



PASCAL

Pattern Analysis, Statistical Modelling and  
Computational Learning



# Competition 2 – Information Retrieval

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# Overview

- Algorithms tested in an Information Retrieval task
  - English, German and Finnish
- Words in the documents and queries were replaced by the suggested segmentations
- If participant did not submit segmentations for the Competition 2 word list, shorter Competition 1 word list was used
  - Other words left unsegmented



# Example

- **Query:** Französische Atomtests
- **Doc 1:** Ein zweiter französischer Atomtest fand mit 15-20 kt Sprengkraft...
- **Doc 2:** Heim ist nicht automatisch ein gutes Heim...



# Example: Method A

- Query: `französisch +e atom test +s`
- Doc 1: `ein zwei +t +er französisch +er  
atom test fand mit 15-20 kt  
spreng kraft...`
- Doc 2: `heim ist nicht automat isch  
ein gut +es heim...`



# Example: Method B

- Query: fran zö sische a tom tes ts
- Doc 1: ein z weiter **fran zö** sischer **a tom** test fand mit 15-20 kt spr eng kraf t...
- Doc 2: heim ist nicht au **tom a** tisch ein gu **tes** heim...



# Setup

- LEMUR-toolkit: <http://www.lemurproject.org/>
- Okapi BM25 ranking
- Stoplist for the most common morphemes
  - a fixed threshold for corpus frequency



# Evaluation

- Mean Average Precision (MAP)

Rank	Doc. ID	Relevant?	Recall	Precision	Total Rel.
					6
1	17		0	0	
2	22	YES	0.17	0.5	
3	4		0.17	0.33	
4	37		0.17	0.25	
5	34	YES	0.33	0.4	
6	8		0.33	0.33	
7	14		0.33	0.29	
8	43		0.33	0.25	
9	18		0.33	0.22	
10	31		0.33	0.2	



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- $AP = (0.5 + 0.4) / 6 = 0.15$
- Mean over all queries





# IR data sets (same as in 2007-2008)

- **Finnish (CLEF 2004)**
  - 55K documents from articles in Aamulehti 1994-95
  - 50 test queries, 23K binary relevance assessments
- **English (CLEF 2005)**
  - 107K documents from articles in Los Angeles Times 1994 and Glasgow Herald 1995
  - 50 test queries, 20K binary relevance assessments
- **German (CLEF 2003)**
  - 300K documents from short articles in Frankfurter Rundschau 1994, Der Spiegel 1994-95 and SDA German 1994-95
  - 60 test queries, 23K binary relevance assessments



