Choice of word frequency norms can dramatically affect inference

Choice of Word Frequency Norms can Dramatically Effect Inference.

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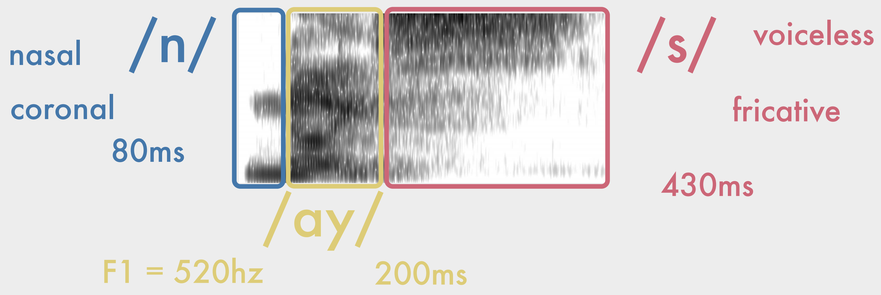
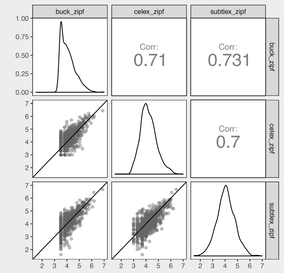
Some factors influencing variation are observable, and others must be estimated. Different estimates may be correlated,



NICE
- valence
- lexical neighborhood density
- *frequency*



but are they interchangable?

Case study 1: TD Deletion

TD Deletion Data: Monomorphemes

west [wɛst] ~ [wɛs]
child [tʃaɪld] ~ [tʃaɪl]

Frequency Norms: Zipf Scaled

$\log_{10}$(frequency per million words) + 3

Model

td ~ zipfscore + (1 | Word) + (zipfscore | Speaker)

Regression Results:

Buckeye Corpus

6,691 Tokens

Frequency Norm	Estimated Effect	x Within Corpus
Within Corpus	−0.29	
Celex	−0.15	0.52
Subtlex	−0.10	0.34

Philadelphia Neighborhood Corpus

18,236 Tokens

Frequency Norm	Estimated Effect	x Within Corpus
Within Corpus	−0.599	
Celex	−0.006	0.01
Subtlex	−0.302	0.51

Discussion

The three different frequency norms result in very different estimated frequency effects. The within corpus frequency norm estimated a frequency effect twice to 100 times the size of the others.

Case study 2: /ay/ raising

/Data: /ay/ Raising from the PNC

right [ɹaɪt] ~ [ɹʌit]
nice [naɪs] ~ [nʌis]

18,608 F1 Estimates

Model:

F1 ~ decade * zipfscore + (decade | Word) + (zipfscore | Speaker)

Regression Results:

Within Corpus

	estimate	CI
intercept	0.68	(0.6, 0.76)
decade	−0.12	(−0.13, −0.10)
freq	−0.03	(−0.09, 0.04)
decade:freq	−0.006	(−0.01, 0.01)

Celex

	estimate	CI
intercept	0.64	(0.57, 0.71)
decade	−0.12	(−0.13, −0.10)
freq	−0.09	(−0.15, −0.01)
decade:freq	−0.001	(−0.01, 0.01)

Subtlex

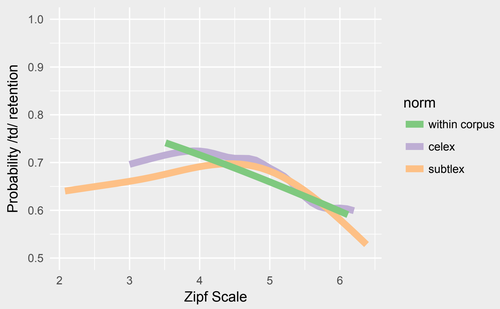
	estimate	CI
intercept	0.67	(0.6, 0.74)
decade	−0.12	(−0.13, −0.10)
freq	−0.05	(−0.12, 0.02)
decade:freq	−0.0003	(−0.01, 0.01)

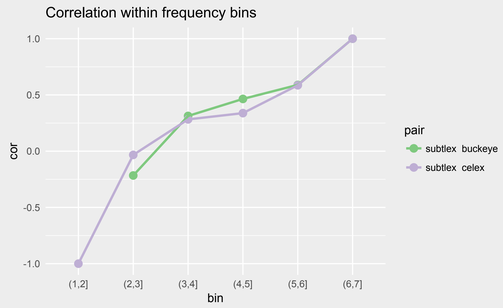
Discussion

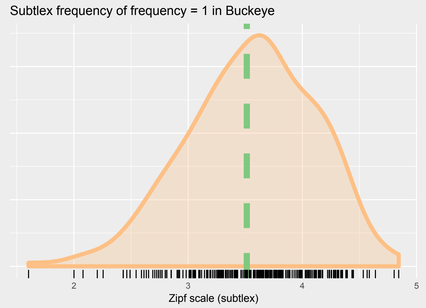
This time, the within-corpus frequency norm estimates the smallest frequency effect, but two of the norms don't have a reliable effect, while the remaining one does.

Why the differences?

The biggest difference between these norms is their estimates of low frequency words. *Recommendation: Use the norms with the best low frequency word estimates.*







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