



The phonetics of derivation

Segmentability (and other) effects on the acoustic duration
of affixed words

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Ingo Plag

DFG Deutsche
Forschungsgemeinschaft
FOR2373



SPOKEN MORPHOLOGY

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SUB-PROJECT 1

My sub-project looks at the phonetics of derived words and compounds.

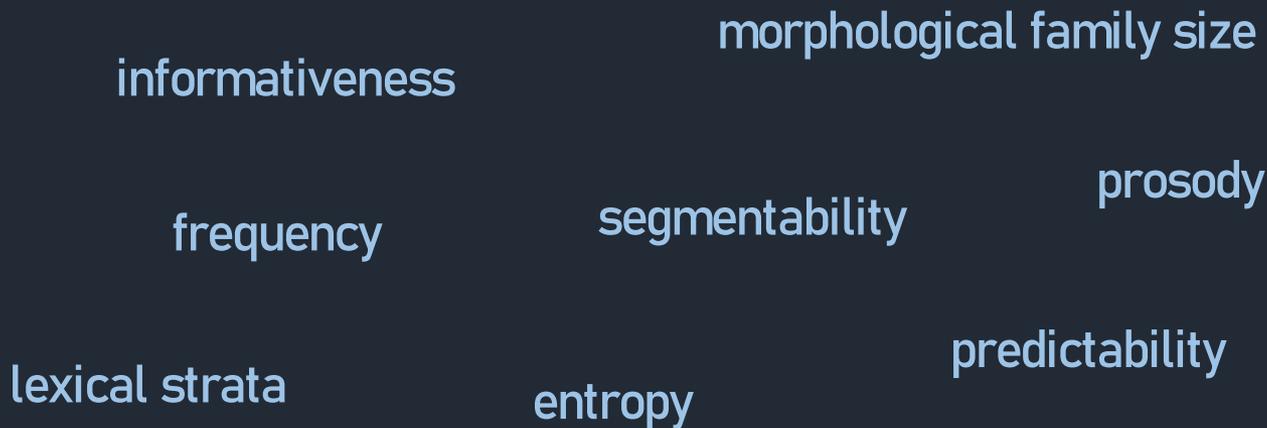
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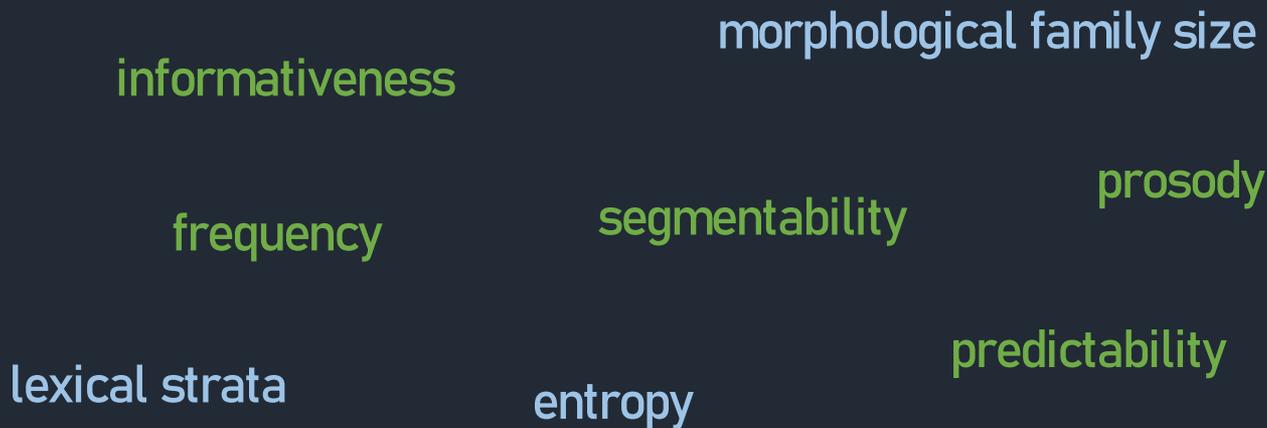
According to which morphological and other parameters does the phonetic detail of English derivatives differ, and under which circumstances?



