

Weblio Pre-reordering SMT System

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Overview

Our system implemented a simple syntactic pre-reordering model firstly described in (Zhu et al., 2014)¹.

The MT pipeline in this system build HRCFG (Head-restructured CFG parse tree) for given input sentence, then reorder the parse tree to gain a new input in similar order of target-side language. Conventional Phrase-based MT is applied for the remaining phases in the pipeline.

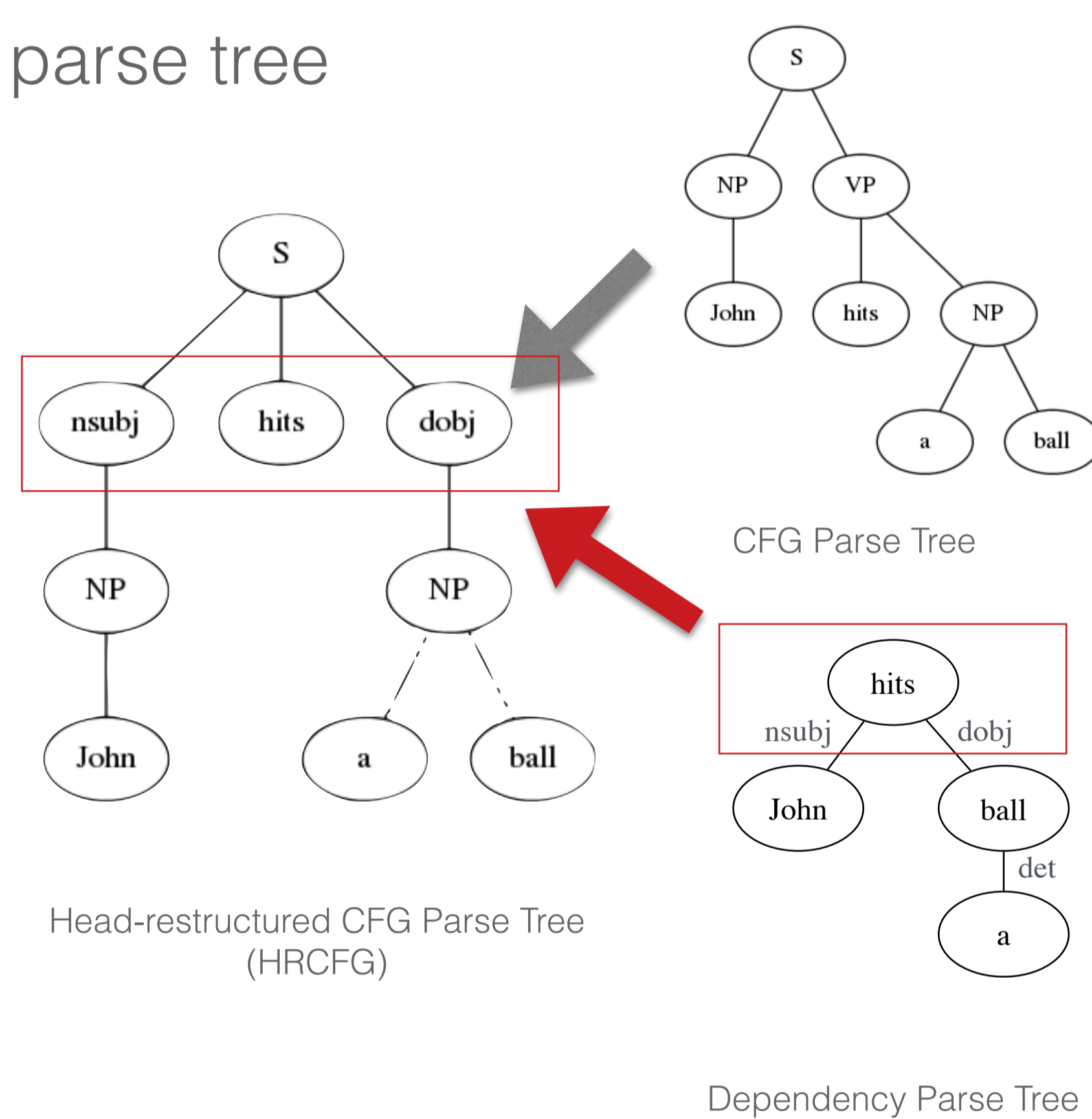
In this system, we extended the pre-reordering model to output *N*-best reordering results. We also attempted to utilize *N*-best parse trees in the experiments.

