Parser evaluation across text types

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Outline

Parsing German

- (Beil et al., 2002; Schulte im Walde, 2003)
  Unsupervised training of a hand-written PCFG
- (Dubey and Keller, 2003)
  Lexicalized parsing for German isn't better than unlexicalized parsing, but keeping some horizontal context helps

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- (Foth et al., 2004)
  Weighted Constraint Dependency Grammar
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  Extended finite-state approach

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  Extended finite-state approach
- (Schiehlen, 2004), (Dubey, 2005)
  Accurate unlexicalized PCFGs

Evaluations

	Dubey	Schiehlen	Foth	Müller	This
TüBa-D/Z (Dep)			*		*
TüBa-D/Z (GF)			*	+	*
Negra (Dep)		+	+		*
Negra (CS)	+	+			
CDG Corpus (Dep)			+		*

- Different measures
  (Parseval vs. Dependencies vs. Grammatical Functions)
- Different text types
  TüBa/Negra: newspaper text
  CDG Corpus: newswire text, trivial/serious literature, law text

Statistical parsing of German

- Freer word order and richer morphology than English
- More nonprojectivity
- Lexicalization helps for other highly configurational languages such as French (Arun and Keller, 2005), but only very little for German (Dubey and Keller, 2003)

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- As an example for a state of the art statistical parser, we developed an unlexicalized PCFG parser using BitPar (Schmid, 2004) and TüBa-D/Z
- Contrary to Negra, TüBa-D/Z (2nd release) contains morphology information for 15 260 sentences[1].