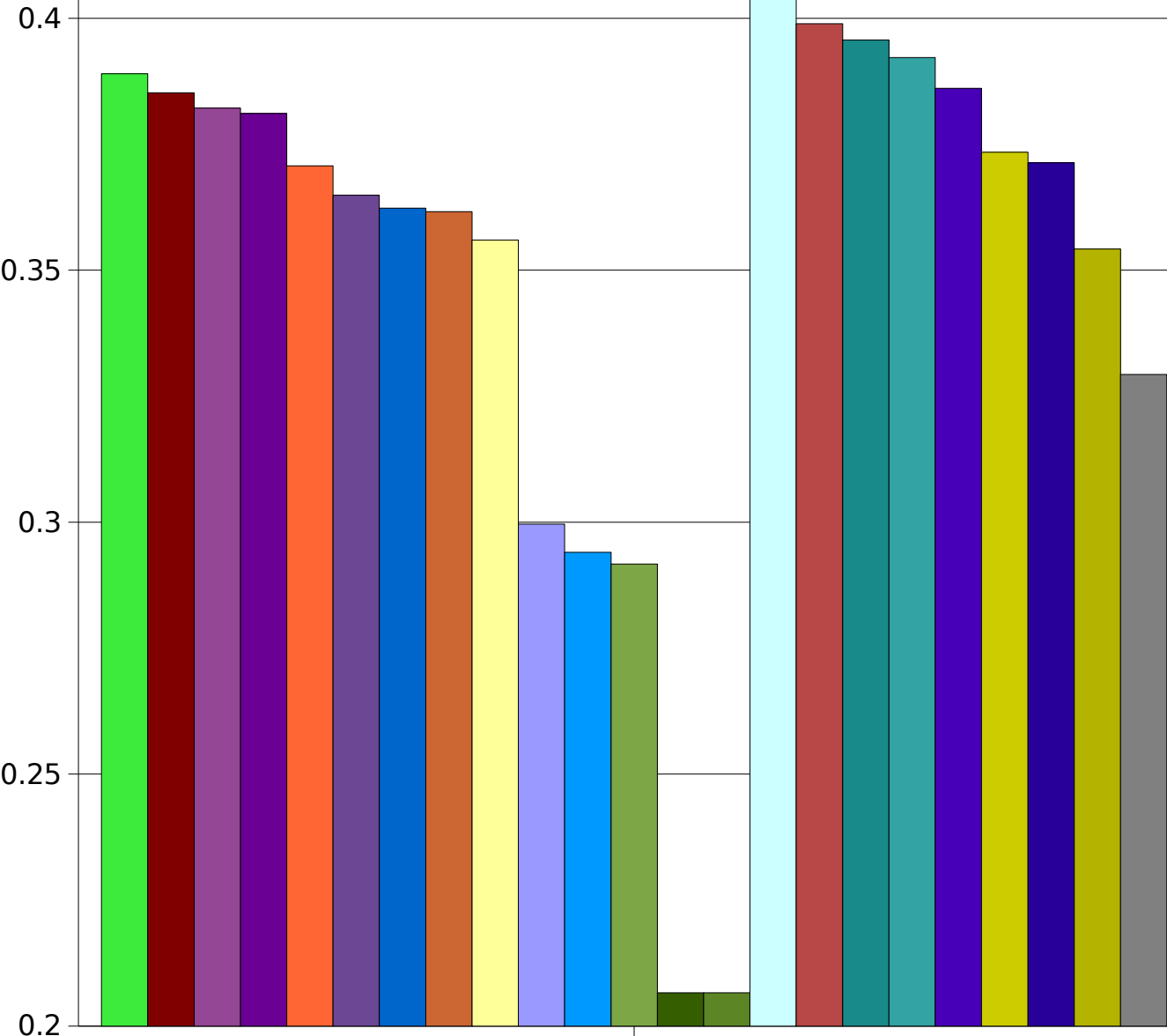
## Reference methods

- **Morfessor Baseline:** our public code since 2002
- **Morfessor Categories-MAP:** improved, public 2006
- **dummy:** no segmentation, all words unsplit
- **grammatical:** full gold standard segmentation (reference of Competition 1)
  - all: all alternative segmentations included
  - first: only the first alternative chosen
- **TWOL:** word normalization by a commercial rule-based morphological analyzer (all & first)
- **Snowball:** Language specific stemming



