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Grammatical Frequencies and Gender in Nordic Twitter Englishes

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27 September 2016

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Contexts of the Present Research

- Categorization of discourse, language genres or varieties based on the principal communicative functions exemplified by configurations of linguistic features (Biber 1988, 1995, 2006; Biber and Conrad 2009)
- English as it is used in the Nordic countries: CMC "Global Englishes" and the status of Nordic languages
- Gender and language: Do differences reported for L1 English in CMC (e.g. Wolf 2000, Baron 2004, Herring and Paolillo 2006, Herring 2013, Bamman et al. 2014) also hold true for English used in the Nordics?

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Data Collection

- Nordic data: Python script to get tweets from Streaming API
- Geo-encoded tweets from a bounding box circumscribing the Nordic countries (longitude -26 to 32, latitude 53 to 72)
- Data collected May 2016: 16.2 m tweets

- Filtering by `country` field: 302,737 tweets from Nordic countries of Iceland, Norway, Denmark, Sweden, and Finland
- Further filtering by `language` field: 101,956 tweets in English (1,475,553 tokens)

Gender Disambiguation

- `author_name` field for each user filtered for strings that either begin with or include as a discrete element the most common male and female given names by country
- Data: Name frequency information from national statistical offices
- Tweets from Sweden by users with the (invented) `author_name` values:

  Anna Andersson → Sweden female subcorpus
  سُعاد الأطرش → ignored
  zYlax85 → ignored
- Users matching both male and female names for a country → ignored
- Method assigned gender to 34% of Iceland, 49% of Norway, 62% of Denmark, 48% of Sweden, and 60% of Finland tweets
- 10 gendered subcorpora created (m and f for Iceland, Norway, Denmark, Sweden, and Finland)

Tokenization and PoS Tagging

- Carnegie-Mellon Twitter PoS Tagger (Gimpel et al. 2011; Gimpel et al. 2013, Owoputi et al. 2013)
- Penn Treebank tags (Marcus et al. 1993) tags, additional tags for Twitter-specific types (retweet, username, hashtag), emoticons get “interjection” tag
- Output consists of tab-separated token/tag/probability lines

```
83008   Slovenia        NNP 0,9735
83009   ,       ,       0,9905
83010   it's    PRP 0,8554
83011   very    RB  0,9529
83012   unimaginative   JJ  0,9728
83013   ,       ,       0,9903
83014   but CC  0,9990
83015   I   PRP 0,9940
83016   like    VBP 0,7748
83017   it  PRP 0,9969
83018   :D  UH  0,9909
83019   #BlueIsBlue HT  0,9774
83020   #RedIsRed   HT  0,9786
83021   #Eurovision HT  0,9851
83022   #ESC2016    HT  0,9375
83023   #ComeTogether   HT  0,9823
```

A tweet from Sweden about the Eurovision song contest

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English is used extensively in the Nordics on Twitter (Denmark > Norway > Finland > Sweden > Iceland

	National language(s)	English	Other languages
Iceland	7.76	3.13	0.10
Norway	3.43	7.32	9.23
Denmark	7.36	6.45	8.17
Sweden	6.62	2.24	2.13
Finland	3.56	3.27	4.16

Percent tweets by country and language

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- Females use English more than males on Twitter in Iceland, Norway and Denmark, while males use the national languages slightly more in Sweden and Finland
- The differences in English use by gender were statistically significant at $p < 0.05$ for all 5 countries (Fisher's exact test)
- Effect sizes (odds ratio θ): Iceland $= 1.96$, Norway $= 1.64$, Denmark $= 1.66$, Sweden $= 0.96$, Finland $= 0.82$

		female	male
Iceland	National language	5.71	8.80
	English	6.17	8.9
	Other language	9.10	4.9
Norway	National languages	3.37	6.46
	English	0.40	9.28
	Other language	7.22	5.24
Denmark	National language	7.25	4.45
	English	5.52	0.40
	Other language	8.21	6.14
Sweden	National language	8.63	9.61
	English	8.23	5.24
	Other language	4.12	6.13
Finland	National languages	5.58	2.57
	English	0.25	8.28
	Other language	5.16	0.14

Percent tweets by country, language, and gender

Geographical distribution of English tweets (gender-induced data)

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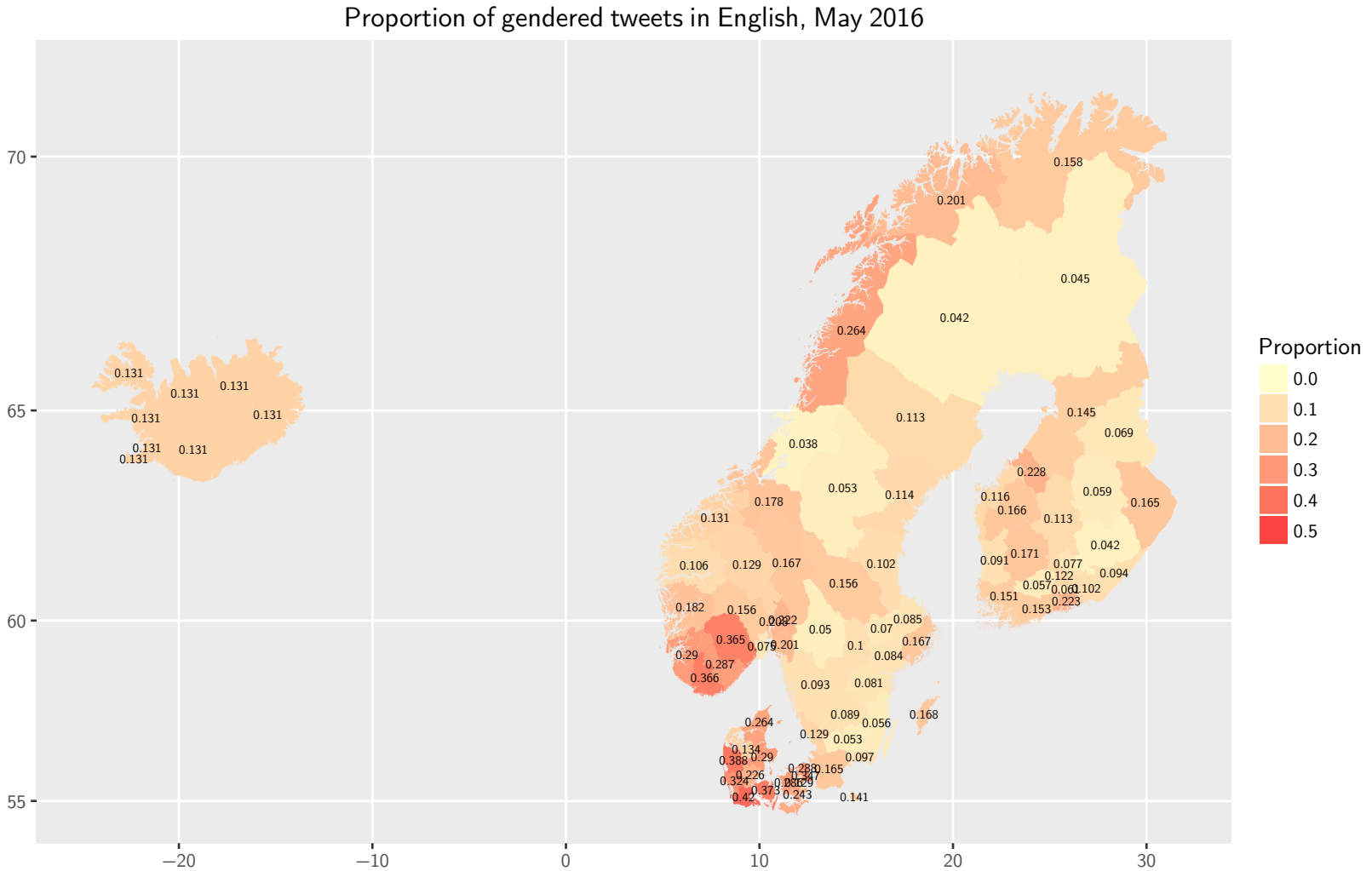

