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Multi-source Cross-lingual Delexicalized Parser Transfer:

Prague or Stanford?

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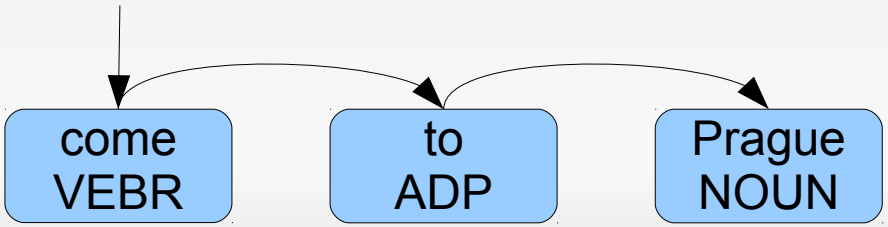
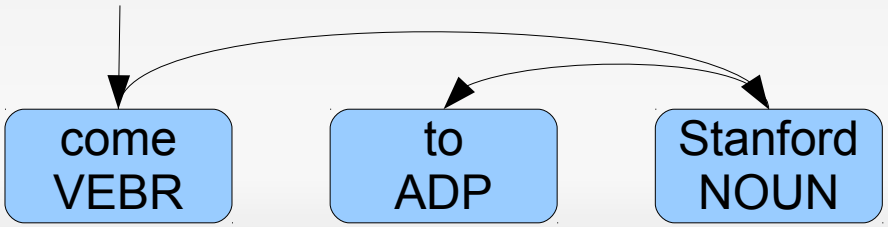
Introduction

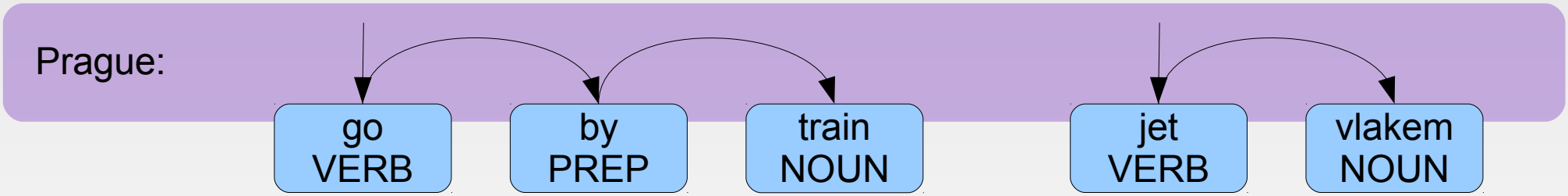
- Task: cross-lingual parser transfer
  - train a parser on treebank for language A
  - use the parser to parse text in language B
  - HamleDT 2.0 treebank collection (30 languages)
- Question: Prague or Stanford annotation style?
  - focus on adposition annotation (= prep., postp., …)
  - Prague: ADP as head x Stanford: ADP as leaf





Motivation

- Prague style generally better for parsing
  - full Prague **+5%** abs. over full Stanford (avg UAS)
  - Prague ADP **+0.8%** over Stanford ADP – lexicalized
    - delexicalized: **+0.2%** (usually significant, but weaker)



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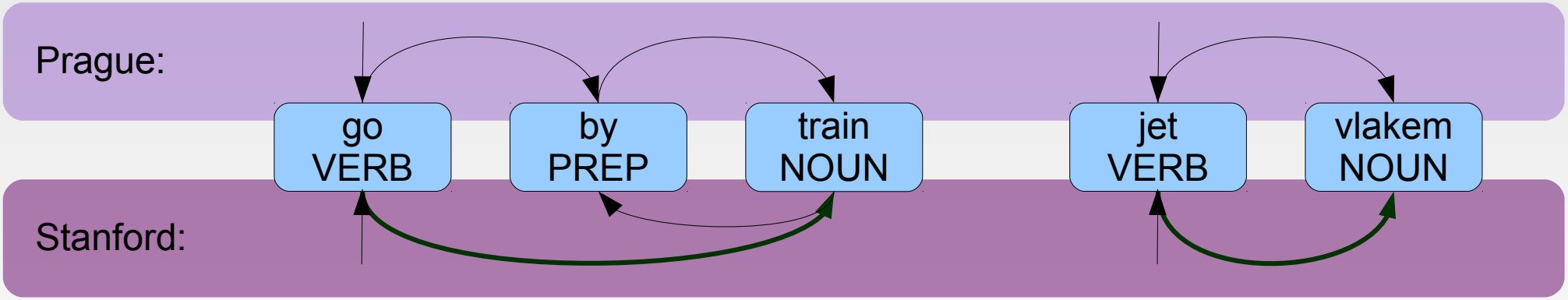