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Frequency and duration

Frequency and duration

Lexical frequency

How often does a linguistic unit occur in a language?

Acoustic duration

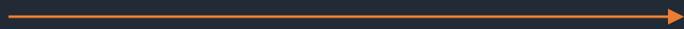
How long do we pronounce linguistic units?

Frequency and duration

Lexical frequency

How often does a linguistic unit occur in a language?

higher



Acoustic duration

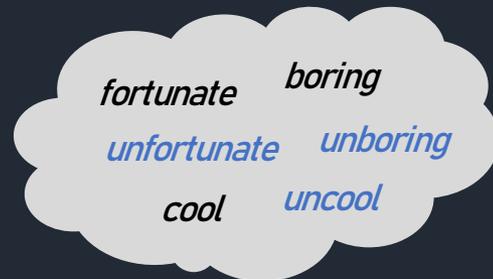
How long do we pronounce linguistic units?

shorter

Storage in the mental lexicon

Storage in the mental lexicon

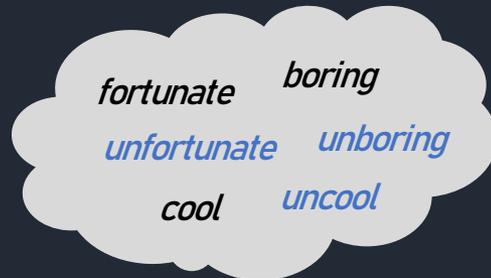
Whole-word storage



complex words are stored
unanalyzed

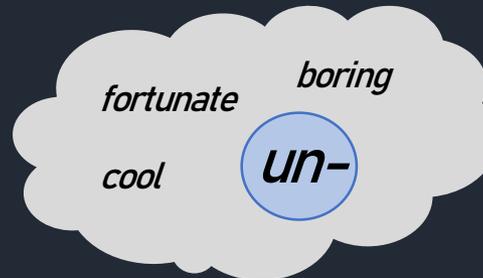
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Compositional models



morphemes are stored
separately

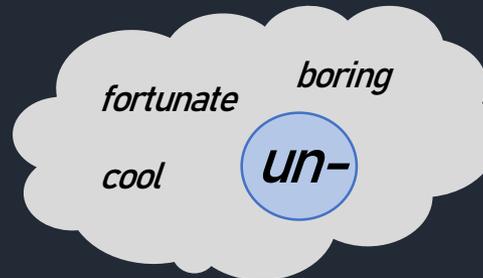
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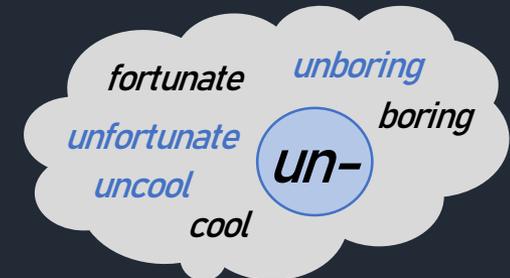
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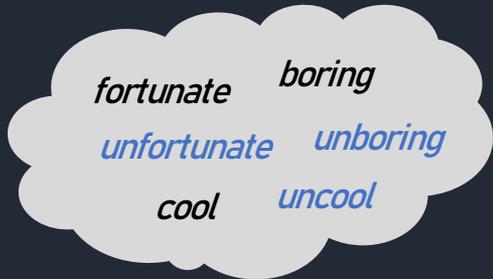
Dual-route models