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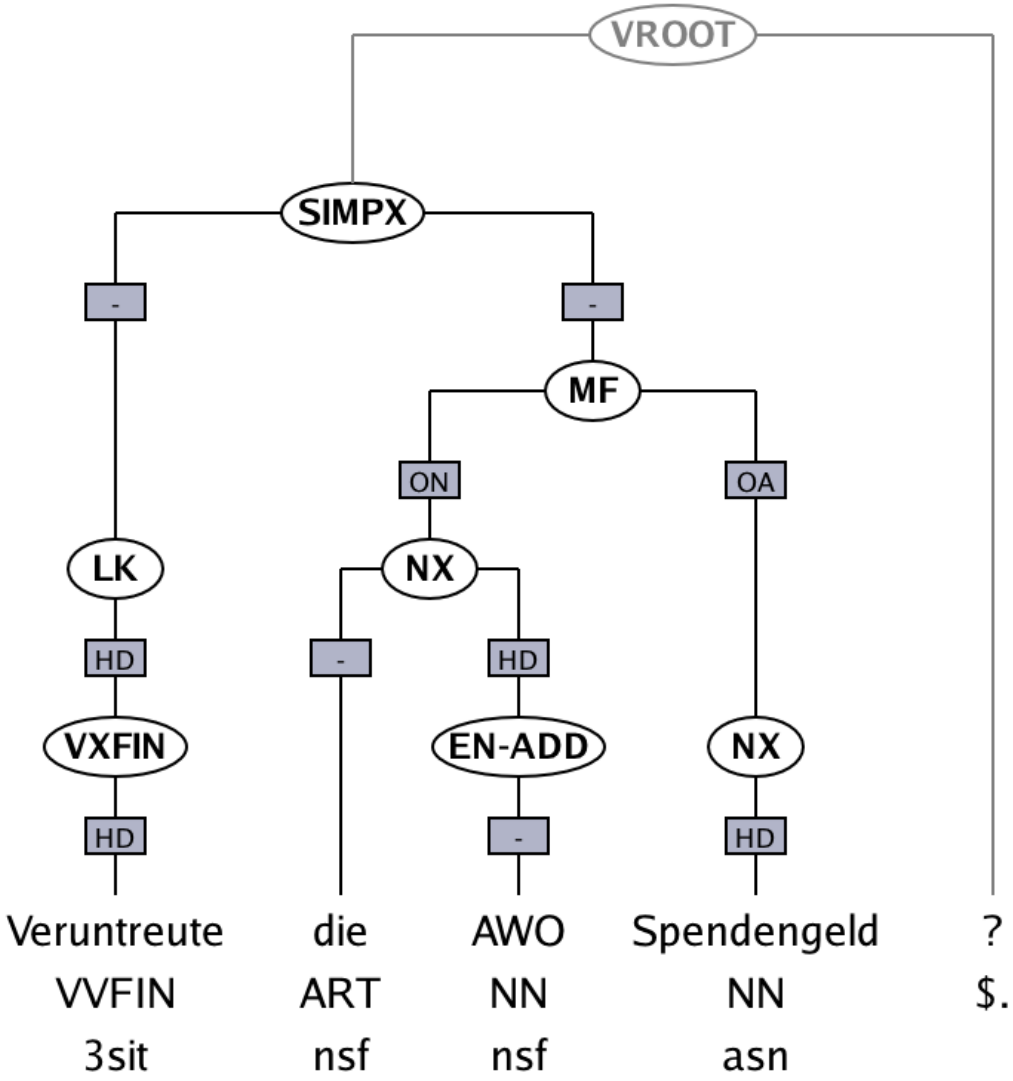
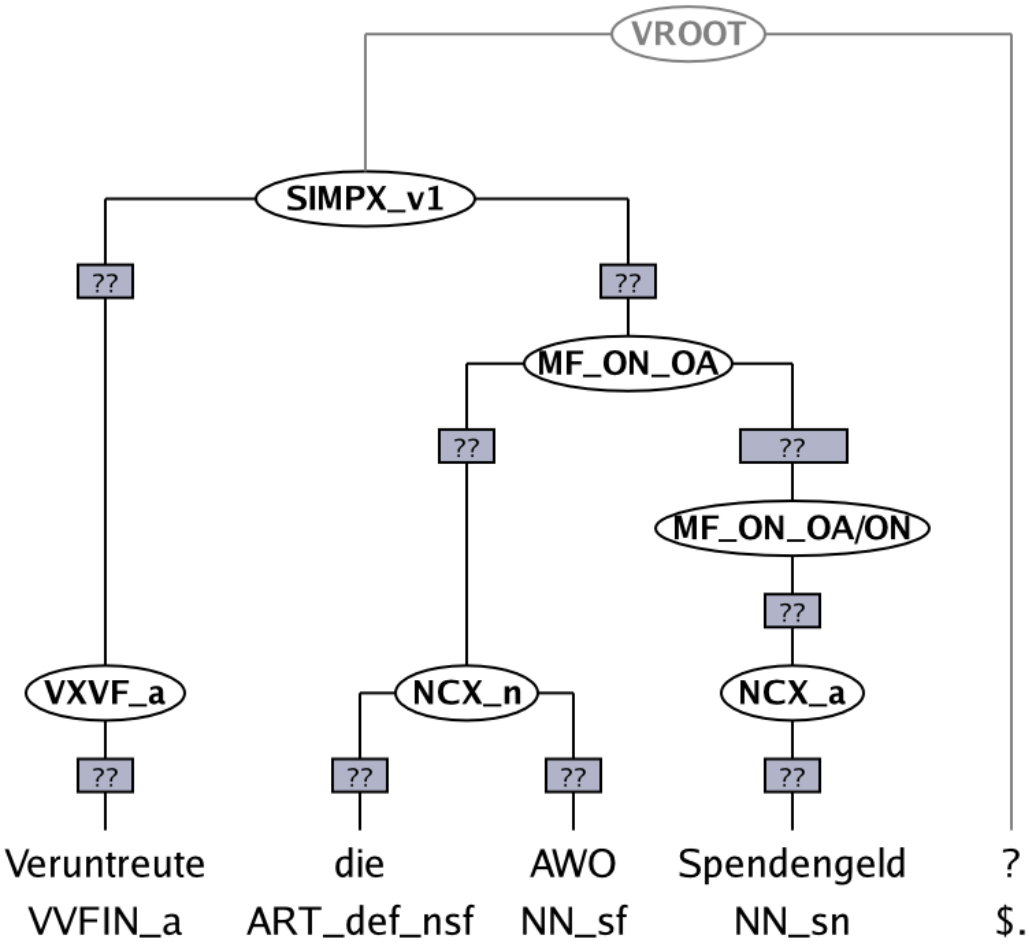
- Limiting yourself to the information that can be estimated from the treebank
  - Underspecified morphology
  - Disregarding rare verb complements in subcategorization
  - Better unknown word classification