- Many tweets from Denmark and Norway are in English - from rural Sweden, Finland or Iceland less so (Iceland values averaged across all provinces)

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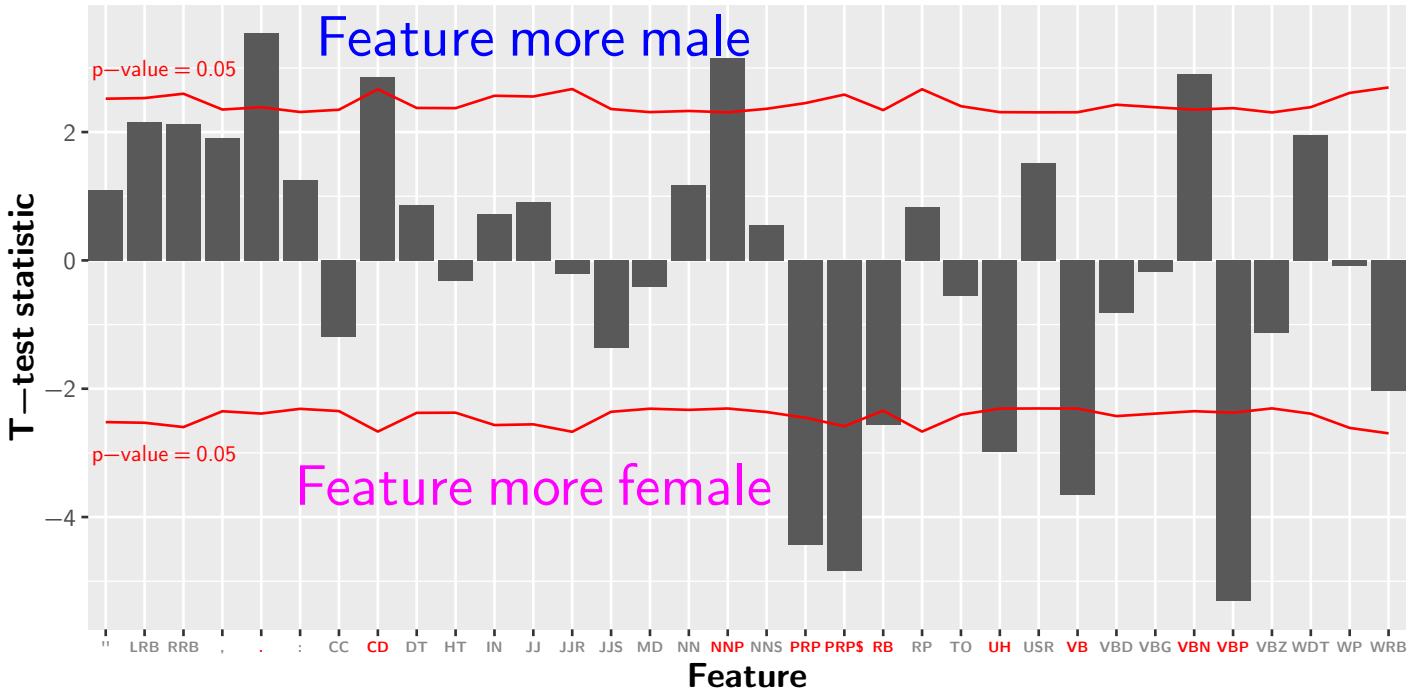

- For the entire English corpus, ten features exhibited significant differences in frequency of use by gender according to the results of Welch's two-sample t-test
- Males used more sentence-ending punctuation (.), numbers (CD), proper nouns (NNP), and past participles (VBN)
- Females used more personal pronouns (PRP), possessive pronouns (PRP$), adverbs (RB), interjections (UH), verbal base forms (VB), and non-3rd-person-present singular verb forms (VBP)

Correlation of Grammatical Features and Gender by Country

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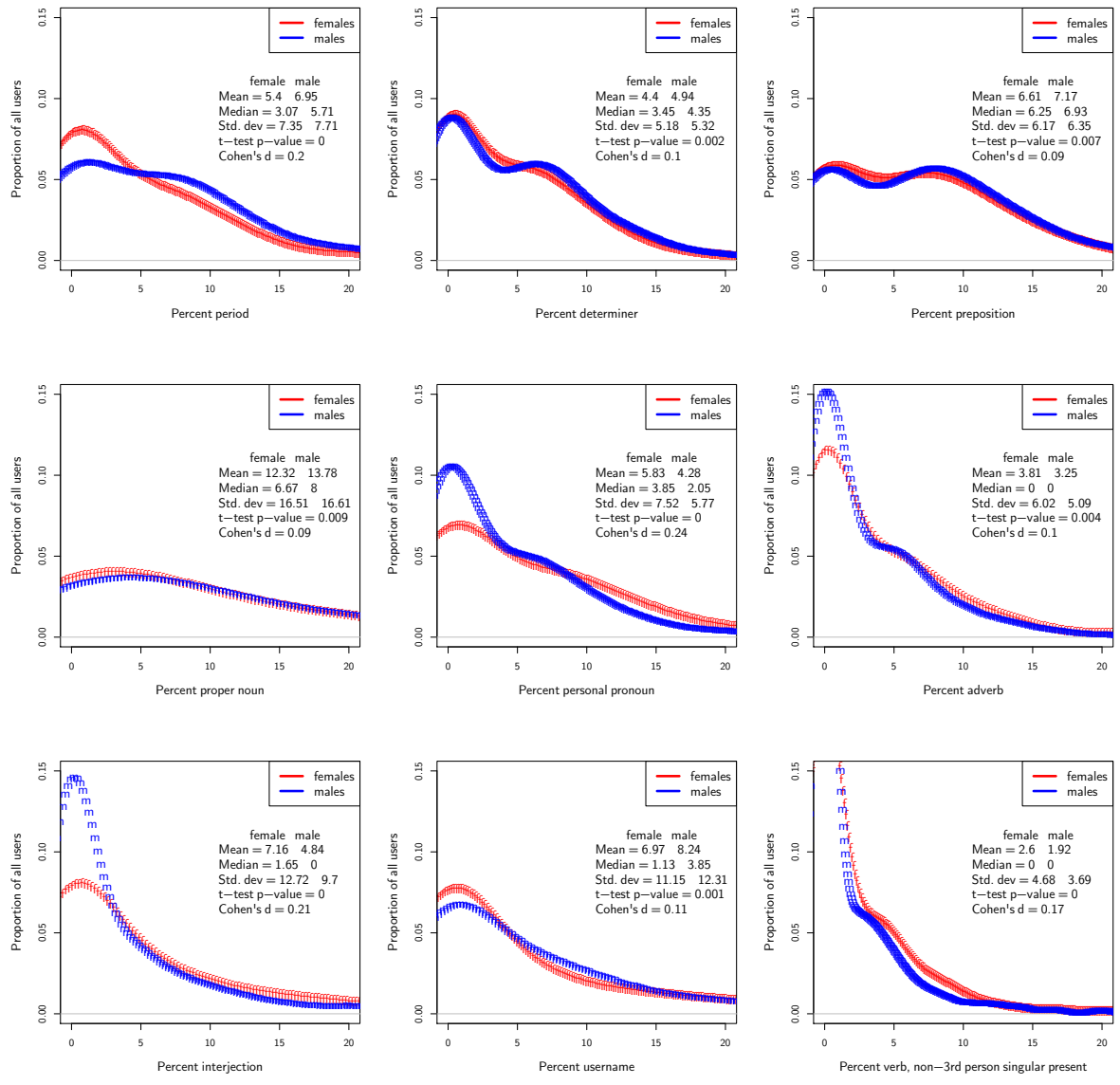
- Feature frequencies by country and gender
- For example Sweden: significant difference in use by gender for nine features
- Modest effect sizes (Cohen's D) – largest here is personal pronoun use



