



The semantics of *-ee* and *-ation*: a distributional semantic approach

Viktoria Schneider

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Introduction: eventuality-related nominalizations

- What are eventuality-related nominalizations?
 - (1) *employee, trainee*
→ participant reading
 - (2) *Markham sets down the rules about park befoulment.* (Plag et al. 2018: 474)
→ whole eventuality reading
- Semantic representation provides eventualities and participants for word formation process (e.g., Plag et al. 2018, Kawaletz 2021)
- Research tends to focus on deverbal nominalizations (e.g., Barker 1998; Alexiadou 2010; Kawaletz & Plag 2015; Plag et al. 2018; Kawaletz 2021)
- Many nominalizing suffixes also attach to non-verbal bases (e.g., Plag 1999, 2004; Bauer et al. 2013)

Introduction: Distributional Semantics

- Distributional Semantics useful for analysis of nominalizations
(e.g., Lapesa et al. 2018; Wauquier et al. 2018; Huyghe & Wauquier 2020)
- Difference in meaning = difference in distribution
- Word vector: computed by list of words in context of target word
- Distance between vectors = semantic similarity
 - High distance → unsimilar
 - Low distance → similar
- Measured in cosine similarity (other measures available)
 - Higher cosine similarity = higher similarity of semantics of words

(see, e.g., Lapesa et al. 2018)

Research questions

- How similar are the meanings of a derivative and its base word?
 - How similar are the meanings of **denominal** derivatives and their base words?
 - How similar are the meanings of **deverbal** derivatives and their base words?
- Which factors influence the cosine similarity between base and derivative?
- Do we find differences regarding different suffixes?
- Focus on *-ee* and *-ation*

Hypotheses

- Base and derivative similar
 - Eventive elements for word formation process already in base (e.g., Plag et al. 2018, Kawaletz 2021)
- Verbal bases more similar to their derivatives than nominal bases to their derivatives
 - Verbs clearly eventive (e.g., Van Valin & LaPolla 1997; Haspelmath 2001; Szabó 2015)
 - Word formation process more straightforward
 - Eventive elements easier identifiable for word formation process

Method

- FastText (Mikolov et al. 2018) *Common Crawl* subword model
 - 2 million pre-trained word vectors
 - Contains subword information to create new vectors based on *n*-grams
- Compare cosine similarity of denominal/deverbal derivatives and their nominal/verbal bases

Method

- Beta regression models to determine which factors influence the cosine similarity
 - Dependent variable: cosine similarity between base and derivative, range of (0,1)

Variables of interest	Expectation
Relative frequency of base/derivative	Higher relative frequency leads to higher segmentability (e.g., Hay & Baayen 2003) → higher cosine similarity
Word class of base	Verbal bases more similar to derivatives due to clearer eventuality
Polysemy of base	Higher polysemy of base leads to decrease of cosine similarity