both morphemes and
complex words are stored

Storage in the mental lexicon

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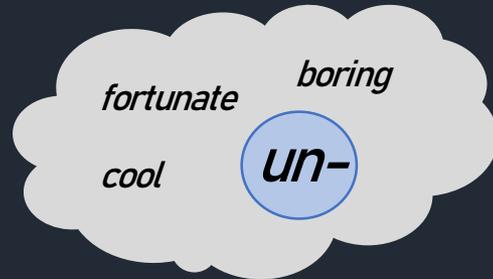


complex words are stored unanalyzed



durations will be shorter the higher the **word frequency**

Compositional models

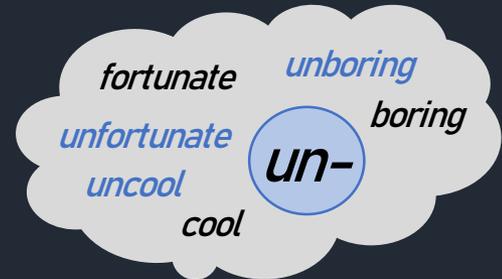


morphemes are stored separately



durations will be shorter the higher the **base frequency**

Dual-route models



both morphemes and complex words are stored



durations will be shorter the lower the **relative frequency**

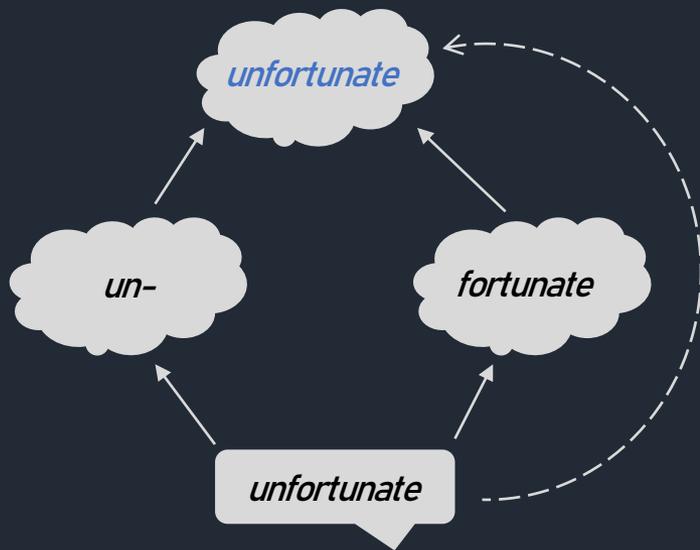
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Segmentability