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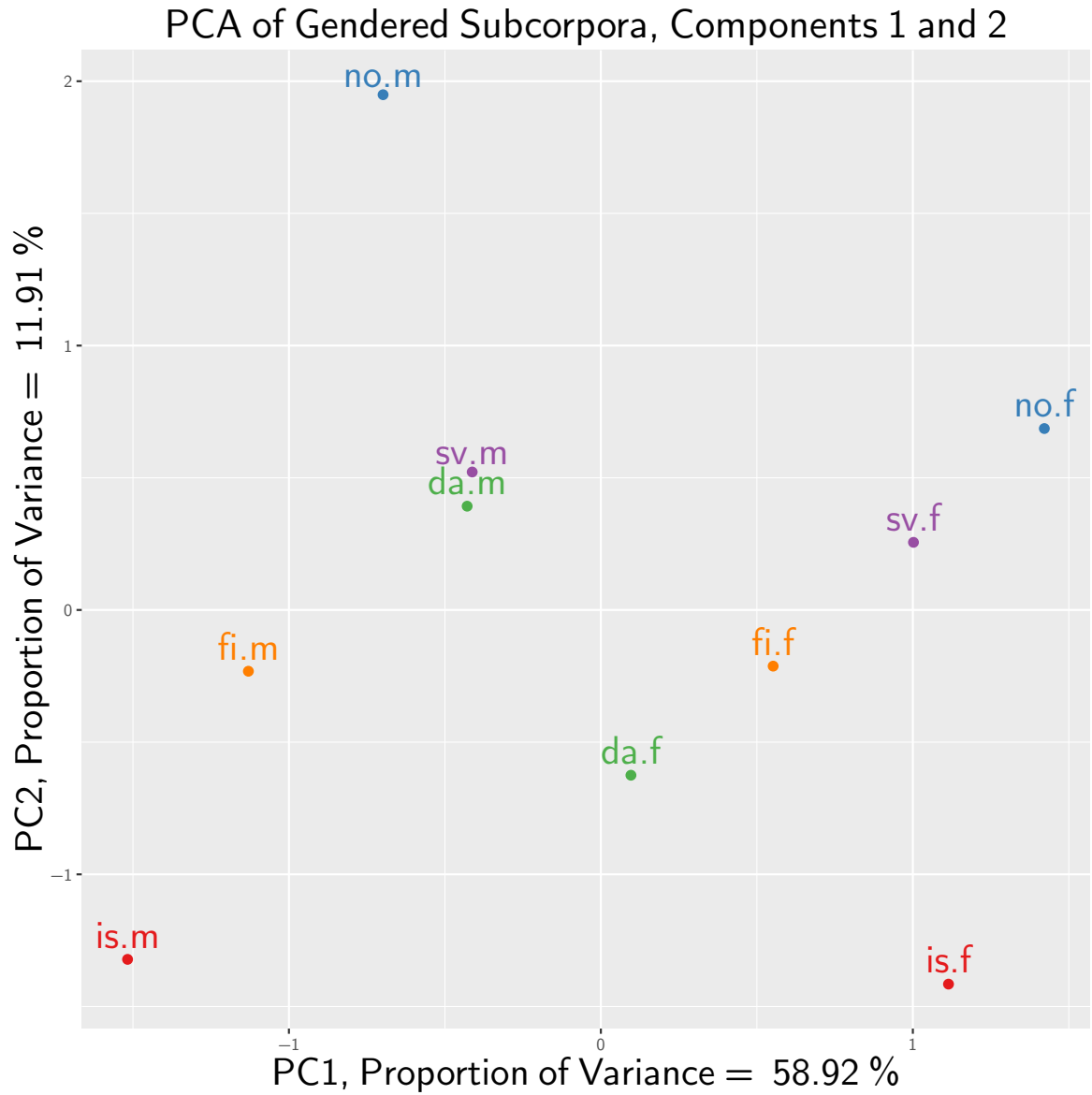

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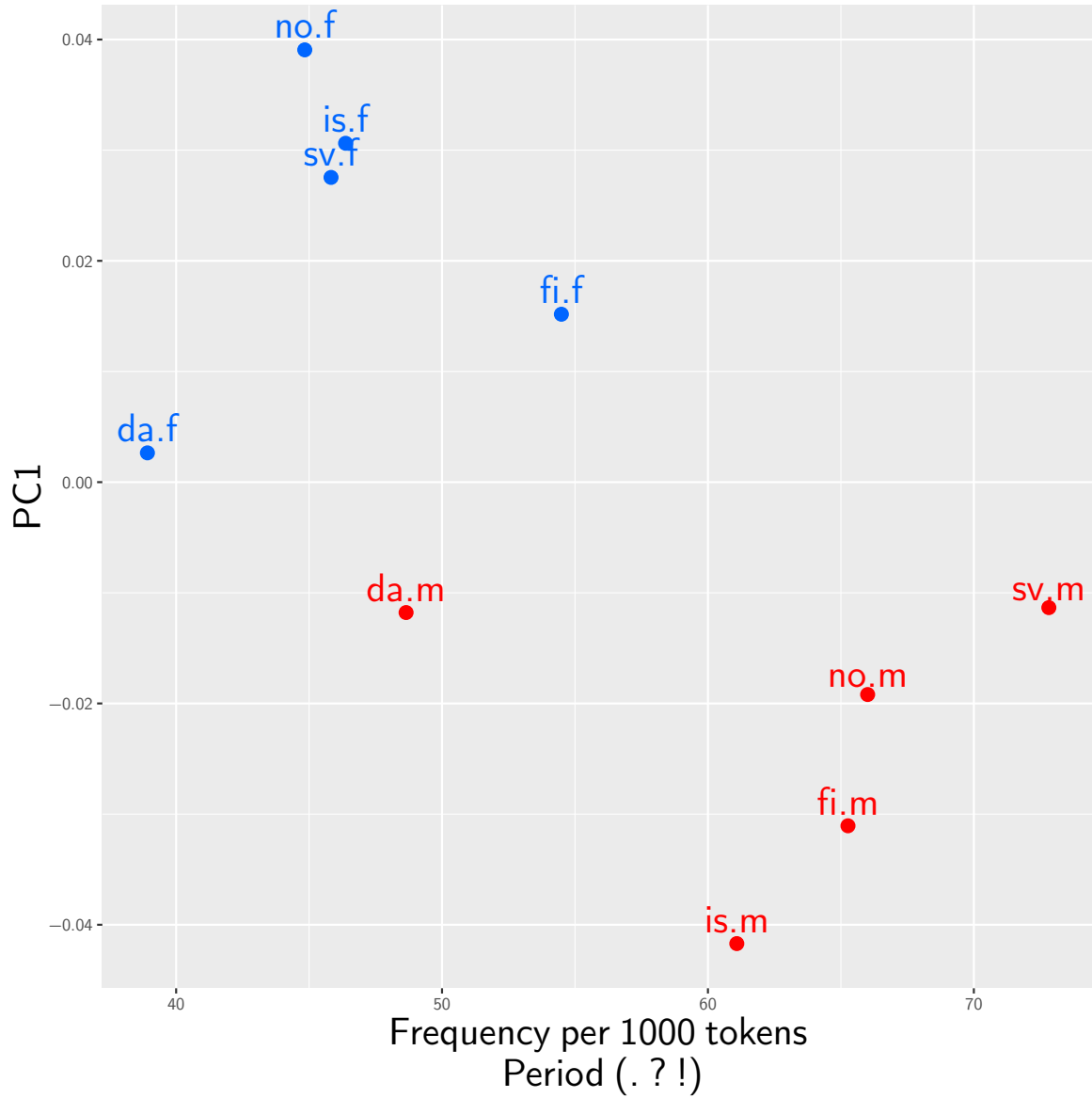

