

# Inducing multi-sense word representations multilingually

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Ambiguity in L1 can correspond to smaller ambiguity in L2  
[Snyder and Barzilay, 2010]

**Polysemy** resolution in L1 can be grounded in **translation**  
[Brown et al., 1991, Dagan and Itai, 1994]

Likely to be successful when:

- translated word is monosemous
- L1 and L2 polysemies don't overlap
- using context words in L2

Can this be useful in learning word representations?

- learn sense inventory and mapping
    - use L2 here
  - learn sense-specific word embeddings
- } jointly

rock\_0

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mud 0.897  
grass 0.877  
deep 0.874  
sea 0.872  
cloud 0.870  
bush 0.858  
canopy 0.856  
reef 0.855  
rough 0.851  
vine 0.849  
hollow 0.844  
surrounding 0.841  
boulder 0.840  
leaf 0.839  
spiral 0.839



rock\_1

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band 0.919  
pop 0.907  
rapper 0.872  
indie 0.870  
punk 0.860  
album 0.823  
duo 0.820  
supergroup 0.811  
singer 0.784  
metal 0.783  
trio 0.781  
songwriter 0.773  
guitarist 0.764  
Pop 0.759  
metalcore 0.758



rock\_2

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disco 0.899  
pop 0.891  
roll 0.883  
gospel 0.882  
hip 0.867  
psychedelic 0.862  
hardcore 0.856  
jazz 0.852  
hop 0.847  
contemporary 0.846  
mainstream 0.842  
grunge 0.841  
techno 0.839  
glam 0.837  
progressive 0.836



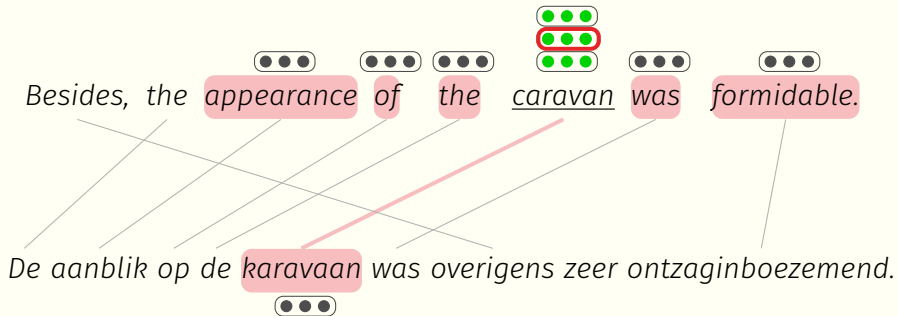
*Besides, the appearance of the caravan was formidable.*

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*De aanblik op de karavaan was overigens zeer ontzaginboezemend.*