biographee

debtee

The suffix *-ee*

46 denominal 312 deverbal

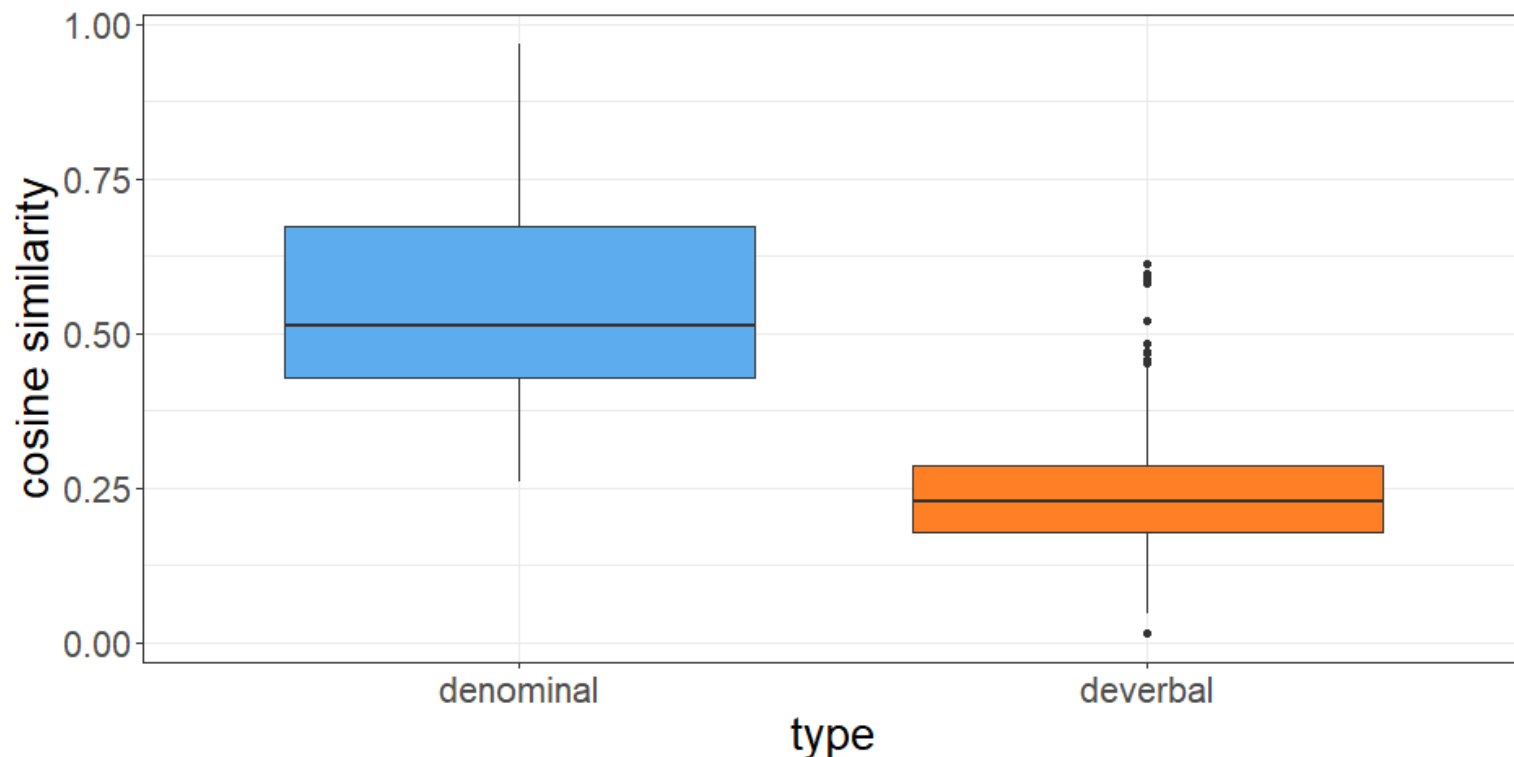
covenantee

mentee

tutee

Similarity nominal and verbal bases and derivatives for *-ee*

- Cosine similarity of denominal derivatives and nominal bases higher than that of deverbal derivatives and verbal bases
- Contra expectation that deverbal derivatives more similar to verbal bases



Beta regression model -ee

- Polysemy of base
 - Not significant
- Relative frequency
 - Significant
 - Higher relative frequency decreases cosine similarity
 - Not expected
- Word class base
 - Significant
 - Cosine similarity decreases if base is a verb
 - Not expected