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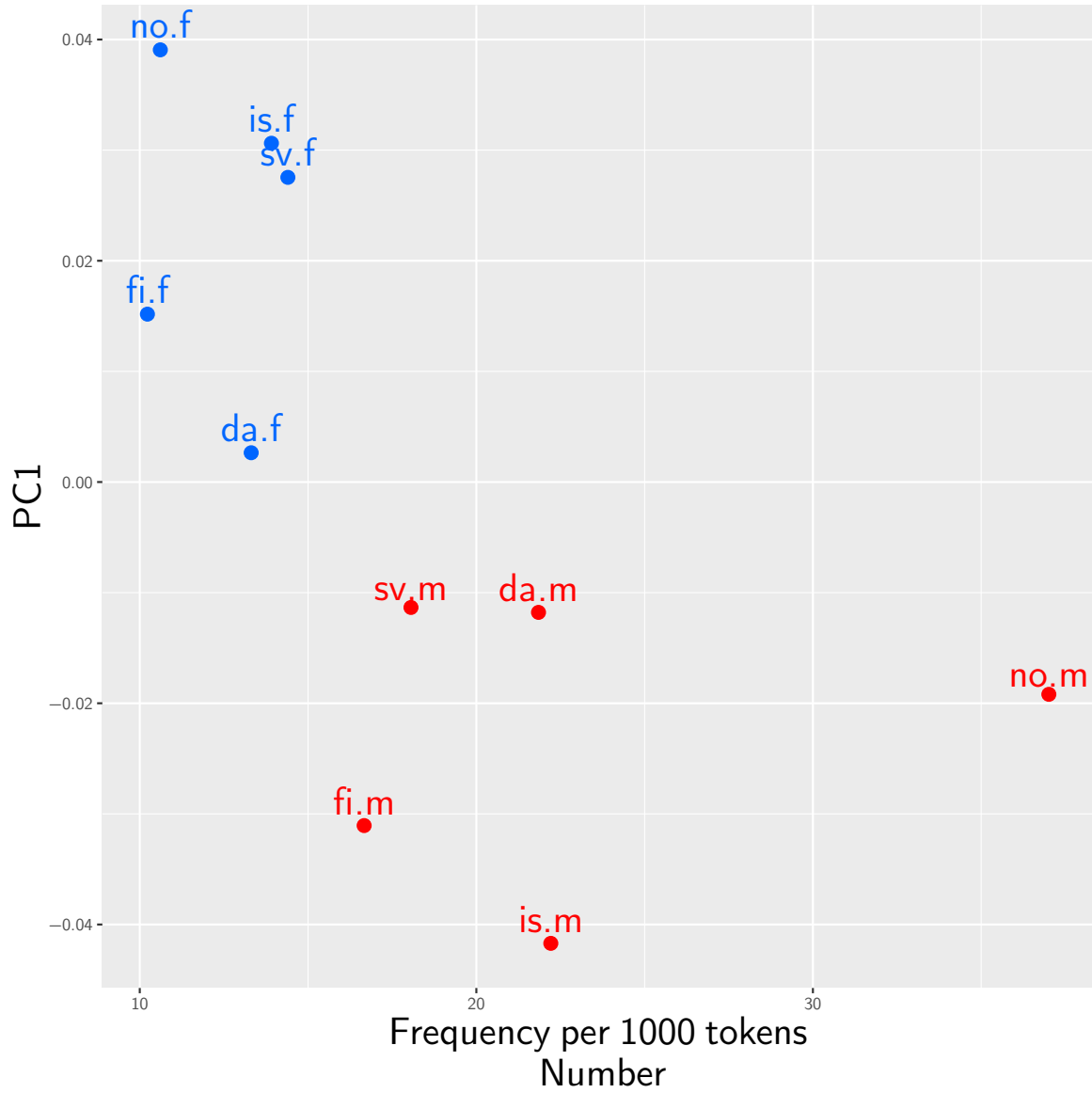

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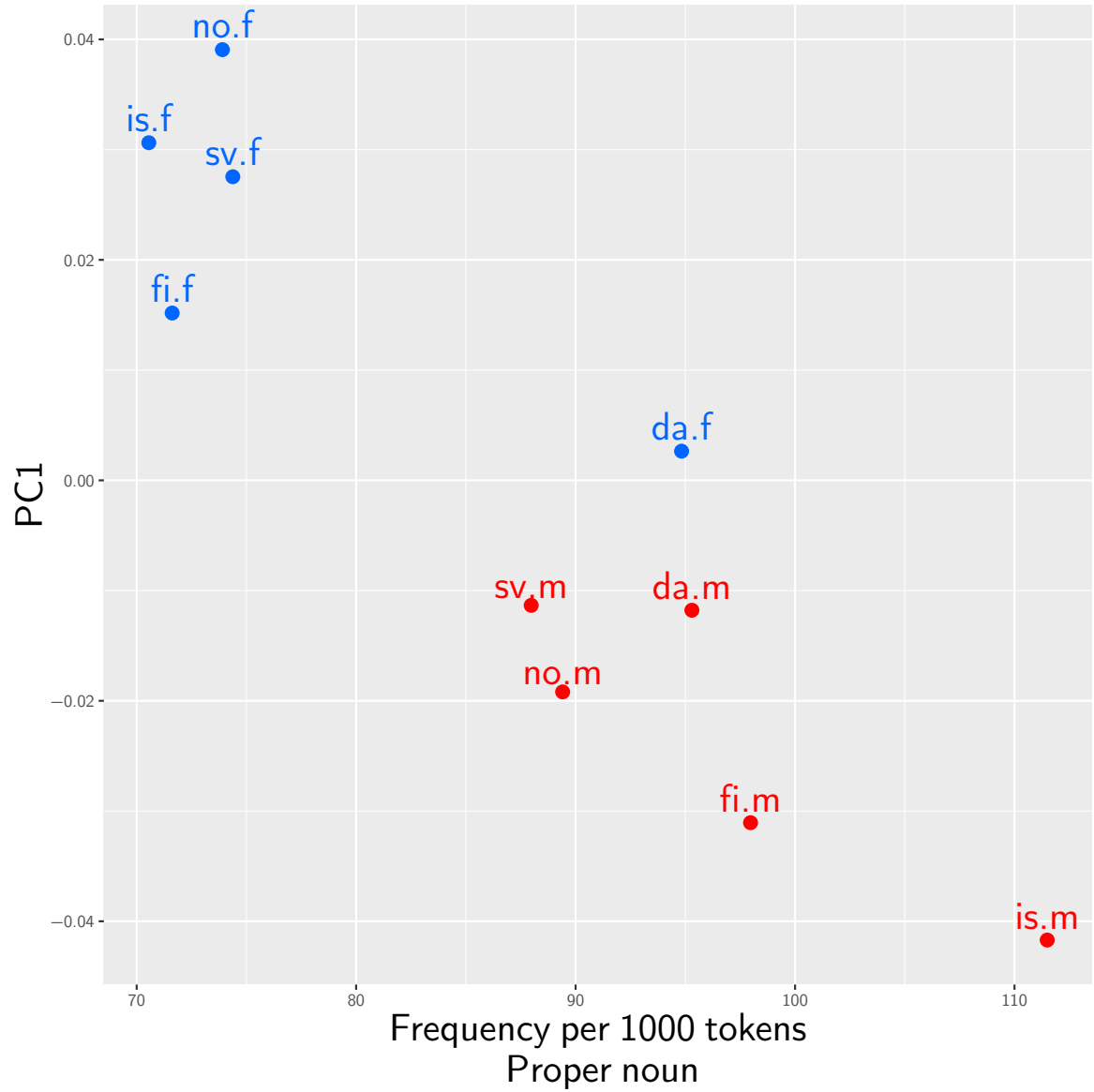