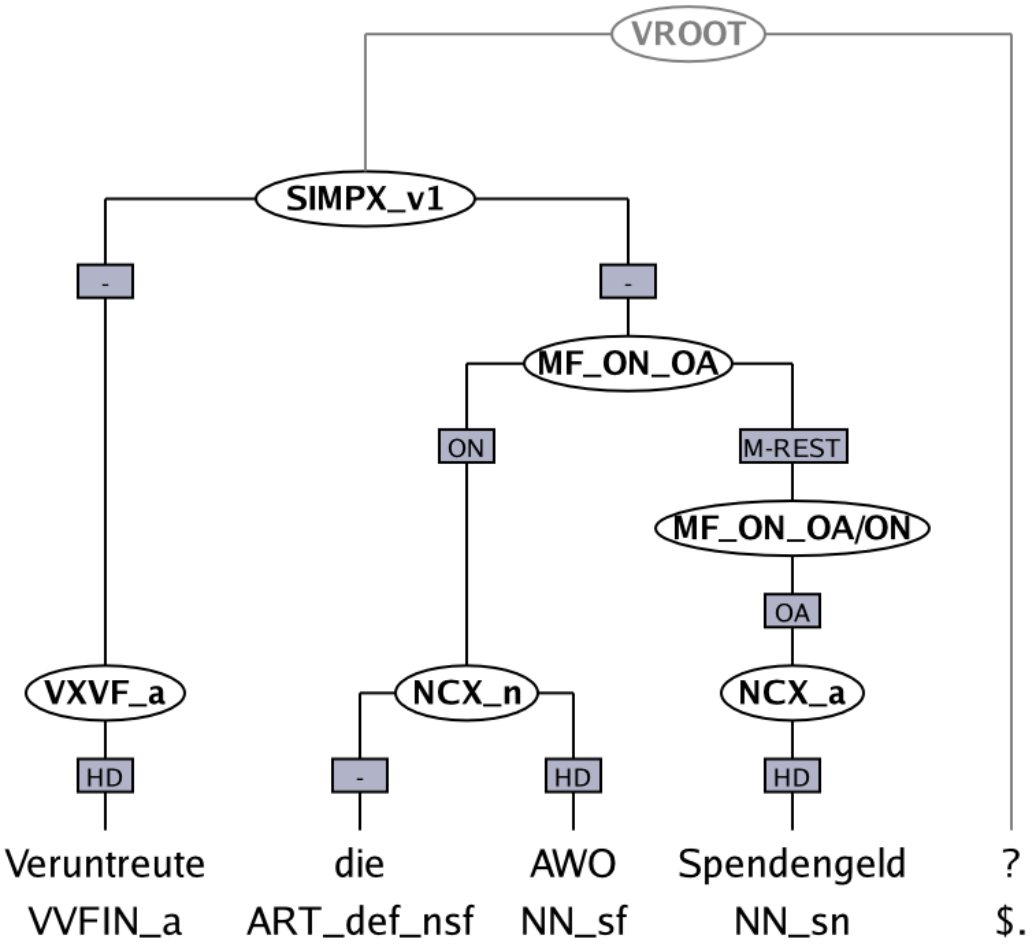
An Example: Treebank



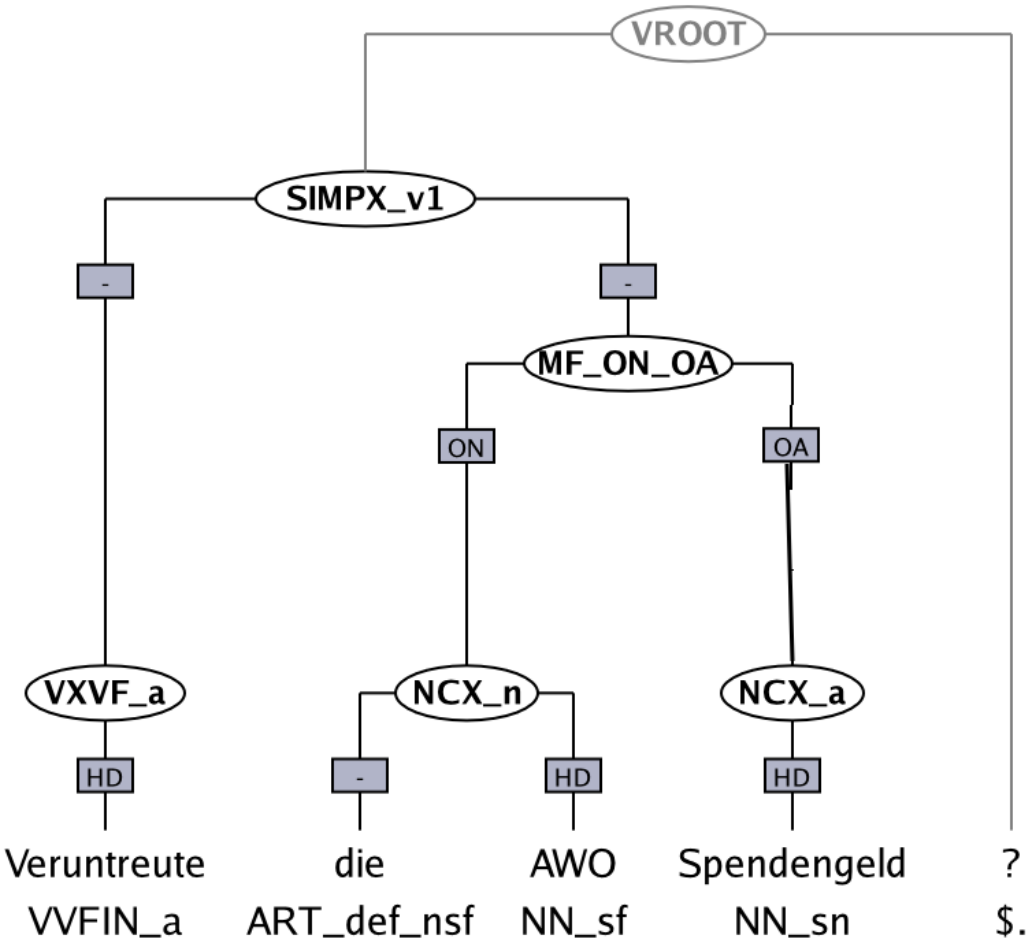
An Example: PCFG



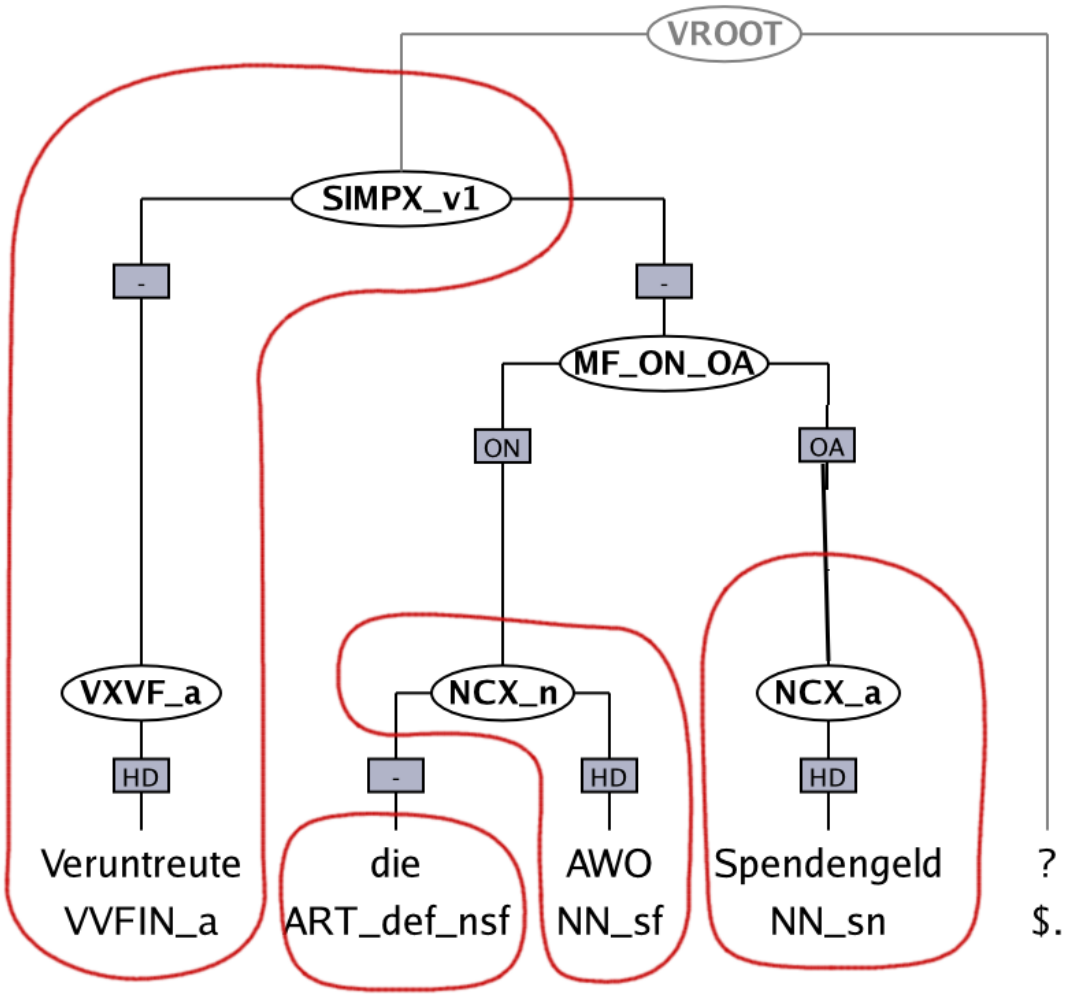
An Example: Relabeling



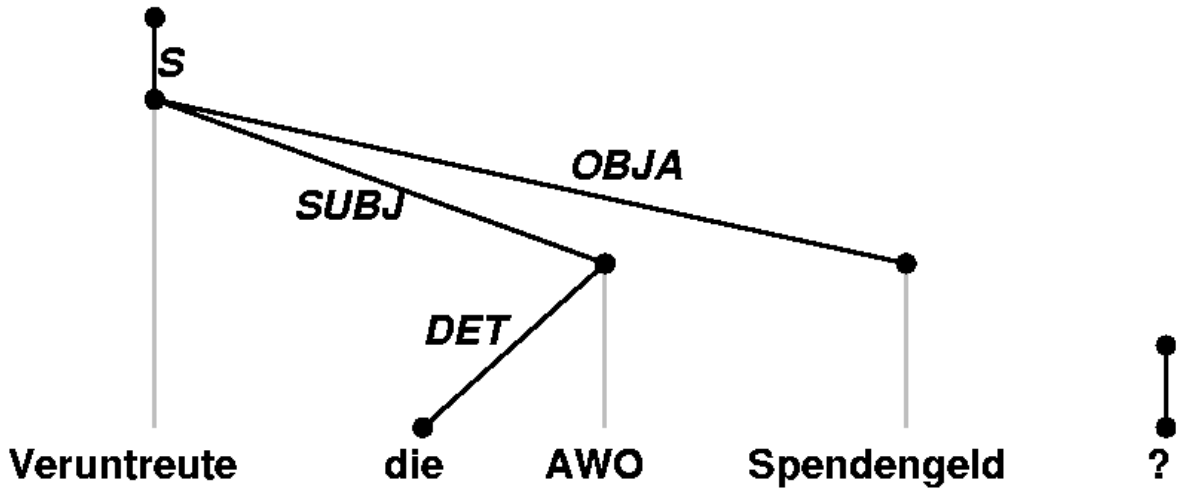
An Example: Undo Markovization



An Example: Head projection



An Example: Dependencies



Results (quantitative)

- Baseline for the unmodified treebank grammar:
  80.0% unlabeled F-measure against manually converted trees
  78.0% on Negra
- TüBa-D/Z:
  85.4% unlabeled F-measure against manually converted trees
  87.2% against automatically converted trees
- Negra:
  84.1% on development set (sent. 1-3000),
  83.6% on unseen test set (sent. 18 603-19 602)
- Grammatical functions on TüBa-D/Z (F-measure):
  86.9% (SUBJ), 73.5% (OBJA), 53.8% (OBJD)

Comparison to previous work

- For the grammatical function task, Foth's WCDG parser performs slightly better than Müller's parser, which in turn visibly outperforms the PCFG parser
- On the Negra test set, our PCFG parser performs better than Schiehlen's (83.6% vs. 81.7% unlabeled F-measure)
  Foth's WCDG parser outperforms both (89.0% unlabeled F-measure)
- For the "serious literature" texts, our PCFG parser is slightly better in terms of unlabeled F-measure (80.7% vs. 78.0%)
- For the law text, our PCFG parser performs much worse than Foth's WCDG parser (62.2% vs. 88.8%)

Conclusion

- With existing tools, it is possible to construct an unlexicalized PCFG parser from a treebank in a reasonable timeframe (about 6 months).
- Statistical parsing for German[2] is lacking not only in comparison with results for English, but also in comparison with manually constructed parsers for German
- Introducing morphological features is important, but easily leads to sparse data problems in a PCFG.
- Outlook: Reranking with global features

[2] This probably applies to other languages with freer word order

Thanks for listening

The End

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