# English results

## Reference methods

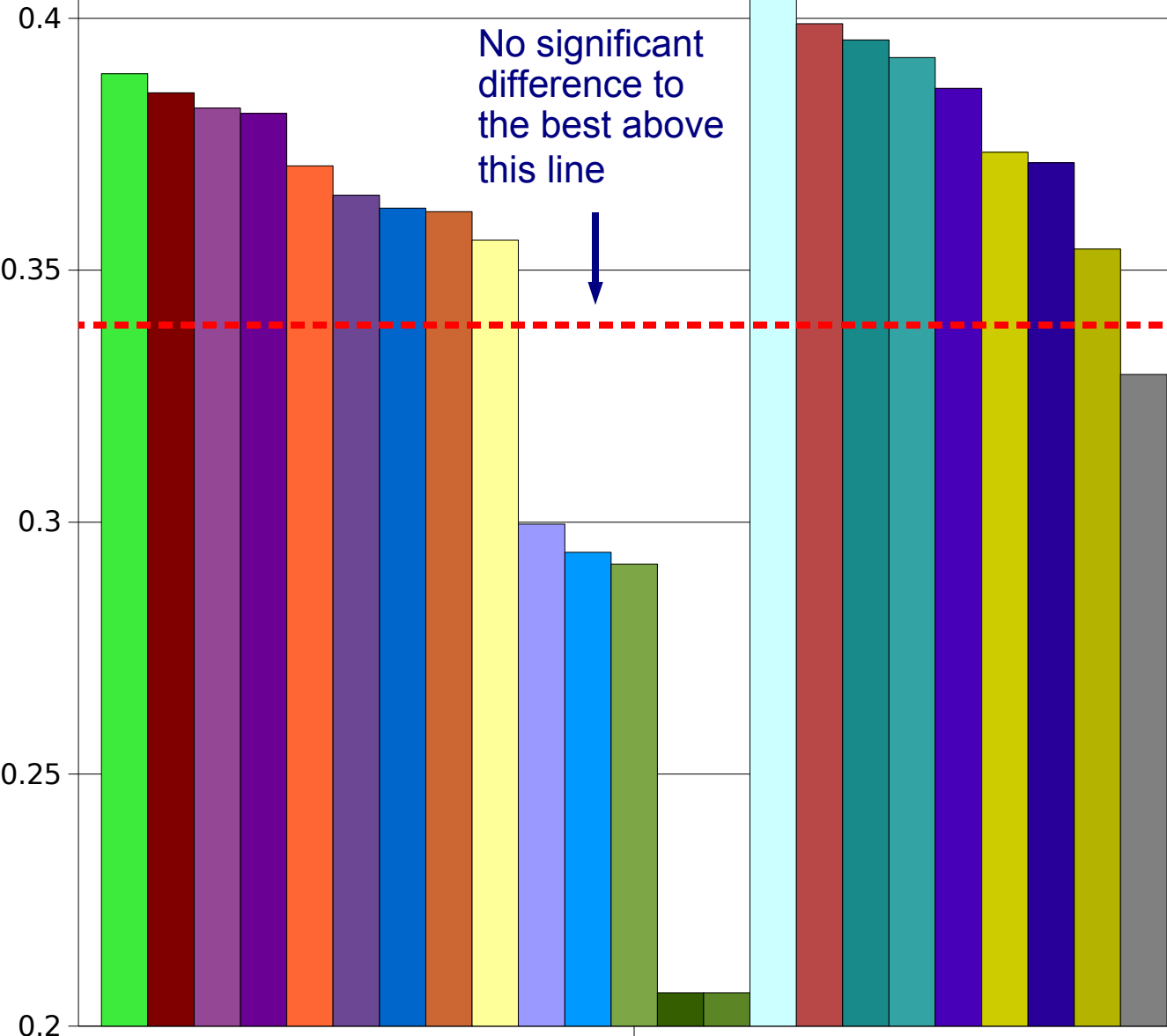


- [Lignos et al.]\*
- [Virpioja & Kohonen] Allomorfessor
- [Monson et al.] ParaMor Mimic
- [Monson et al.] ParaMor-Morfessor Union
- [Lavellée & Langlais] RALI-ANA\*
- [Monson et al.] ParaMor-Morfessor Mimic
- [Tchoukalov et al.] MetaMorph\*
- [Lavellée & Langlais] RALI-COF\*
- [Bernhard] MorphoNet
- [Golénia et al.] UNGRADE\*
- [Can & Manandhar]\*
- [Spiegler et al.] PROMODES\*
- [Spiegler et al.] PROMODES 2\*
- [Spiegler et al.] PROMODES committee\*
- snowball porter
- Best2008 (Monson Paramor+Morfessor)
- TWOL first
- TWOL all
- Morfessor Baseline
- grammatical first
- Morfessor CatMAP
- grammatical all
- dummy