¹ Zhu, Zhongyuan et al. (2014). "A preordering method using head-restructured CFG parse tree for SMT". In: *Proceedings of the 20th Annual Meeting of the Association for Natural Language Processing*, pp. 594-597.

Pre-reordering model

Head-restructured CFG parse tree

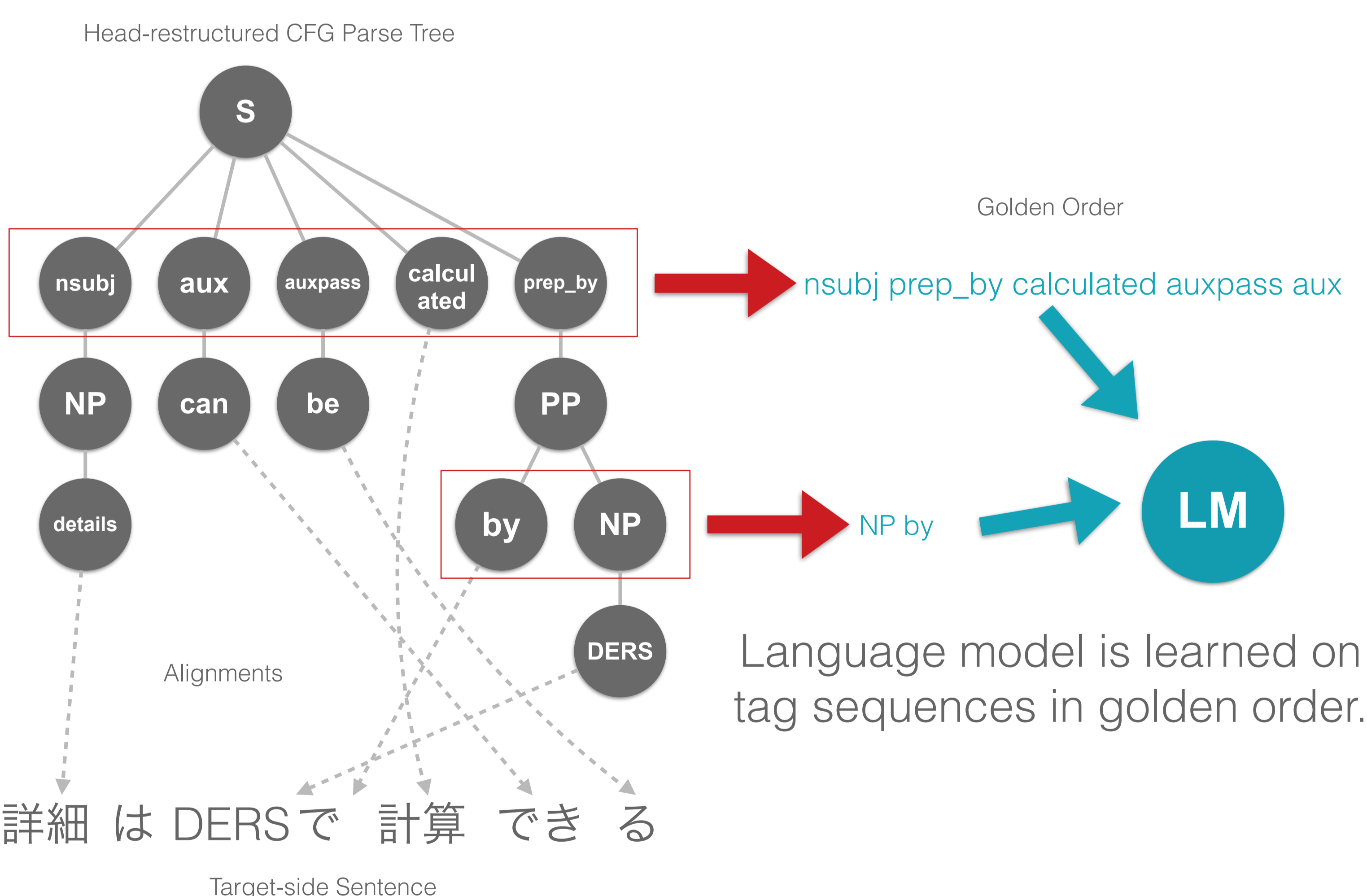
For all S nodes in a CFG parse tree, a new layer contains dependency relationships is been inserted underneath.