- Stanford style more cross-lingually consistent
  - might be beneficial for cross-lingual parsing

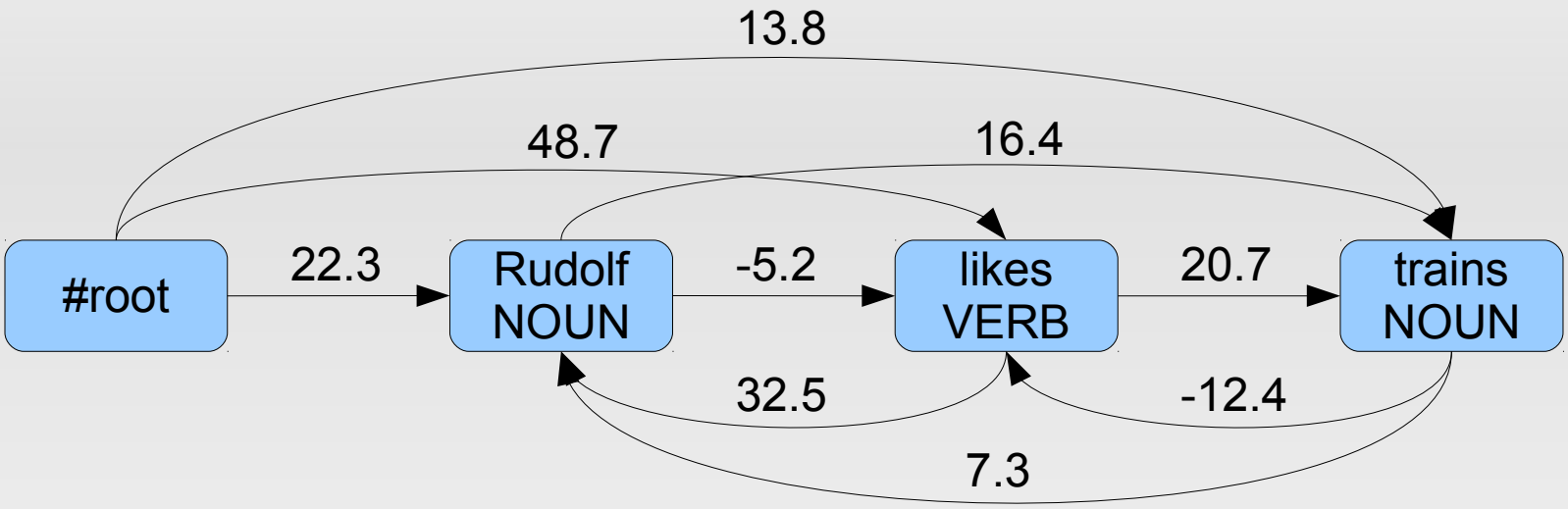
General Approach

- use Prague-style HamleDT treebanks
- perform automatic conversions between Prague and Stanford ADP annotation style
- vary annotation style used at:
  - parser training
  - parser transfer
  - final output
- evaluate with UAS (unlabelled attachment score)