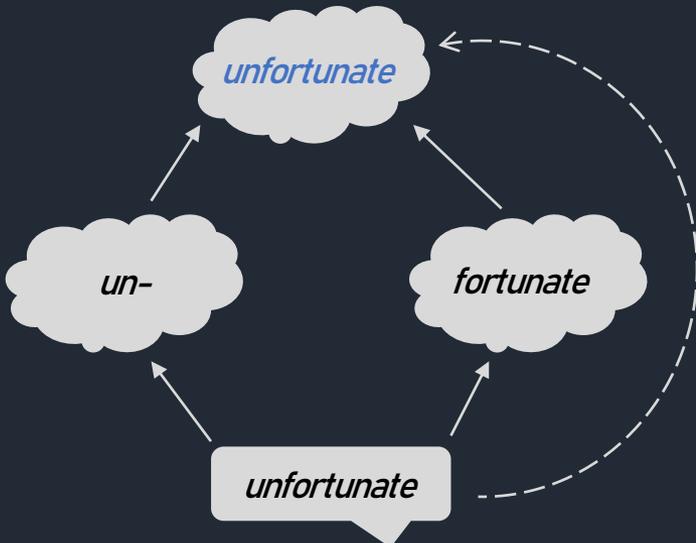
adapted from
Hay 2001: 1045

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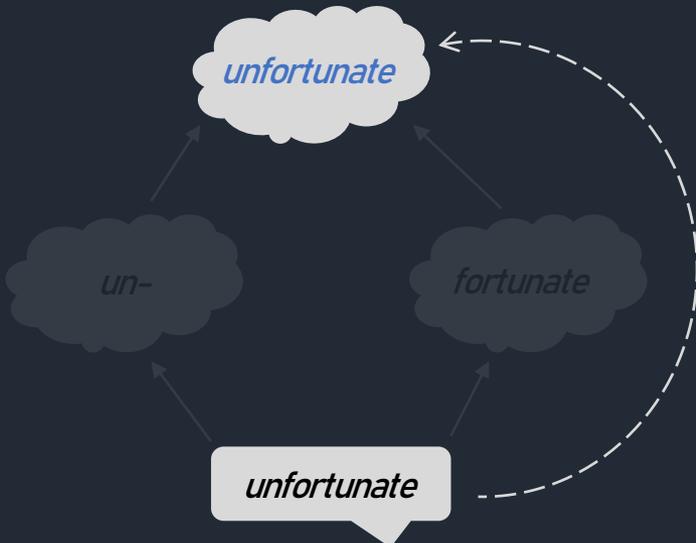
| Word | Frequency | Segmentability | Prediction |
|-------------|-----------|----------------|------------------|
| fortunate | 6000 | low | shorter duration |
| unfortunate | 6915 | | |
| boring | 7483 | high | longer duration |
| unboring | 4 | | |

Dual-route models



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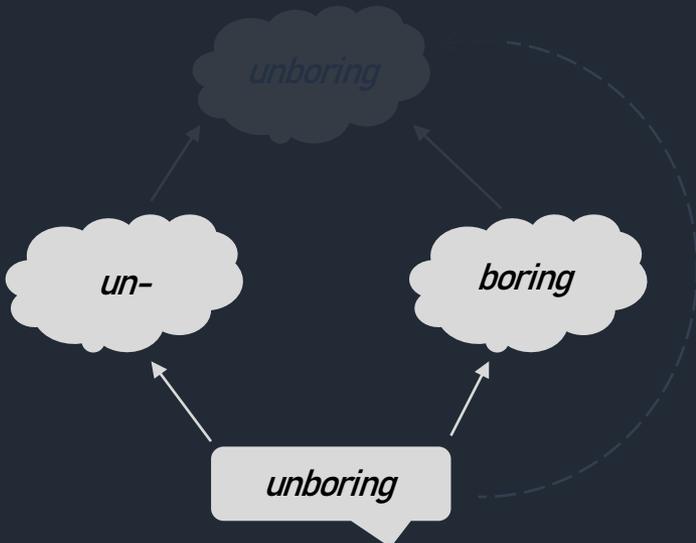
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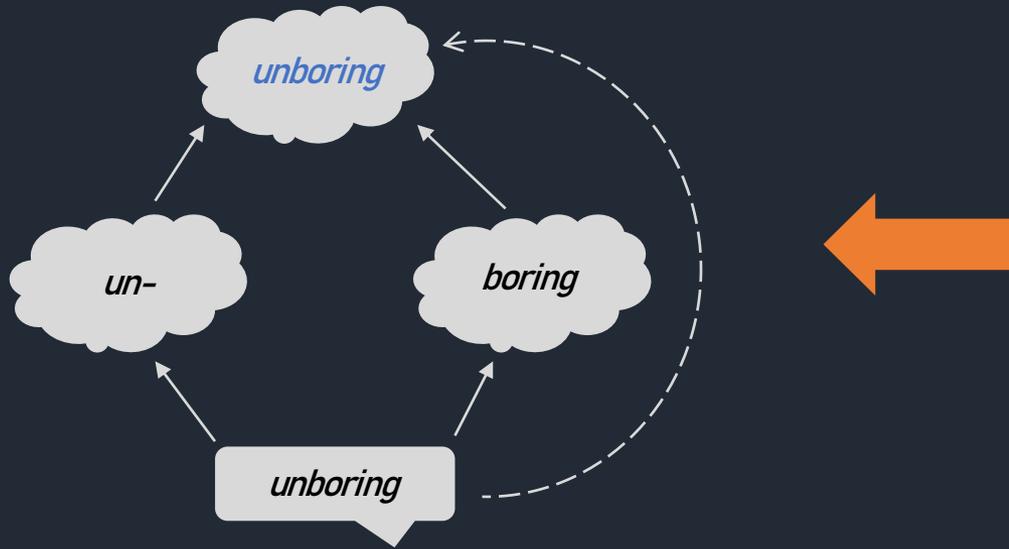
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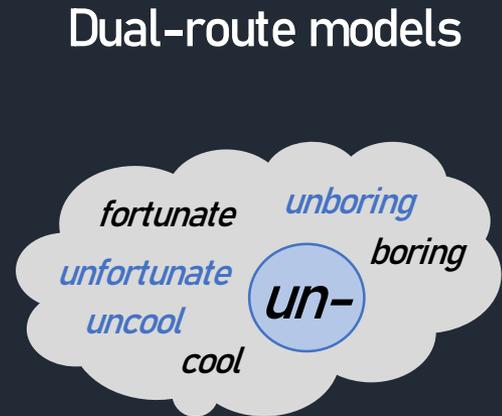