Reordering model

We use language model as a quick solution to tackle the reordering problem.

In the reordering phase, the candidate order with highest LM score is selected.



N-best reordering model

For all treelet t_i in the reordered parse tree,

$$\text{Score}(\mathbf{t}) = \sum_i \log(p_{LM}(t_i))$$

we use Cube Pruning to produce *N*-best reordering results based on the accumulation of LM scores recursively.

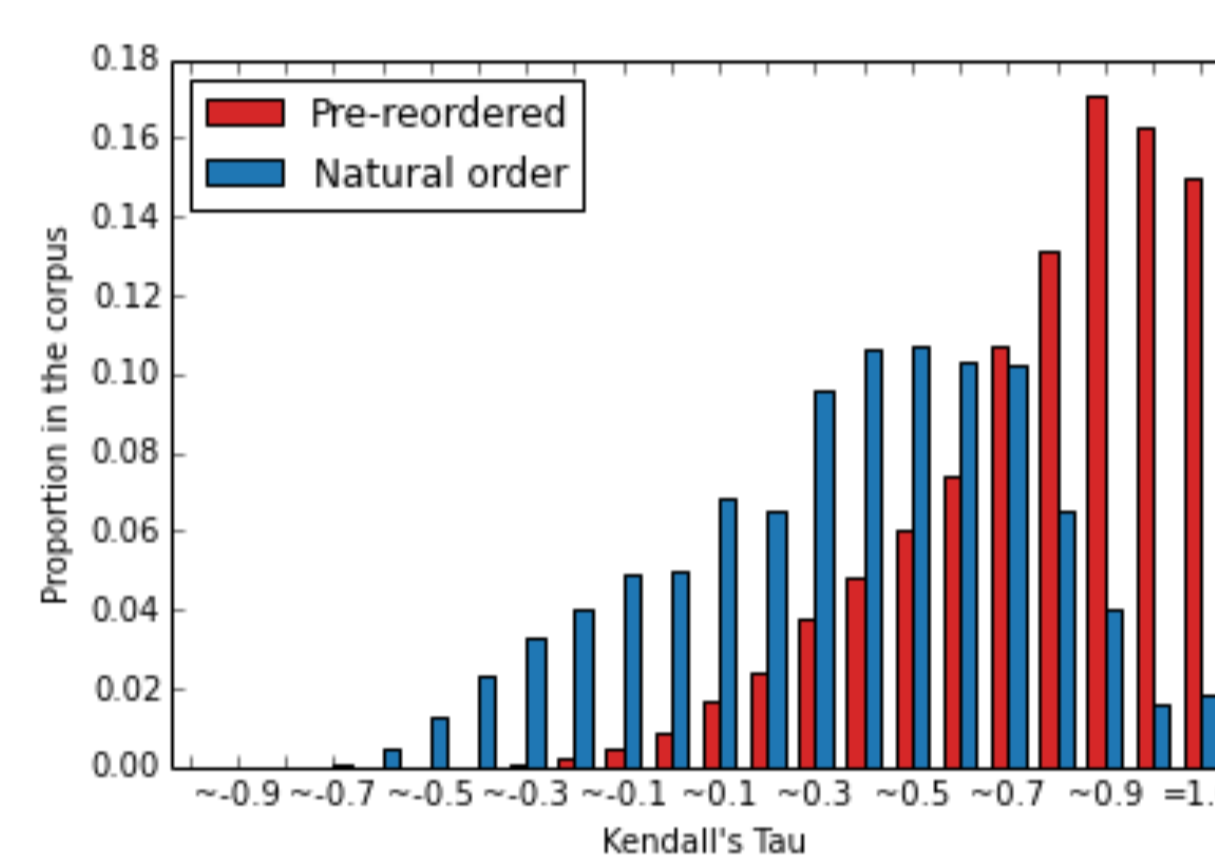
Evaluation results of English-Japanese task