# English results

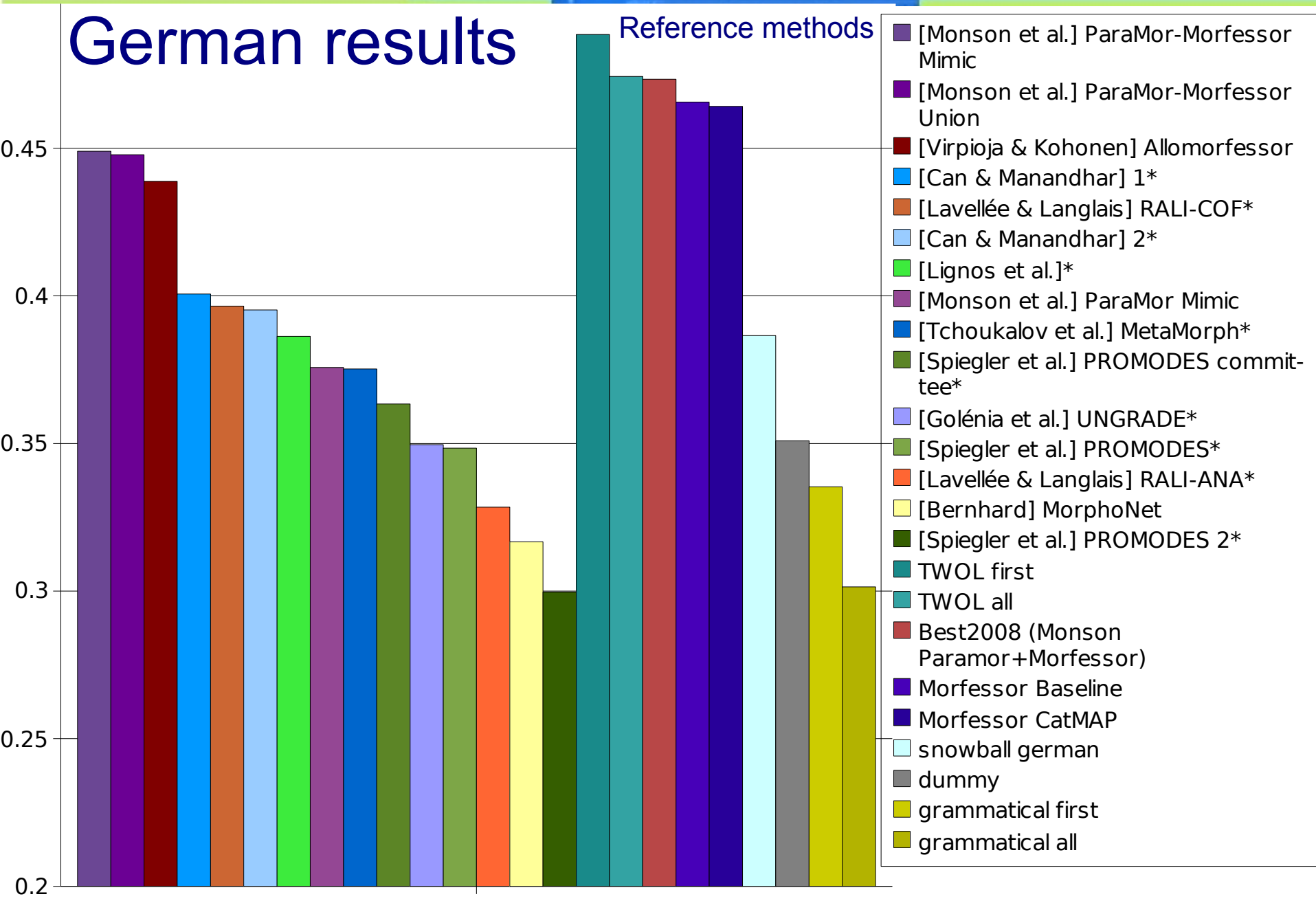
## Reference methods