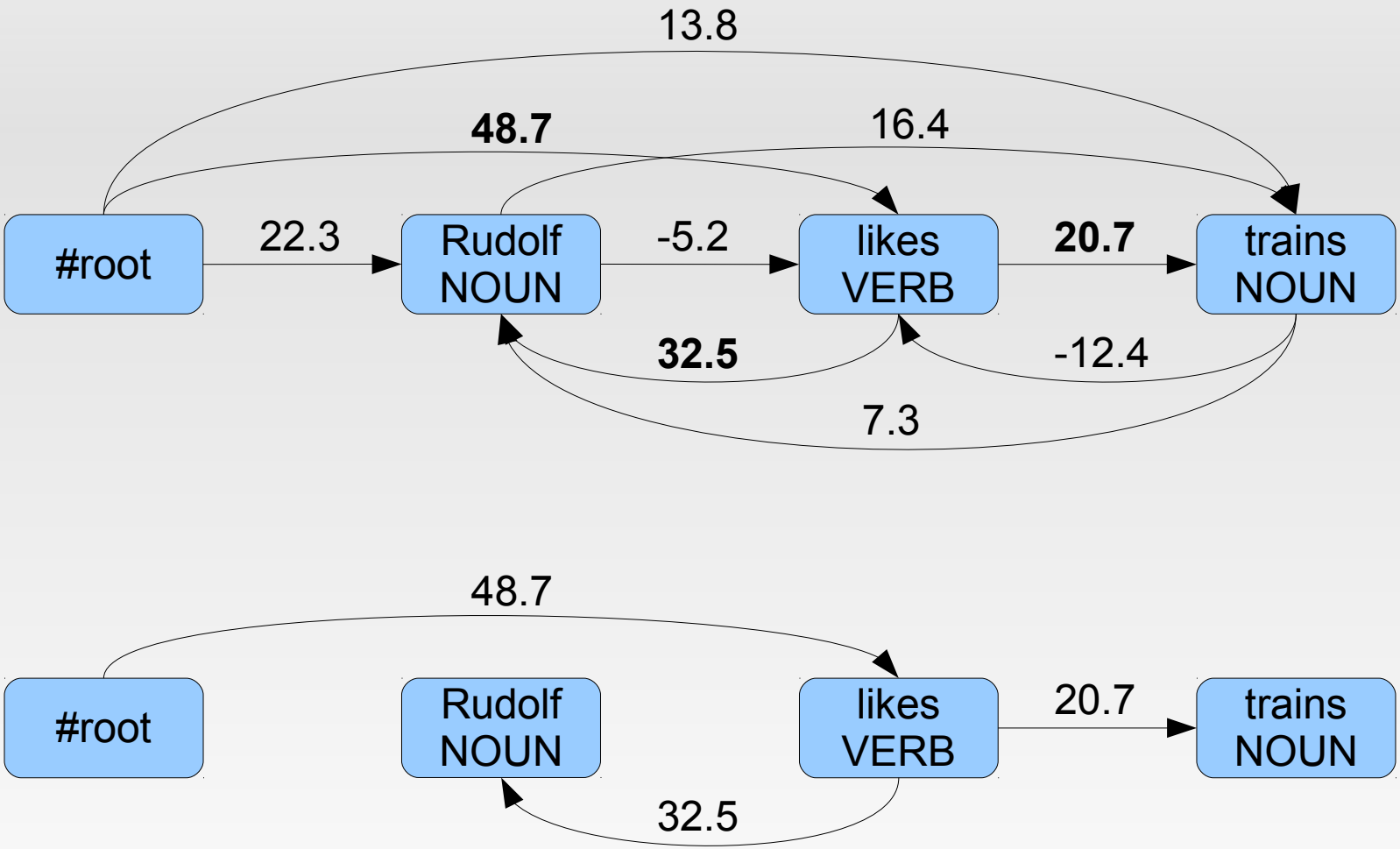
Semi-supervised parsing

- fully supervised dependency parsing
  - requires training data (treebank) or a grammar
  - there are ~100 treebanks (manually annotated)
  - there are ~7 000 languages
  - + various domains, language evolution...
- semi-supervised parsing
  - utilize existing resources, avoid new annotations
    - treebanks for other langs (HamleDT 2.0: 30 langs)
    - unannotated data (here: POS tagged)