| | BLEU | RIBES | HUMAN |
|-------------------------------|-------|--------|--------|
| N-best reorder | 34.87 | 0.7869 | +43.25 |
| N-best reorder + N-best parse | 35.04 | 0.7900 | +36.00 |
| BASELINE PBMT | 29.80 | 0.6919 | 0.00 |

The inconsistency of human evaluation score and automatic evaluation scores for the second system is discussed in the organizer's paper.

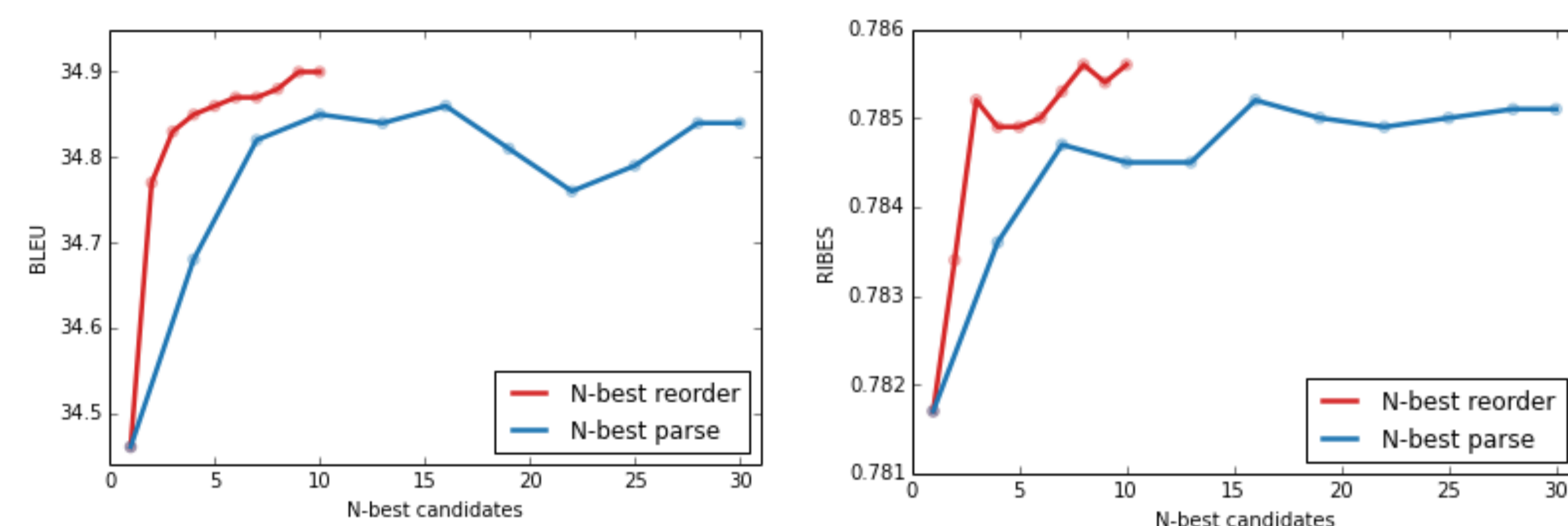
Evaluation of pre-reordering

the effect of pre-reordering (Kendall's Tau on training data)



After pre-reordering, about 15% of English sentences have the identical order of corresponding Japanese translations.

Automatic evaluation scores after applying *N*-best reordering results and *N*-best parse trees



Incorporating *N*-best reordering results and parse trees lead to better automatic evaluation scores.

Online demonstrations



Head-restructured CFG parse tree
<http://raphael.uaca.com/demos/hdtree>



Pre-reordering
<http://raphael.uaca.com/demos/raphreorder>