sense selection  $p(s|x_i, C_i, C'_i)$





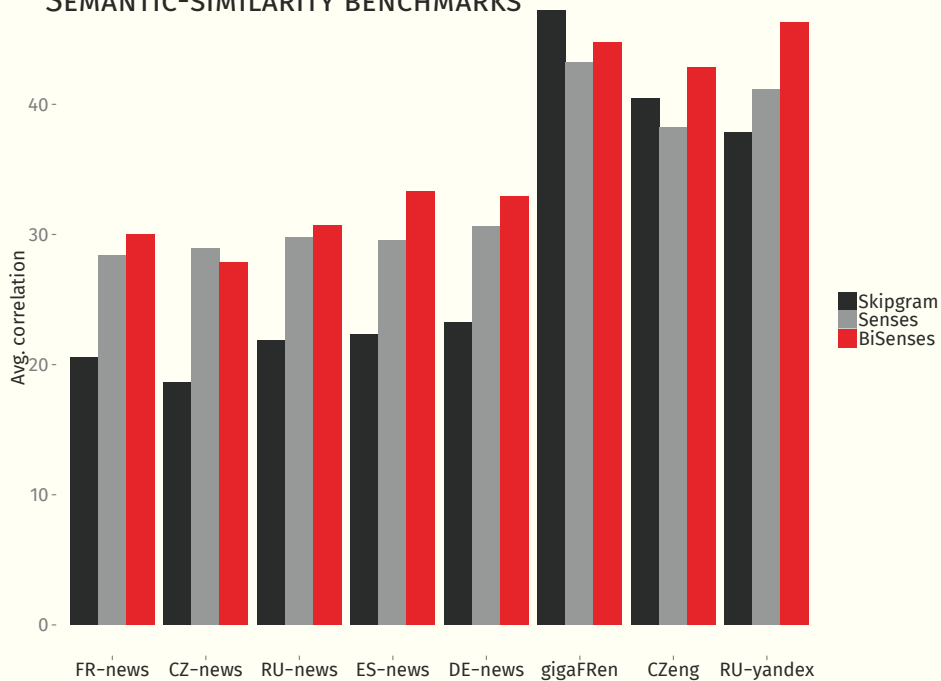
context-word prediction  $p(x_j|x_i, s)$



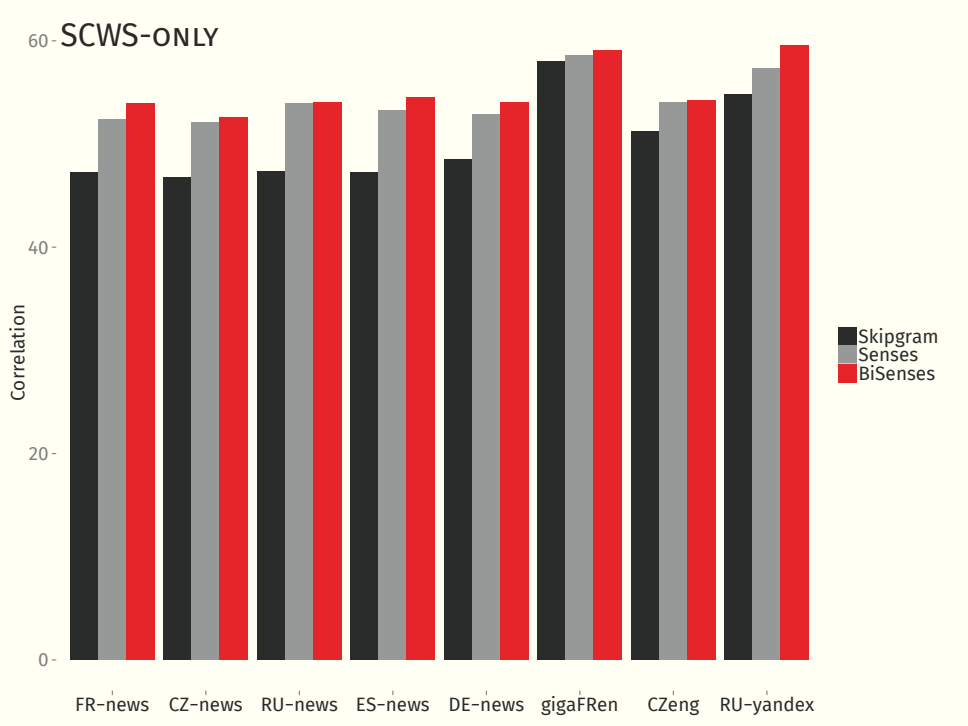
Besides, the appearance of the caravan was formidable.

~~De aanblik op de karavaan was overigens zeer ontzaginboezemend.~~

# SEMANTIC-SIMILARITY BENCHMARKS



60-SCWS-ONLY





Brown, P. F., Pietra, S. A. D., Pietra, V. J. D., and Mercer, R. L. (1991).

Word-sense disambiguation using statistical methods.  
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Climbing the Tower of Babel: Unsupervised Multilingual Learning.

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