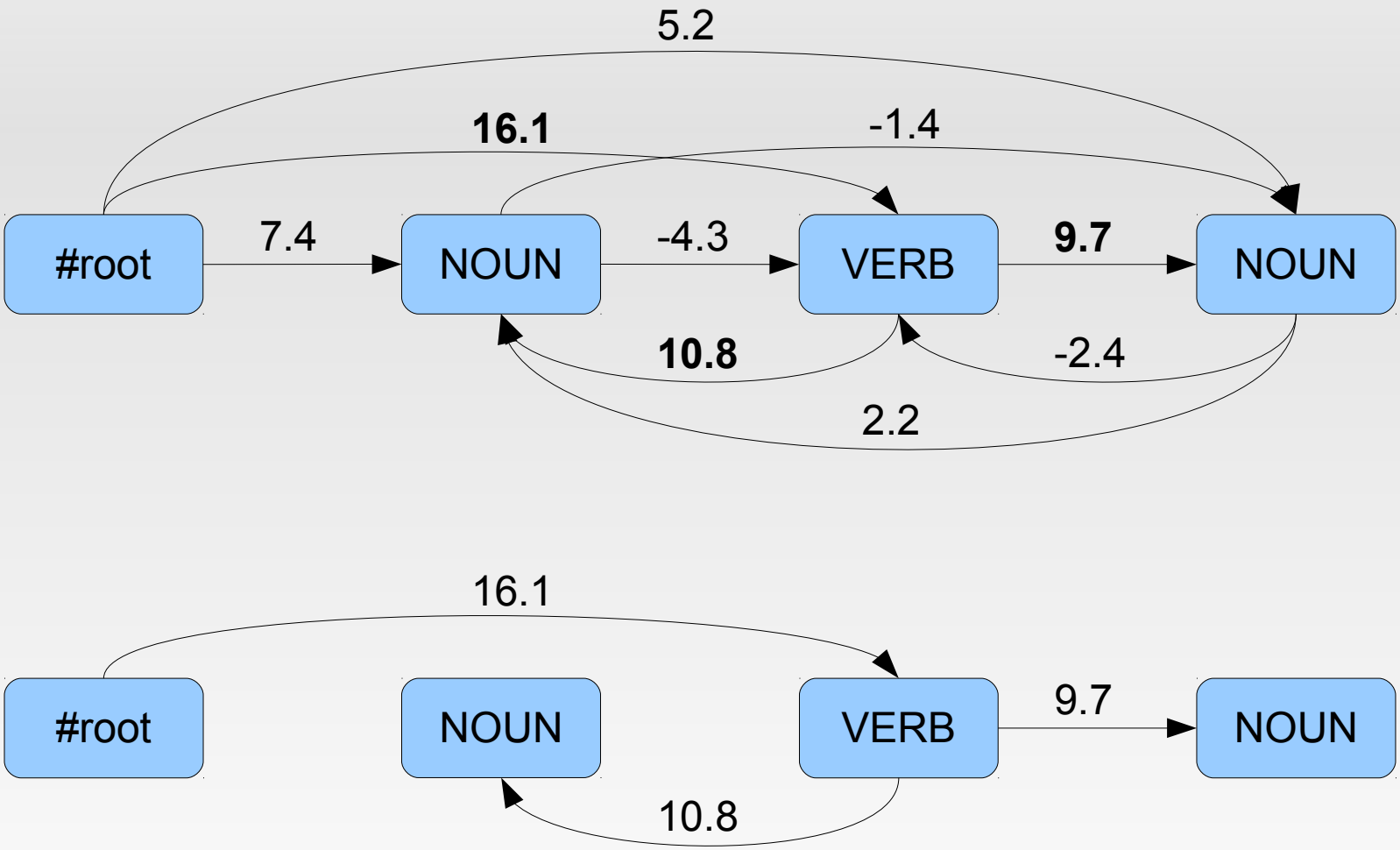
(Lexicalized) MSTParser



(Lexicalized) MSTParser



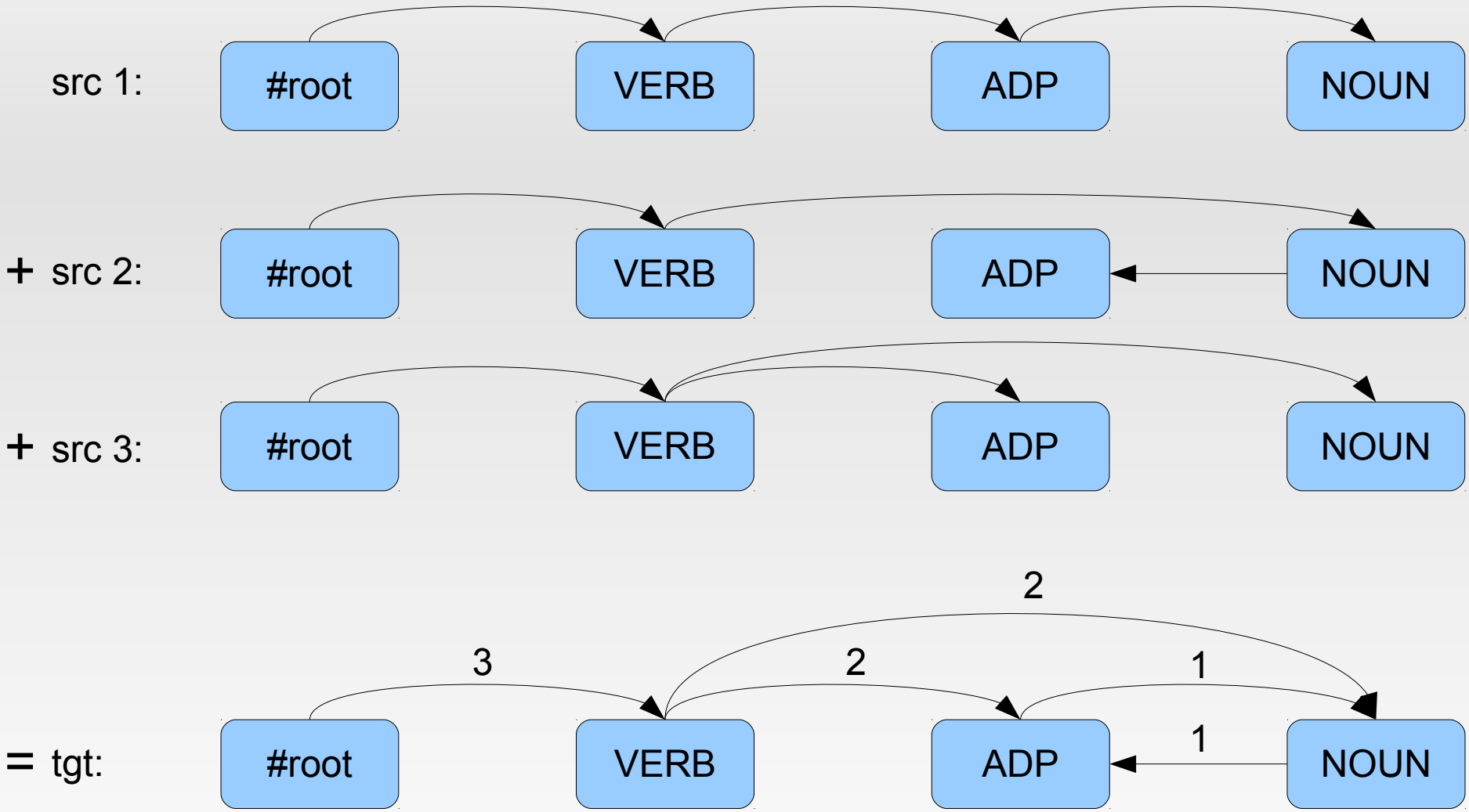
Delexicalized MSTParser



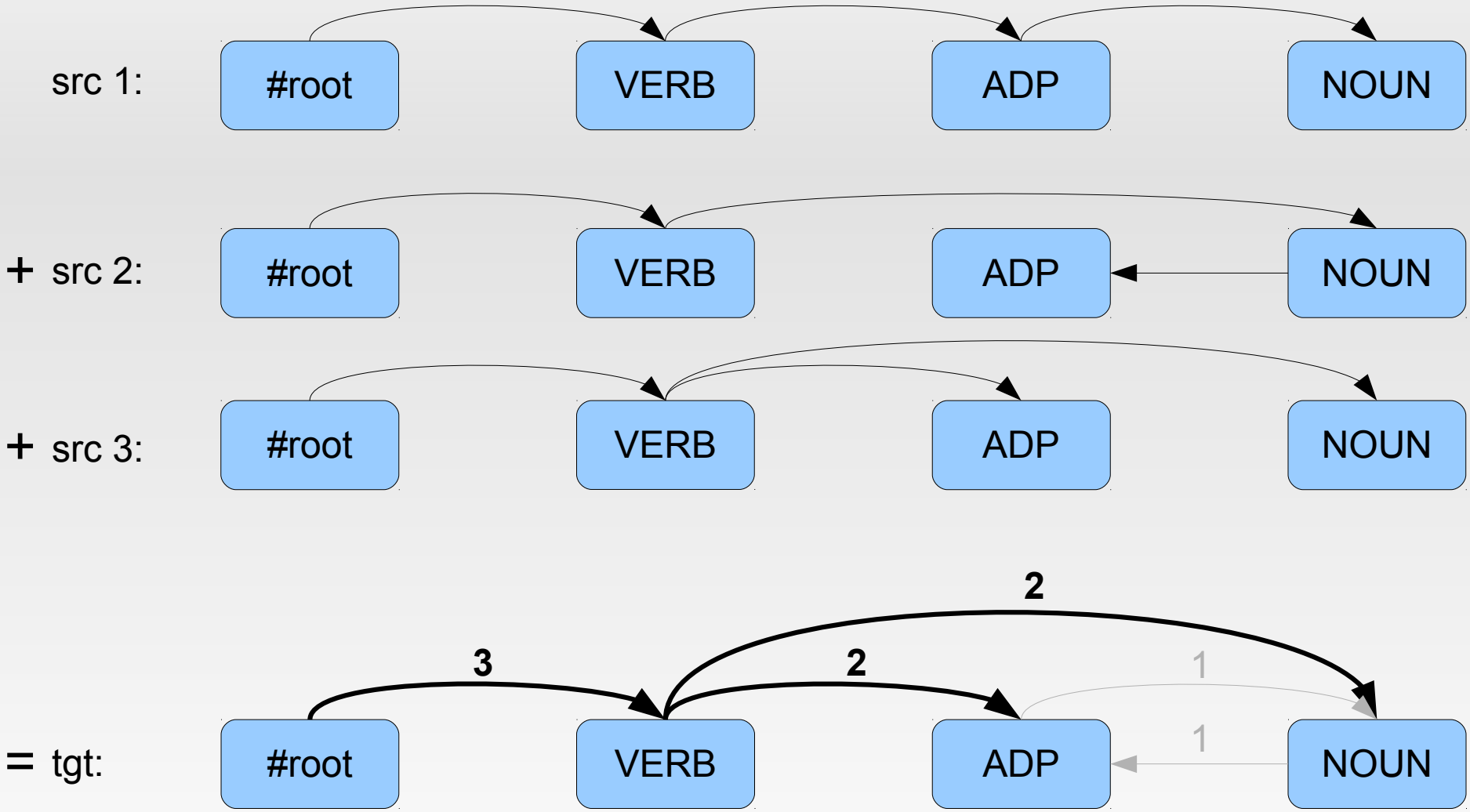
Delexicalized parser transfer

- Single-source
  - train a delexicalized parser on a **source** language treebank (e.g. Czech – PDT)
  - use it to parse **target** language text (e.g. Slovak)
    - need a POS tagger for the target language
- Multi-source
  - a set of source treebanks, train a parser on each
  - parse target text by each of the parsers
  - combine their outputs