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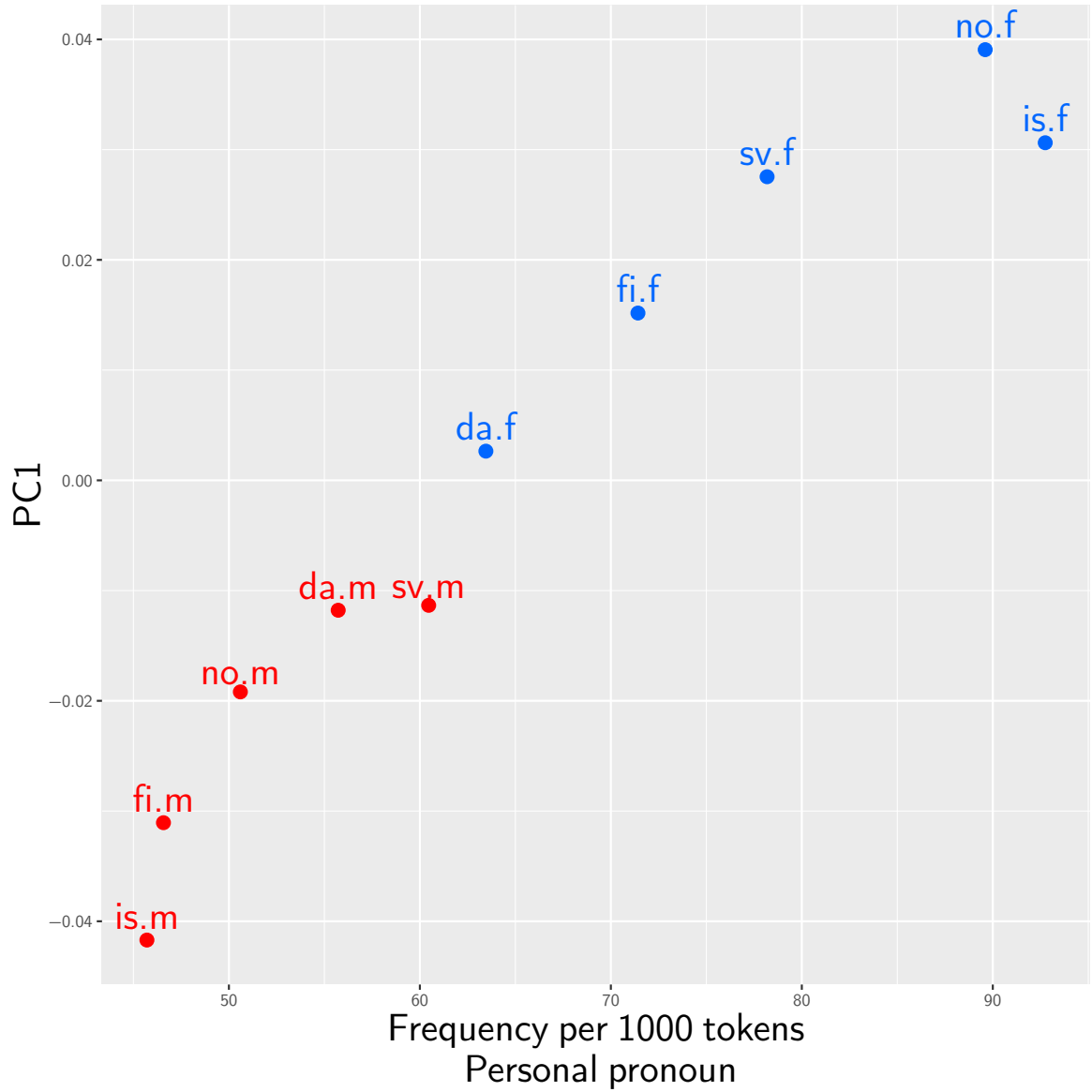

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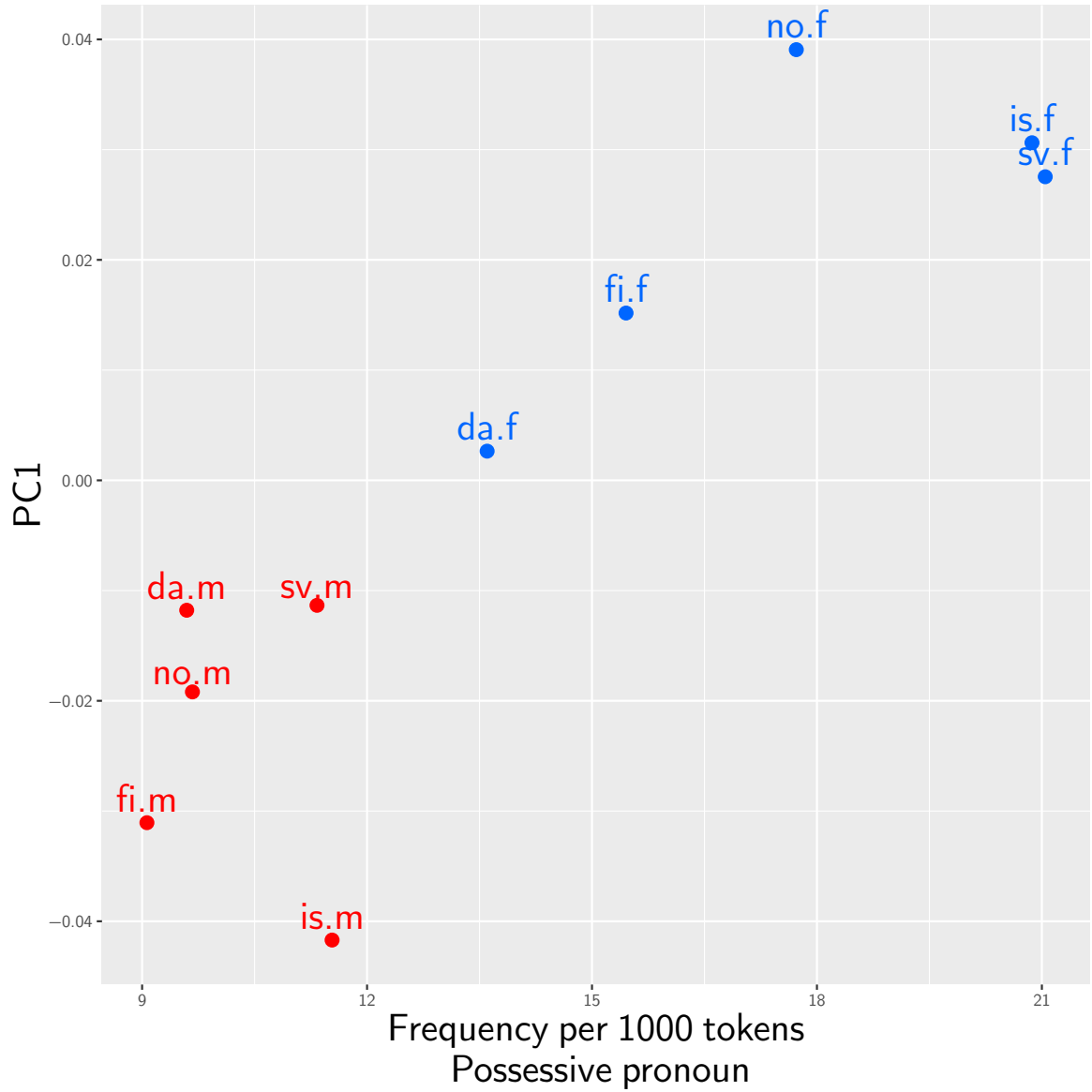