concertation

pixelation

The suffix *-ation*

67 denominal 72 deverbal

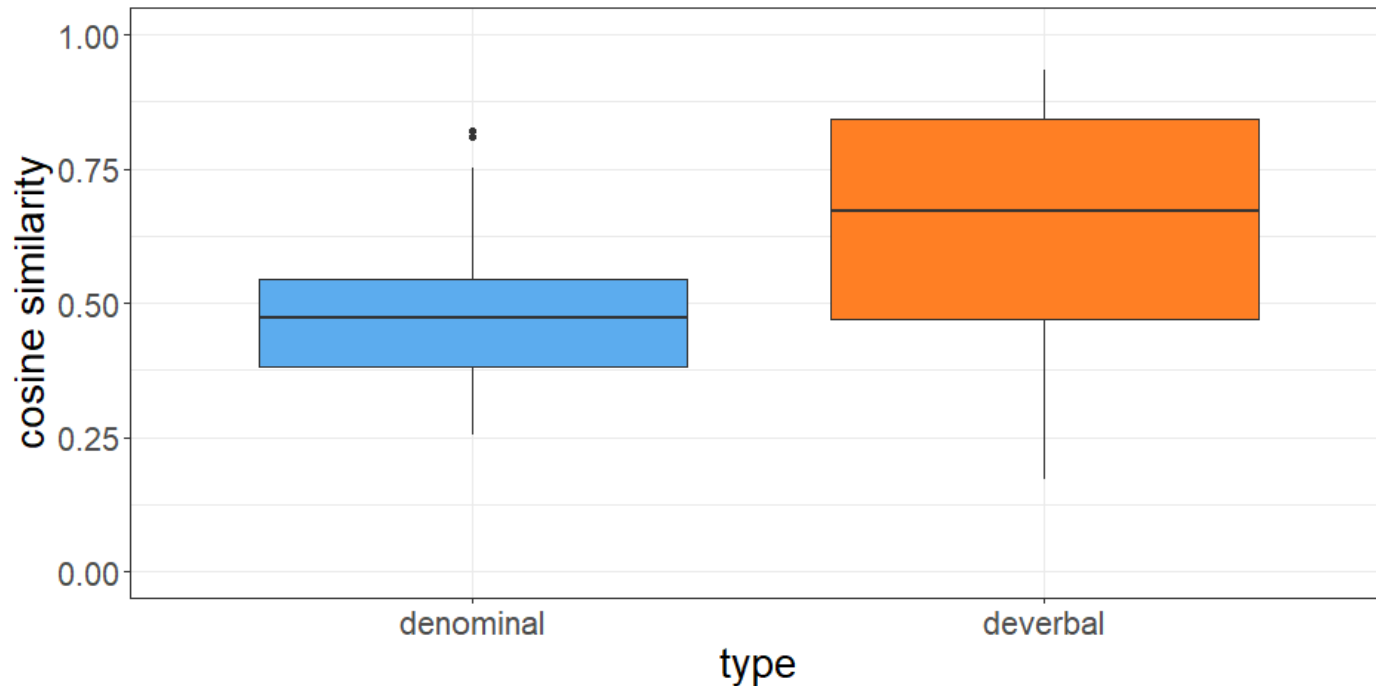
ozonation

instrumentation

impactation

Similarity nominal and verbal bases and derivatives for *-ation*

- Denominal derivatives and nominal bases show lower cosine similarity than deverbal pairs → opposite picture than for *-ee*



Beta regression with principal component for *-ation*

- Correlations of relative frequency, base polysemy, word class
→ Principal Component (PC) Analysis to get rid of possible collinearity
- First principal component is retained for analysis as fulfills common criteria (e.g., O'Rourke et al. 2005; Baayen 2008; Schmitz et al. 2021)
 - Higher polysemy of base word decreases cosine similarity (expected)
 - Higher relative frequency decreases cosine similarity (unexpected)
 - Word class of base influences cosine similarity (verbal base higher cosine similarity, expected)

Differences *-ee* and *-ation*

- Cosine similarity
 - **Denominal** *-ee* derivatives more similar to nominal bases than **deverbal** derivatives to verbal bases
 - **Deverbal** *-ation* derivatives more similar to verbal bases than **denominal** derivatives to nominal bases
- Cosine similarity significantly influenced by
 - Relative frequency for both data sets (contra expectation)
 - Word class for both data sets (contra expectation for *-ee*, in line with expectation for *-ation*)
 - Polysemy of base for *-ation* data (in line with expectation)

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Thank you!