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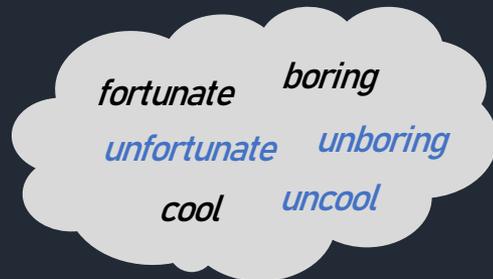


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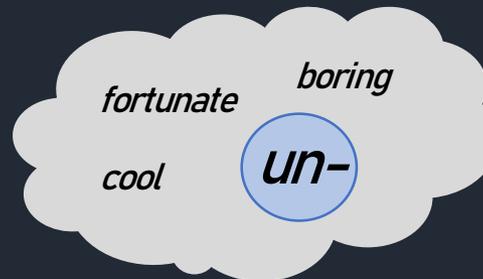


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Compositional models

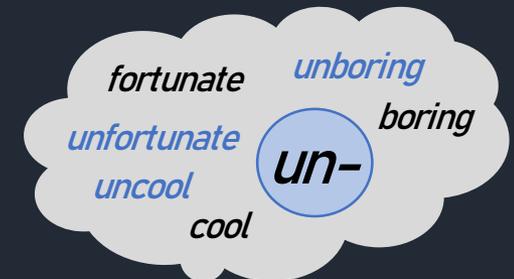


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Caselli et al. 2016

- › inflectional suffixes *-ing*, *-ed*, and *-s*
- › evidence for both whole-word storage and composition
 - › higher base frequency → shorter word duration
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Plag and Ben Hedia 2018

- › segmentability effects for *un-* and *dis-*
- › null effects for negative *in-*, locative *in-*, and *-ly*

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**Contradictory evidence:**

Why do the frequency measures sometimes show and sometimes not show effects?