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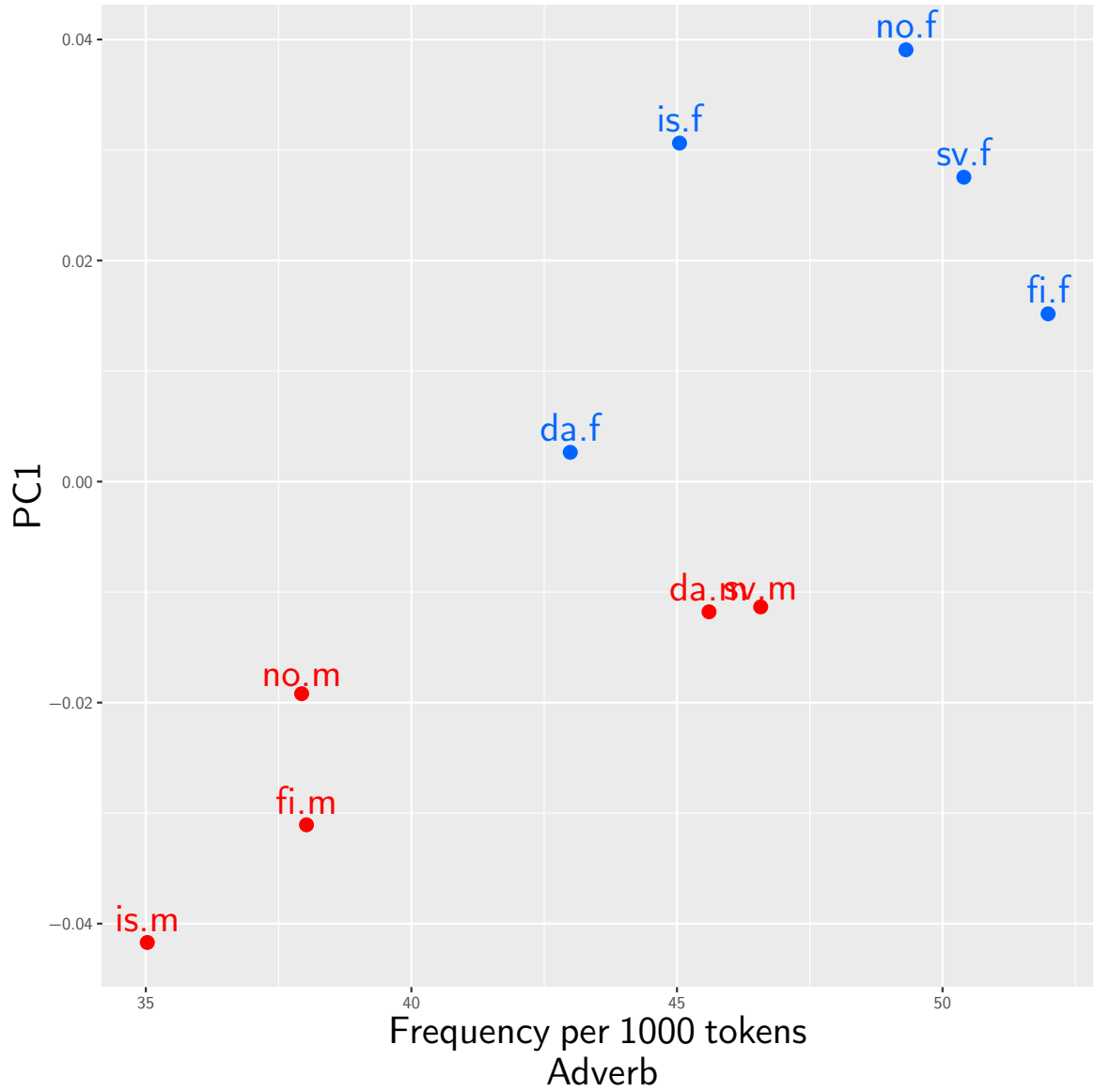

