, etc.) (12%)

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   (The board of directors **chose** the takeover proposal made by Bongrain and **rejected** the one made by Besnier.)
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Targeted features

- Targeting simple parallelism (38% of errors):
  - Pos-tag mismatch
  - Preposition mismatch
- If the 1$^{\text{st}}$ conjunct is correct, generally the 2$^{\text{nd}}$ as well
- Features target the 1$^{\text{st}}$ conjunct
- But to do this, they need to guess ahead at the 2$^{\text{nd}}$ conjunct with little information available

Identifying the 2nd conjunct

1. **Verb coordination**: *Il s'**agit** ici d'un jour normal de la semaine* **et** *un inventaire scrupuleux **exigerait** que l'on prenne également en compte l'offre accrue du mercredi.*

   (We are **dealing** here with a normal weekday, **and** a scupulous inventory would **require** us to take into account the increased offer on Wednesdays.)

2. **Comment phrase**: *A Lourdes, nous* **signale** *notre correspondant Jean-Jacques Rollat, la venue* **et** *la circulation des pèlerins* **ont** *été très perturbées.*

   (At Lourdes, **signals** our correspondent Jean-Jacques Rollat, the arrival and circulation of pilgrims **was** considerably disrupted.)

3. **Relative clause**: *Les émissions d'éveil qui ont* **fait** *la richesse des chaînes de service public entre 1975* **et** *1985 ont toutes* **disparu**.

   (The discovery programmes which **constituted** the richness of public channels between 1975 **and** 1985 have all **disappeared**.)

Accuracy: true 99.07%, false 94.54%.

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- **Mismatched prepositions:** from N **to** N and **from** N
- **Pos-tag match:** V **N** and **N**
- **3 conjunct parallelism:** **N**, **N** and **N**
- **Parentheses:** W1 (**W2**) and **W3**

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Targeted features: initial results

dev corpus coordination recall:

dev	targeted correct	targeted error	baseline total
baseline correct	1250	**29**	1279
baseline error	**61**	403	464
targeted total	1311	432	1743

test corpus coordination recall:

test	targeted correct	targeted error	baseline total
baseline correct	2496	**63**	2559
baseline error	**167**	694	861
targeted total	2663	757	3420

Error count:

- Dev error count (recall): from 464 to 432 (-6.9%)
- Test error count (recall): from 861 to 757 (-12.1%)
- Dev f-score: from 84.34% to 85.52% (-7.54%)
- Test f-score: from 85.16% to 86.97% (-12.20%)

Can we do better?

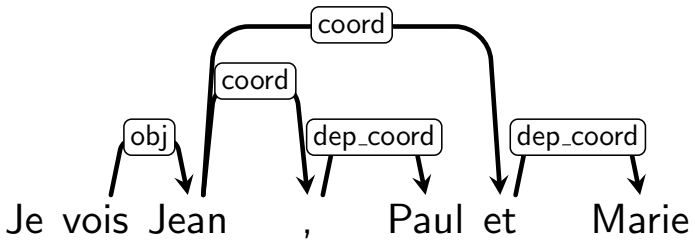
Targeted manual error correction

- In original error analysis, 24% annotation errors.
- Iterative targeted feature tuning highlights many errors (unexpected feature results)
- Enables efficient targeted **manual** error correction:
  - 1,488 for train (out of 21,061 coord relations = 7.07%)
  - 106 for dev (out of 1,743 coord relations = 6.08%)
  - 274 for test (out of 3,420 coord relations = 8.01%)

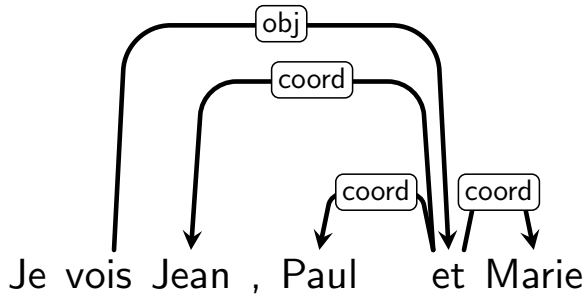
	dev base	**dev fix**	**test base**	**test fix**
train base	*84.34*	85.08	*85.16*	85.54
train fix	83.99	**85.75**	84.99	**86.75**

Table : Coordination f-score after targeted manual error correction

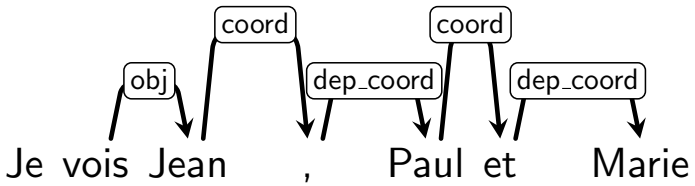
Comparing annotation schemes



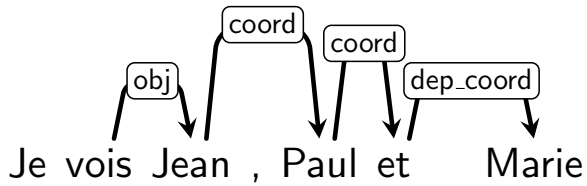
1st-conjunct headed (1H)