Parse tree combination



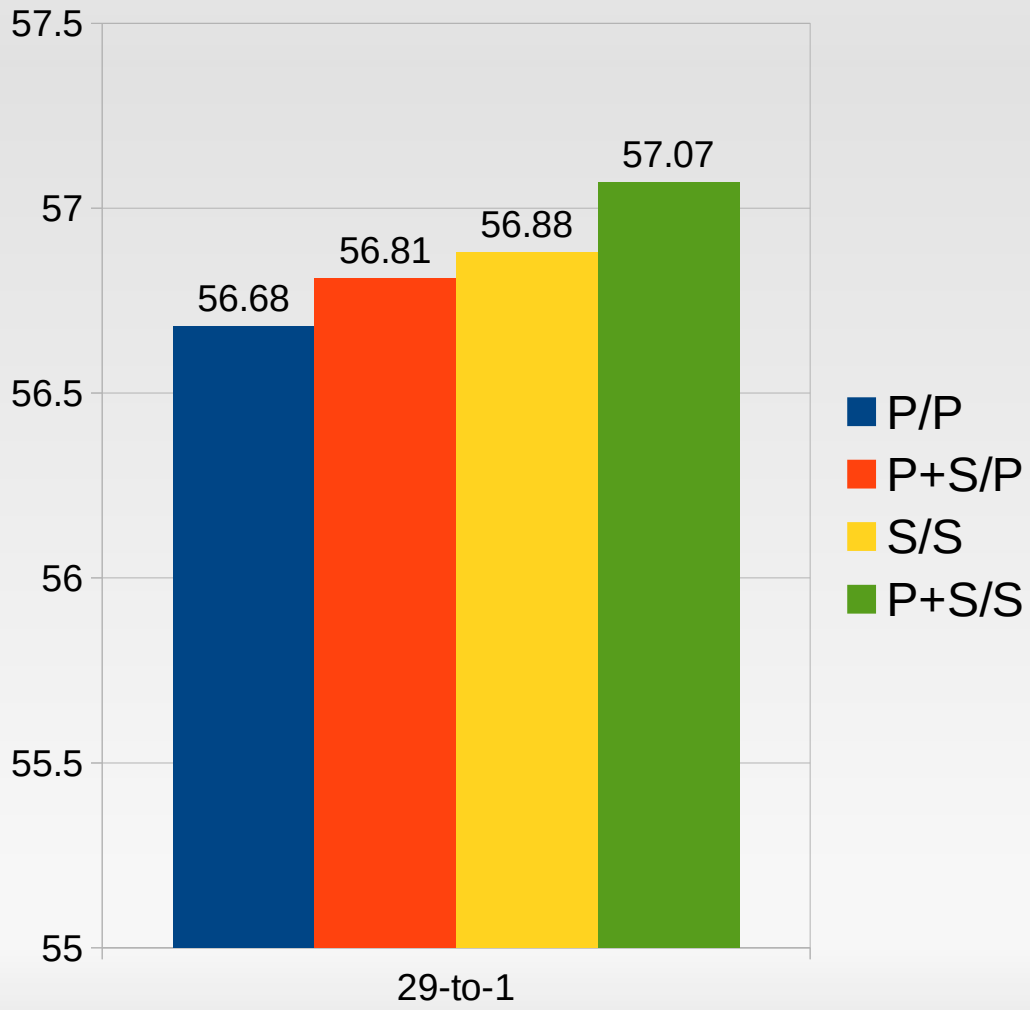
Parse tree combination



Experiments

- vary ADP annotation styles
  - Prague style (“P”), Stanford style (“S”)
  - (other phenomena = always Prague style)
- +/- convert treebanks to style X
  - train delexicalized parsers
  - parse the target text by the parsers
- +/- convert parser outputs to style Y
  - combine the parse trees
- setups denoted “X/Y” (e.g. “P/S”)