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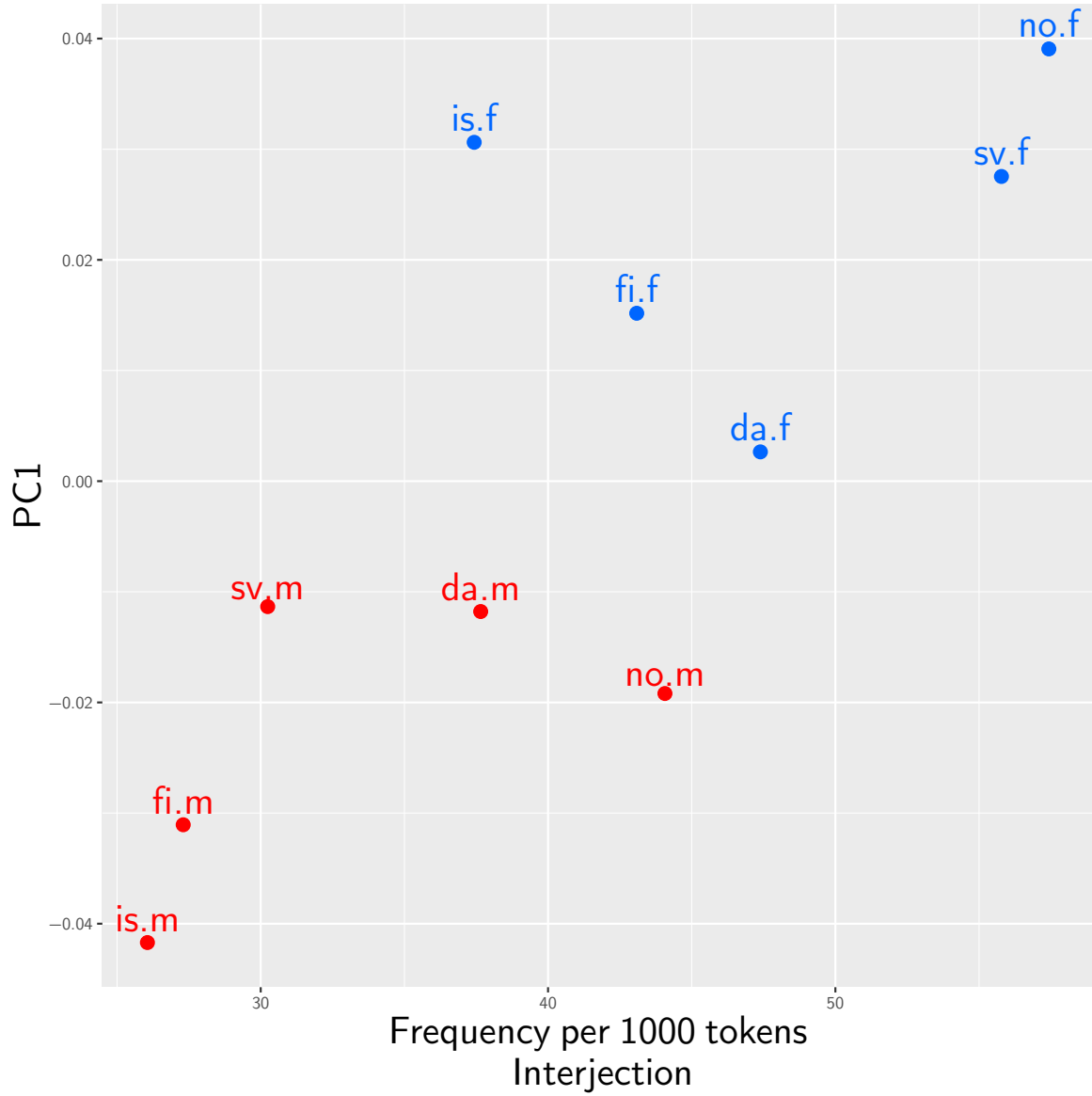

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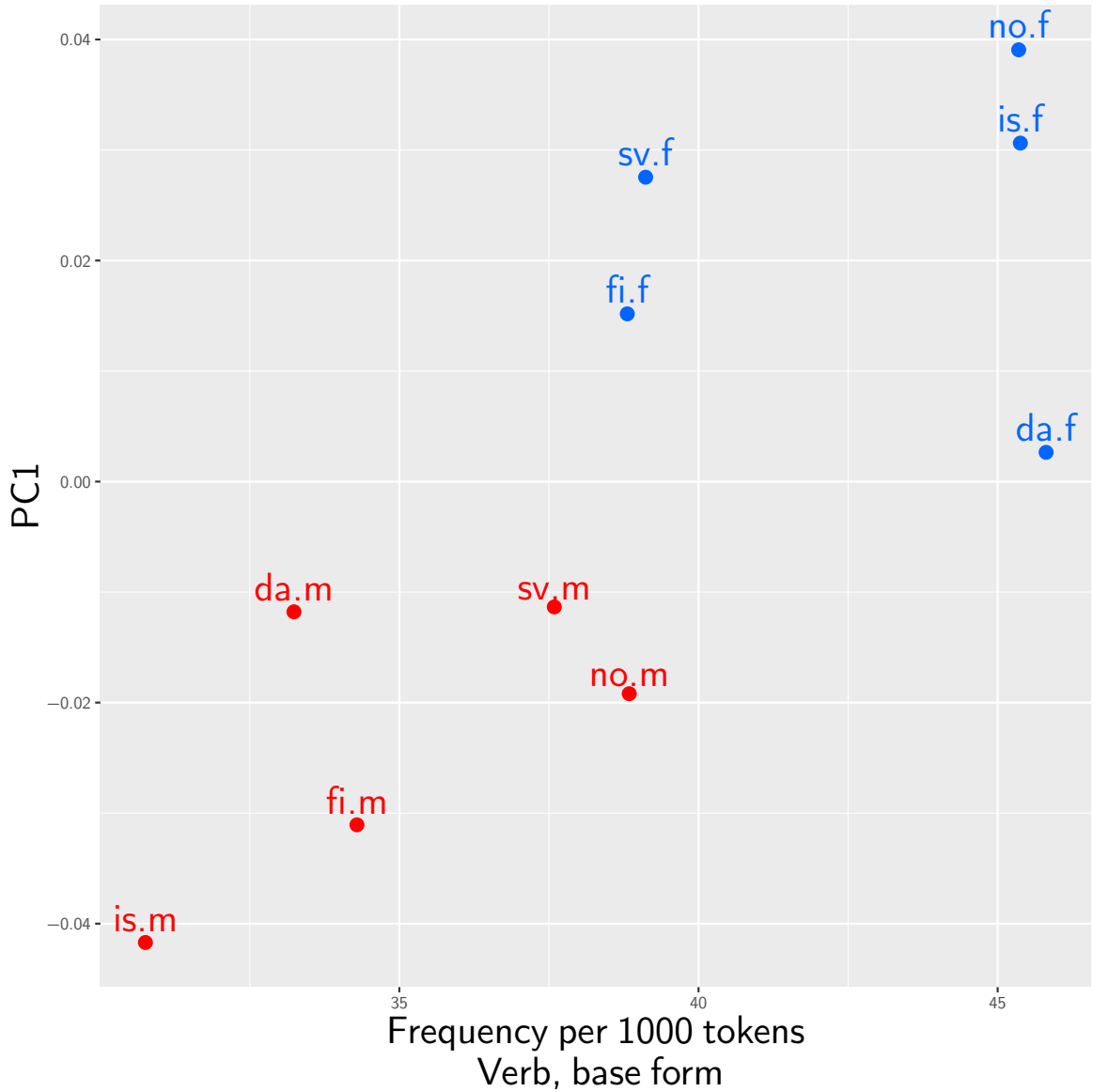