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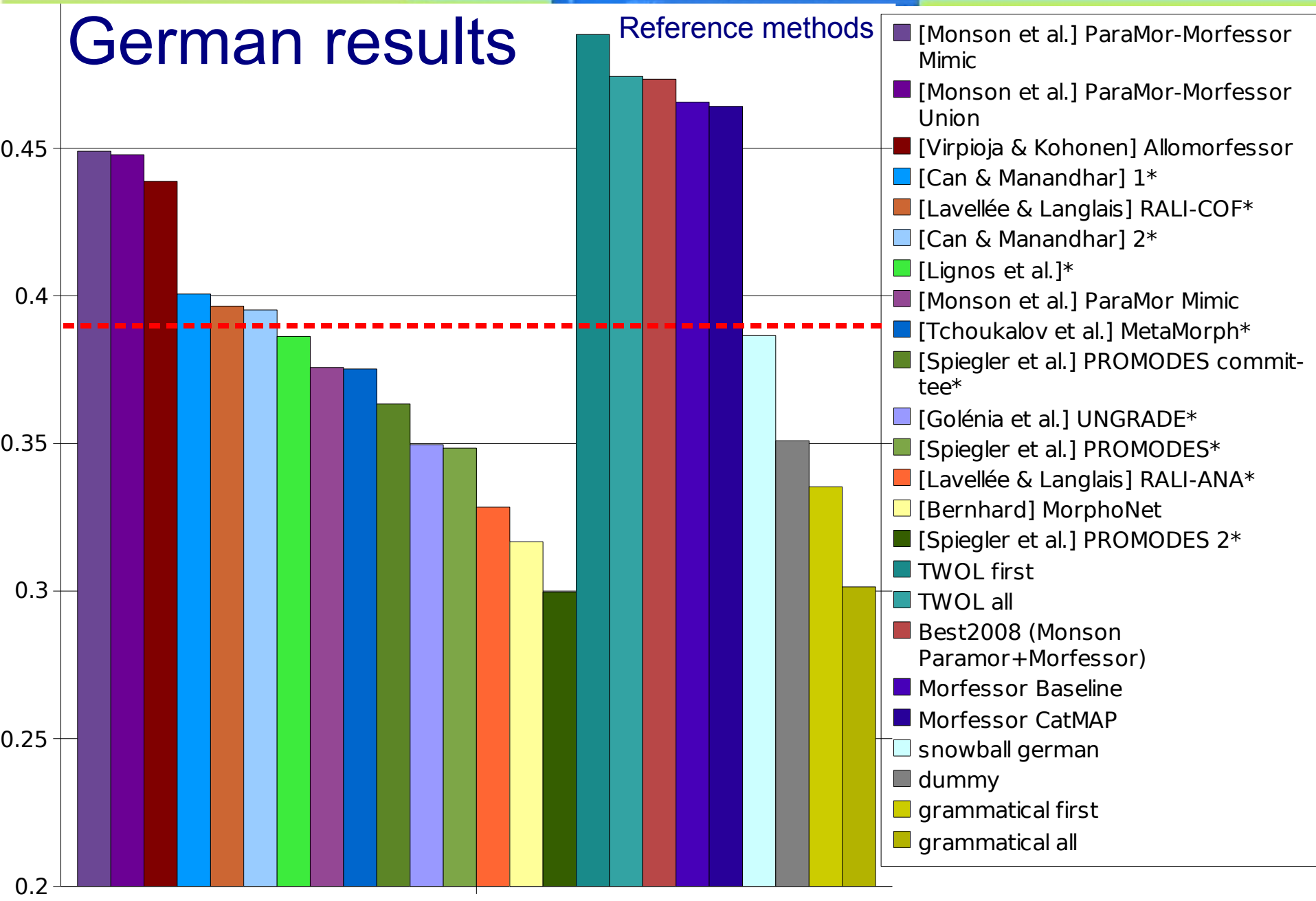