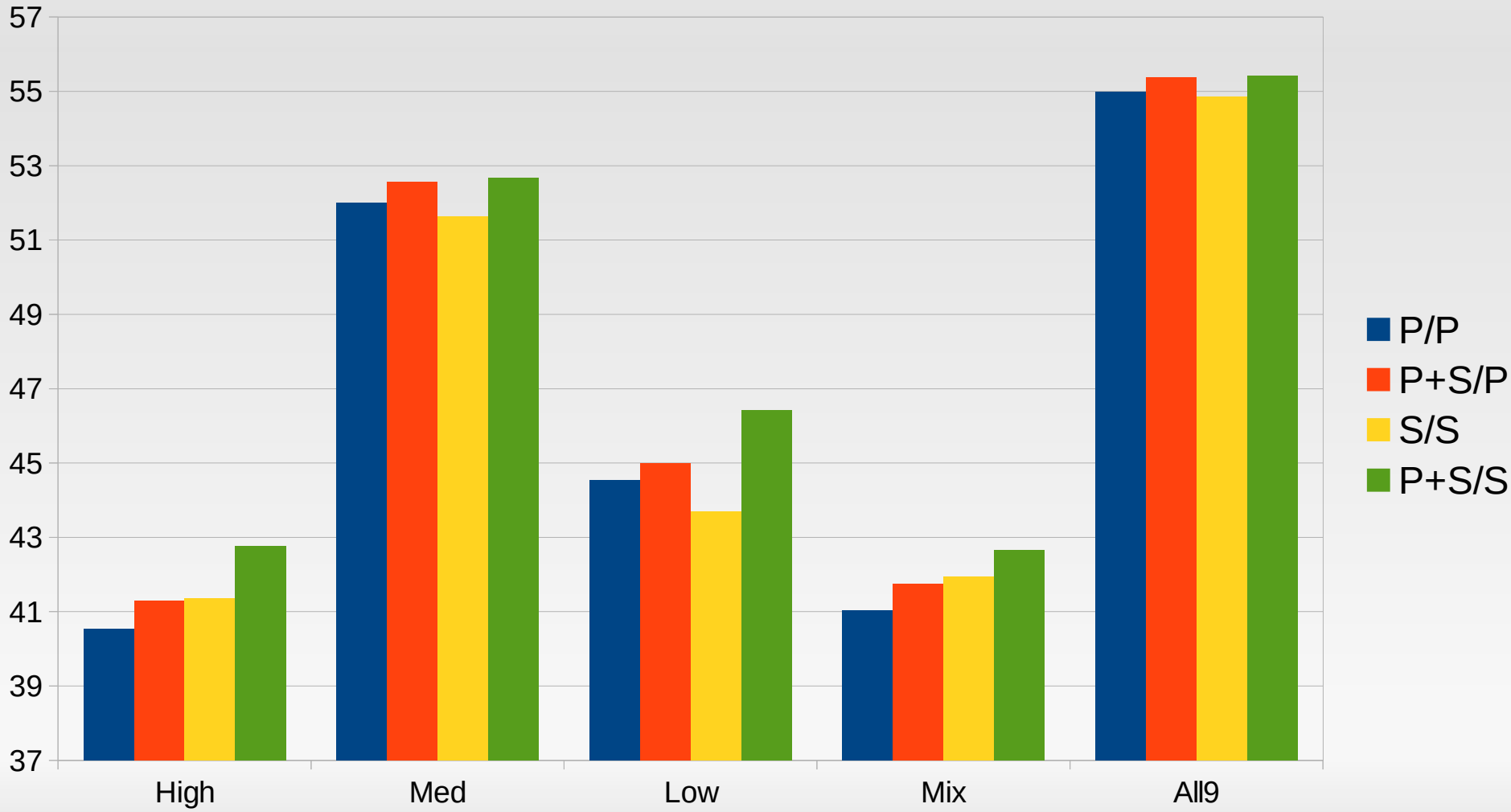
29-to-1



Smaller Source Treebank Subsets

- sources for training: smaller groups of treebanks grouped by frequency of ADP
  - high: Spanish (15%), Hindi (19%), Japanese (19%)
  - medium: English (8%), Czech (9%), Swedish (9%)
  - low: Basque (0%), Hungarian (1%), Anc. Greek (4%)
  - mix: Hungarian (1%), Swedish (9%), Spanish (15%)
  - all 9
- targets for testing: the remaining 21 treebanks

Smaller Source Treebank Subsets



Conclusion

- adposition annotation style
  - Prague (ADP=head) vs Stanford (ADP=leaf)
- multisource crosslingual parser transfer
- Stanford style seems better
  - even more so for small and diverse treebank sets
- best results:
  - use both Prague and Stanford style for training
  - convert to Stanford style for combination and output

Thank you for your attention

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http://ufal.mff.cuni.cz/rudolf-rosa/