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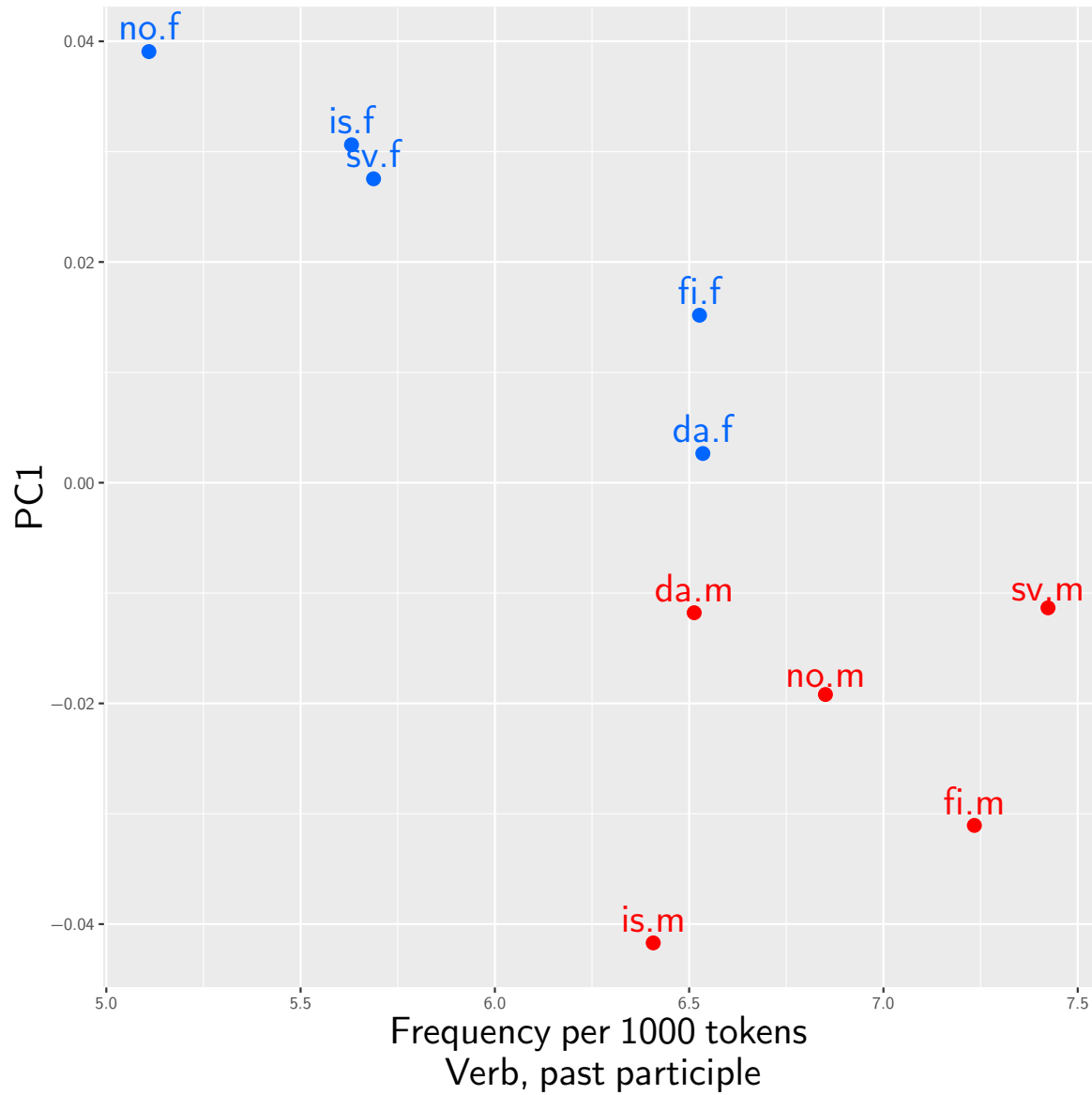

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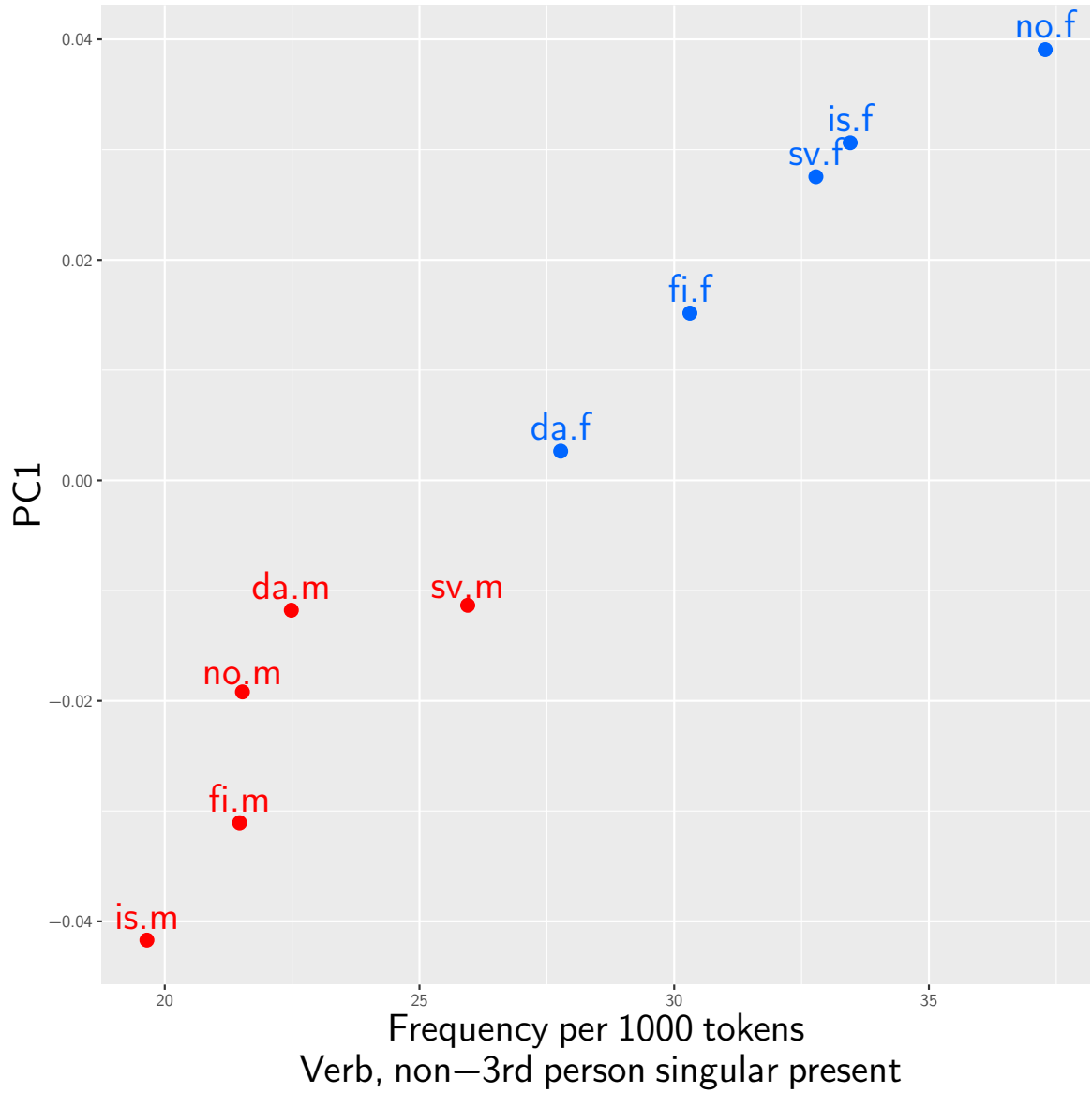

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Summary – Language Preference

- English is extensively used on Twitter in the Nordic countries (Denmark > Norway > Finland > Sweden > Iceland)
- Overall, females make slightly more use of English than males, and males more use of the national languages. At the country level, this is true for Iceland, Norway, and Denmark
- Sociolinguistic interpretation: Females are more ready to embrace new language practices when they are introduced into a community from social groups perceived to have high social standing? (parallel to observed change in feature use by gender, Labov 2001: 266)
- For Sweden and Finland, the pattern is reversed (but effect sizes are also much smaller) – this supports findings from Finnish survey data (Leppanen et al. 2011)

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- Females use features associated with interaction and the negotiation of **stance and affect concerns**
- Males use features associated with **information or discourse organization**
- Similar to findings from L1 English contexts for various genres (Argamon et al. 2007; Bamman et al. 2014)
- Different preferences in communicative style? **Involved versus informational** dimensions suggested by Biber (1988; 1995)
- Principal components analysis of 34 features in the ten gendered Nordic subcorpora: First principal component, which explains 9%.58 of total variation, **discriminates author gender**

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Summary – Conclusion

- Confimation of findings from L1 anglophone cultures in L2 contexts → communicative styles between males and females
- Future work: Larger corpora, feature frequency analysis in Nordic (or other L1) languages by gender
- Thanks for your attention!

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