# German results





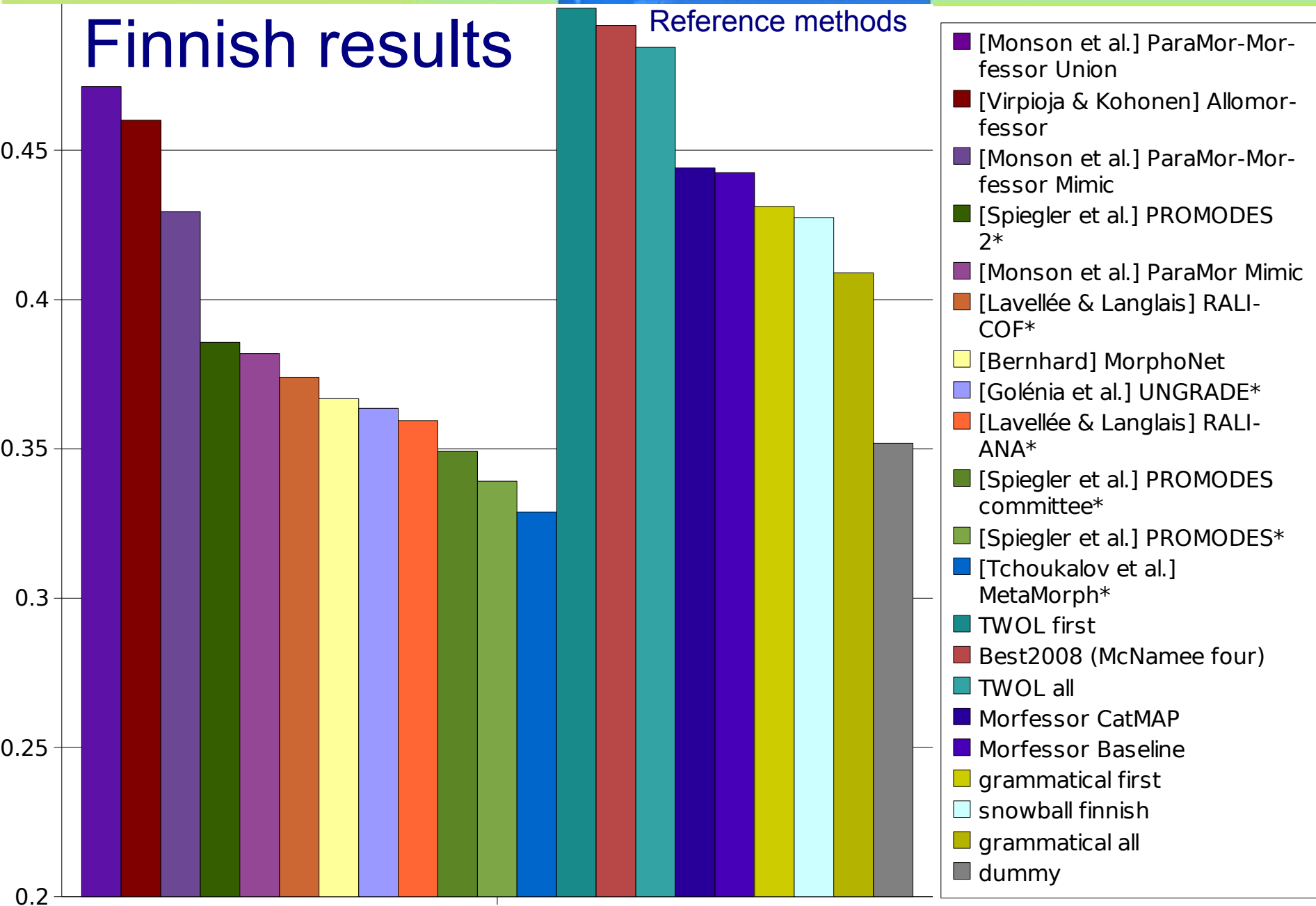
# German results





# Finnish results

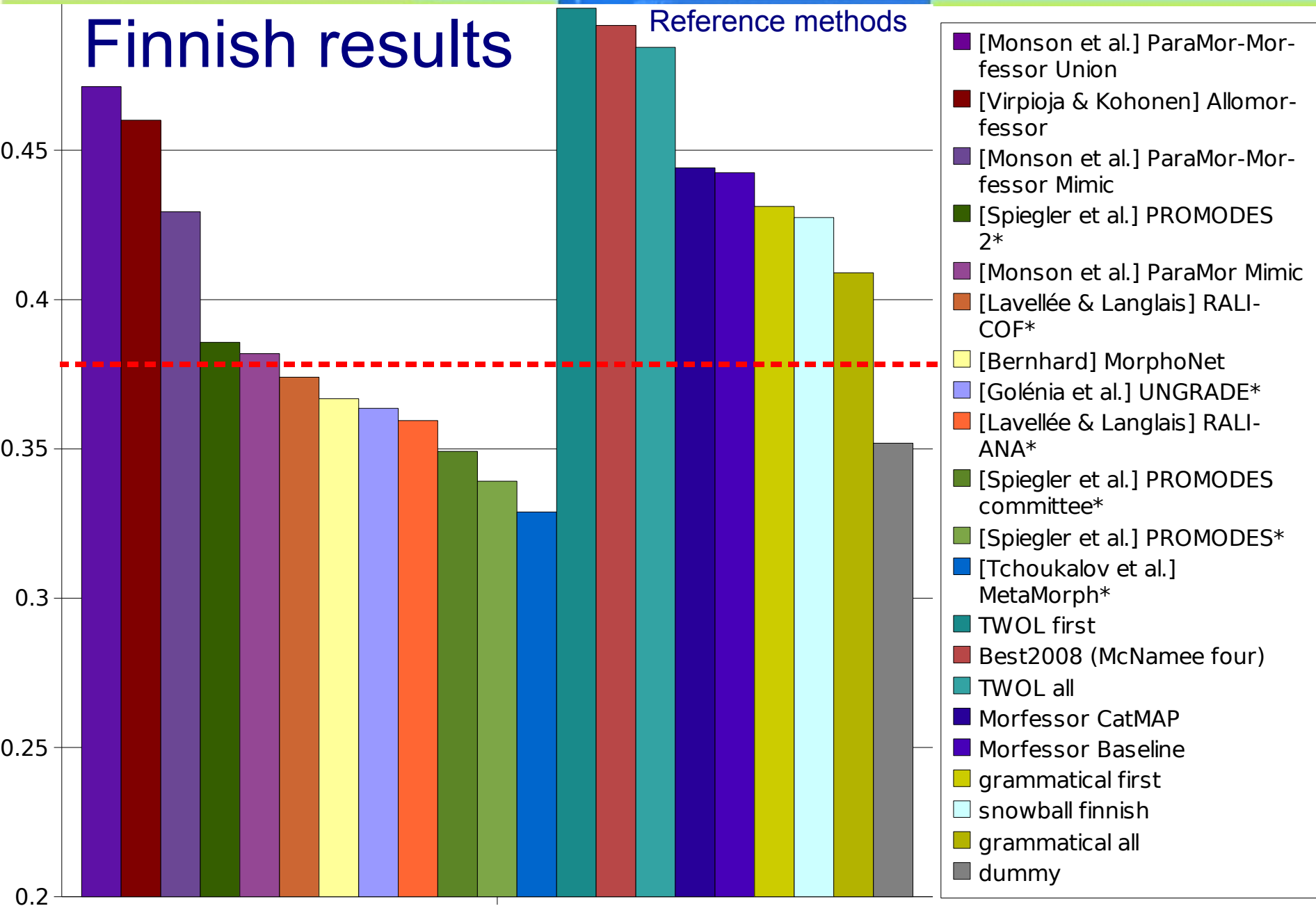
Reference methods





# Finnish results

Reference methods



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# Discussion

- Results not improved from last year
- Hard to achieve statistically significant differences
- No clear winner
- Strong in all languages:
  - “ParaMor-Morfessor Union” & “Mimic”
  - “Allomorfessor”
- Full word list not submitted by all participants
  - Comparison bit more difficult



# Conclusions

- IR evaluations for 3 languages (out of 5)
- Good results in all languages by several algorithms
  - => Unsupervised morphological analysis is a viable approach for IR
- Full report and papers in the CLEF proceedings
- Details, presentations, links, info at:  
<http://www.cis.hut.fi/morphochallenge2009/>