Hypothesis 1

Higher word frequency → shorter duration

Present study

Hypothesis 1

Higher word frequency → shorter duration

Hypothesis 2

Higher base frequency → shorter duration

Present study

Hypothesis 1

Higher word frequency → shorter duration

Hypothesis 2

Higher base frequency → shorter duration

Hypothesis 3

Higher relative frequency → longer duration
≈ more segmentability

Present study

Hypothesis 1

Higher word frequency → shorter duration of word, base, and affix

Hypothesis 2

Higher base frequency → shorter duration of word, base, and affix

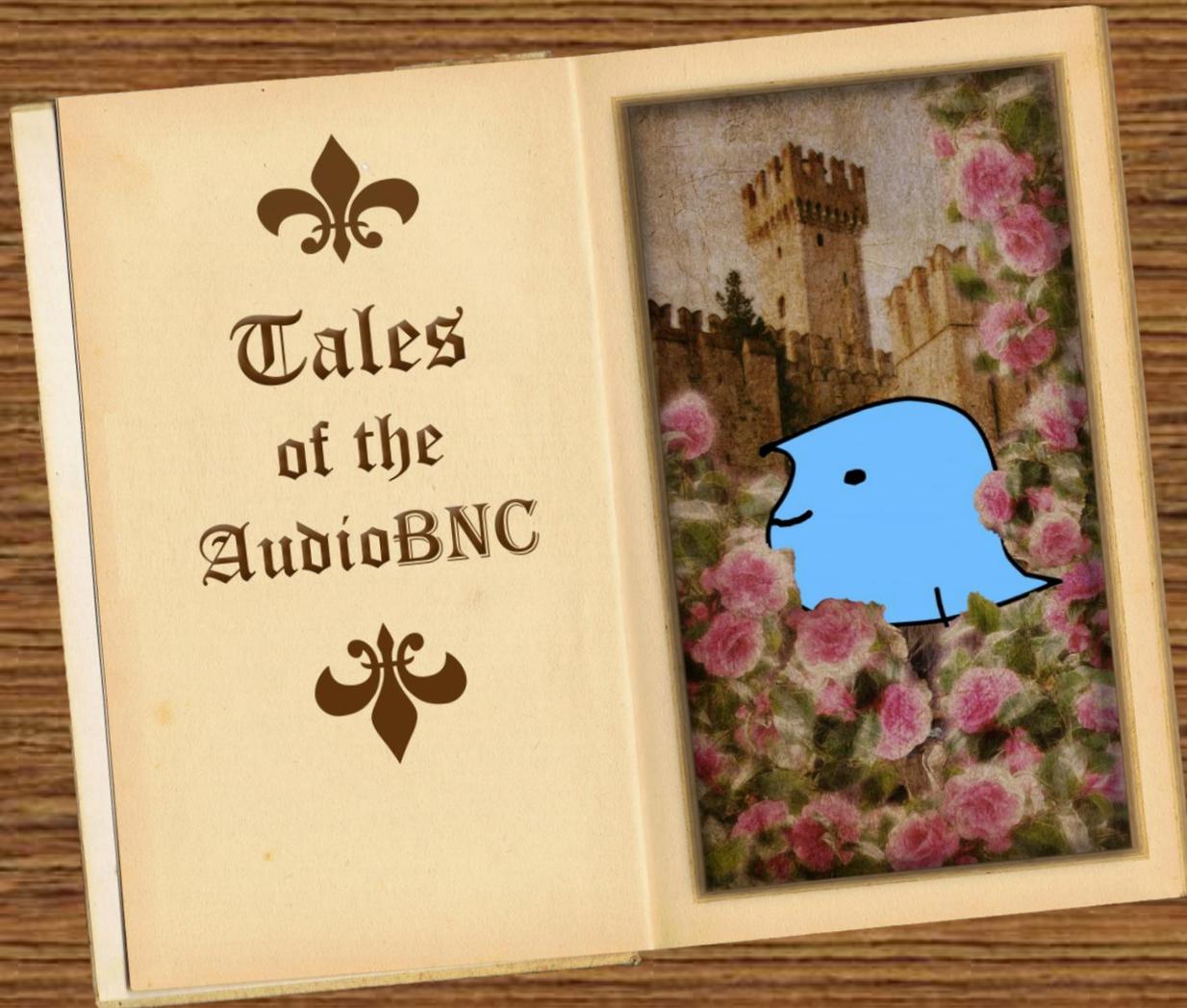
Hypothesis 3

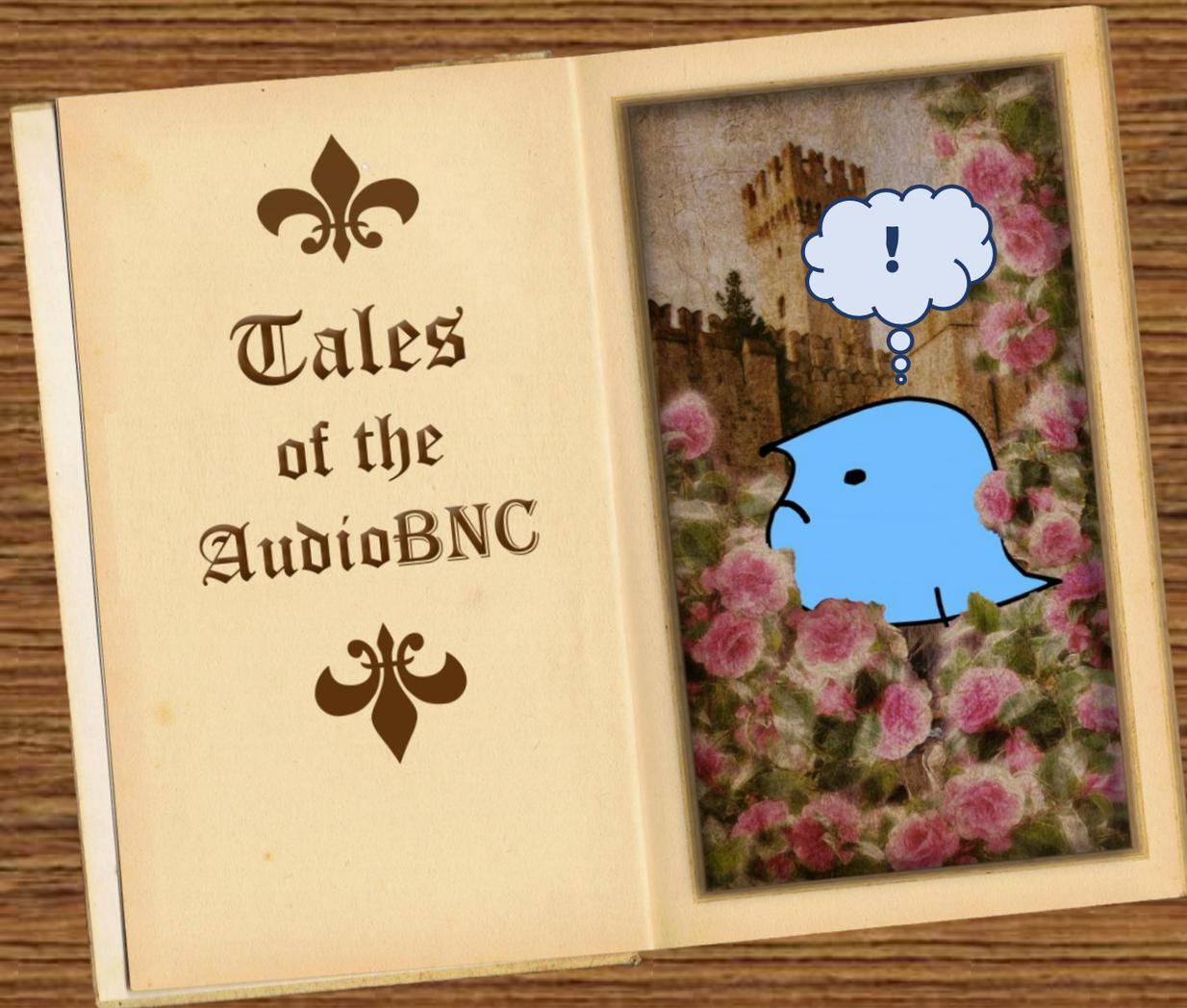
Higher relative frequency → longer duration of word, base, and affix
≈ more segmentability