Conjunction headed (CH)



Previous conjunct headed (PH)



Previous conjunct headed 2 (PH2)

- Option: systematically attach all other punctuation to the previous non-punctuation token (+P)
- Results in six schemes: 1H, 1H+P, CH+P, PH, PH+P, PH2+P

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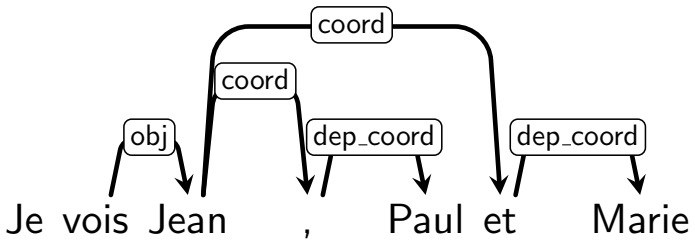

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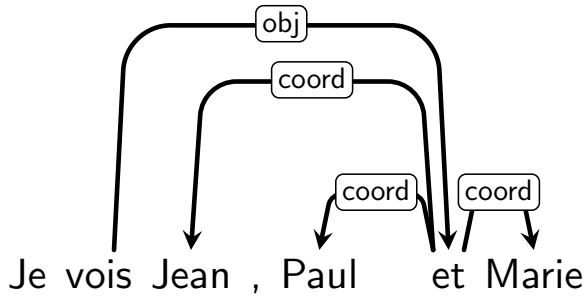
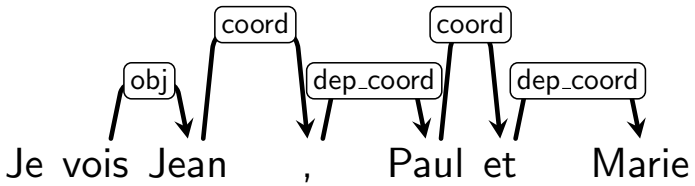
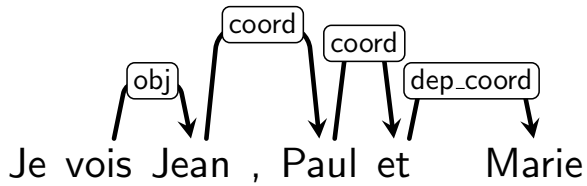


Conjunction headed (CH)



Previous conjunct headed (PH)



Previous conjunct headed 2 (PH2)

- Option: systematically attach all other punctuation to the previous non-punctuation token (+P)
- Results in six schemes: 1H, 1H+P, CH+P, PH, PH+P, PH2+P

Comparing annotation schemes: results

Scheme:	1H	1H+P	CH+P	PH	PH+P	PH2+P
Dev						
Coord f-score	85.75	85.60	*73.20*	86.68	86.96	**89.21**
Coord prec.	99.55	99.55	98.88	99.49	99.49	99.41
Coord recall	75.31	75.09	*58.11*	76.79	77.24	**80.91**
Test						
Coord f-score	86.75	86.94	*73.09*	88.20	88.44	**90.29**
Coord prec.	99.70	99.52	99.38	99.75	99.50	99.71
Coord recall	76.78	77.18	*57.80*	79.04	79.59	**82.50**

Table : Comparing CS annotation

Coordination f-score error reduction between 1H and PH2+P:

- 24.28% for dev
- 26.72% for test

Combining with targeted features: gains

	None	Features	Scheme	Both
Dev: base f-score = 85.75				
Beam 1	0.00	4.28	24.28	29.89
Beam 2	8.49	9.82	32.14	33.40
Beam 5	9.82	11.44	35.09	34.95
Test: base f-score = 86.75				
Beam 1	0.00	12.91	26.72	34.64
Beam 2	8.15	19.02	28.53	36.83
Beam 5	13.58	21.81	28.98	37.28

Table : Coordination f-score error reduction with respect to 1H, baseline features, beam 1

F-score increase from 85.75 dev (86.75 test) to 90.73 dev (91.69 test)
Best LAS 92.0 dev (92.0 test), Best UAS 93.7 (93.7 test)
But, in terms of speed:

- PH2+P scheme: $\times 0.93$
- Beam 2, 5: $\times 2$, $\times 5$
- Targeted features: $\times 22$

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Final error classification

Final error classification (dev corpus, beam 1, PH2+P):

- Errors: 151 (was 250)
- Pos-tag/preposition mismatch: 36% (was 38%)
- Annotation errors: 11% (was 24%)
- Artefacts of annotation scheme: 5% (was 14%)
- Ellipses: 13% (was 5%)
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- Improve parsing of French coordination through:
  - Targeted features
  - Annotation scheme
  - Beam width
- All three methods successful and relatively cumulative
- Combined = 37.28% reduction in coordination f-score error
- But, need to improve speed for targeted features
- Also useful for efficient manual corpus correction
- Add semi-supervised semantic features - further improvement?
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