Data and measurement

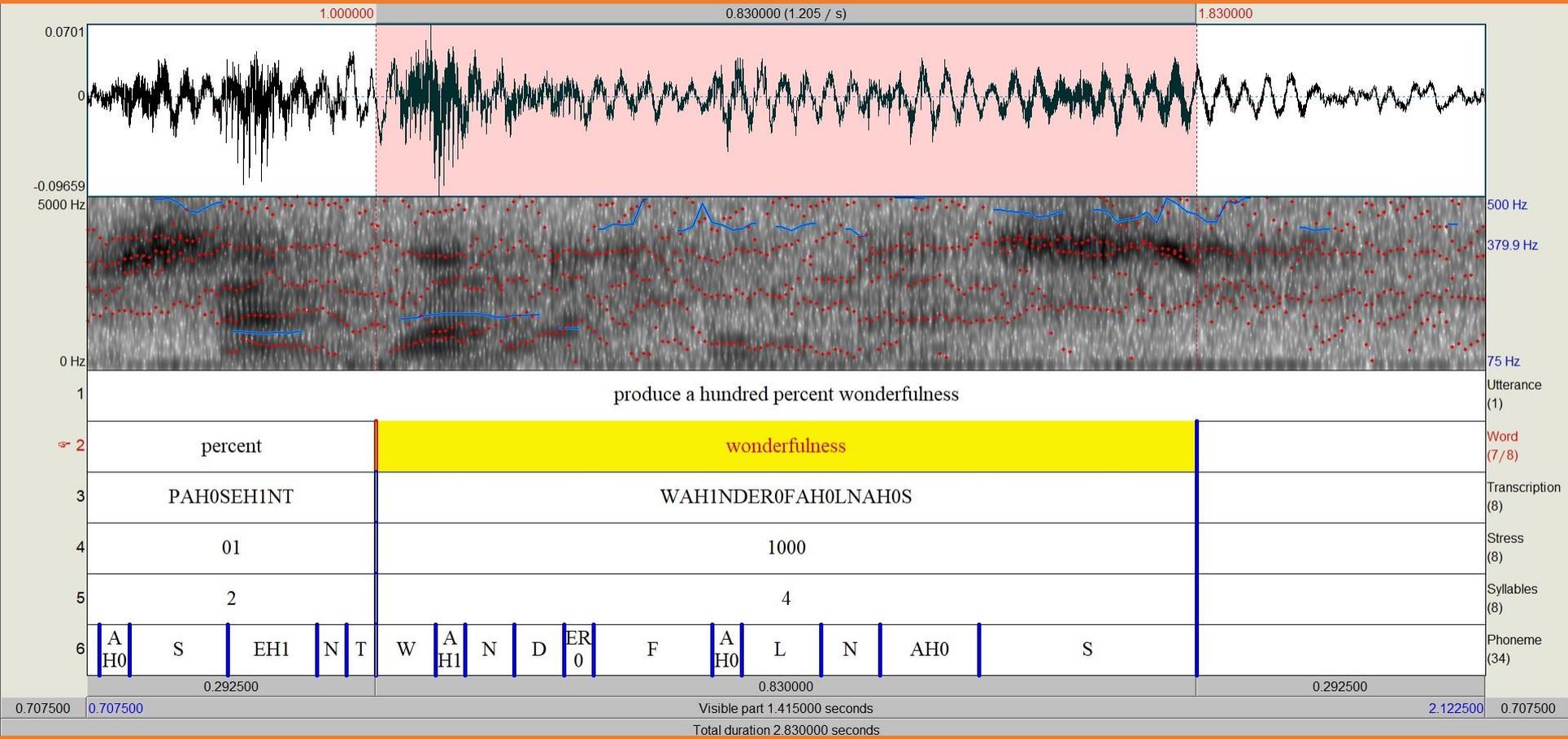
Data collection

- › AudioBNC

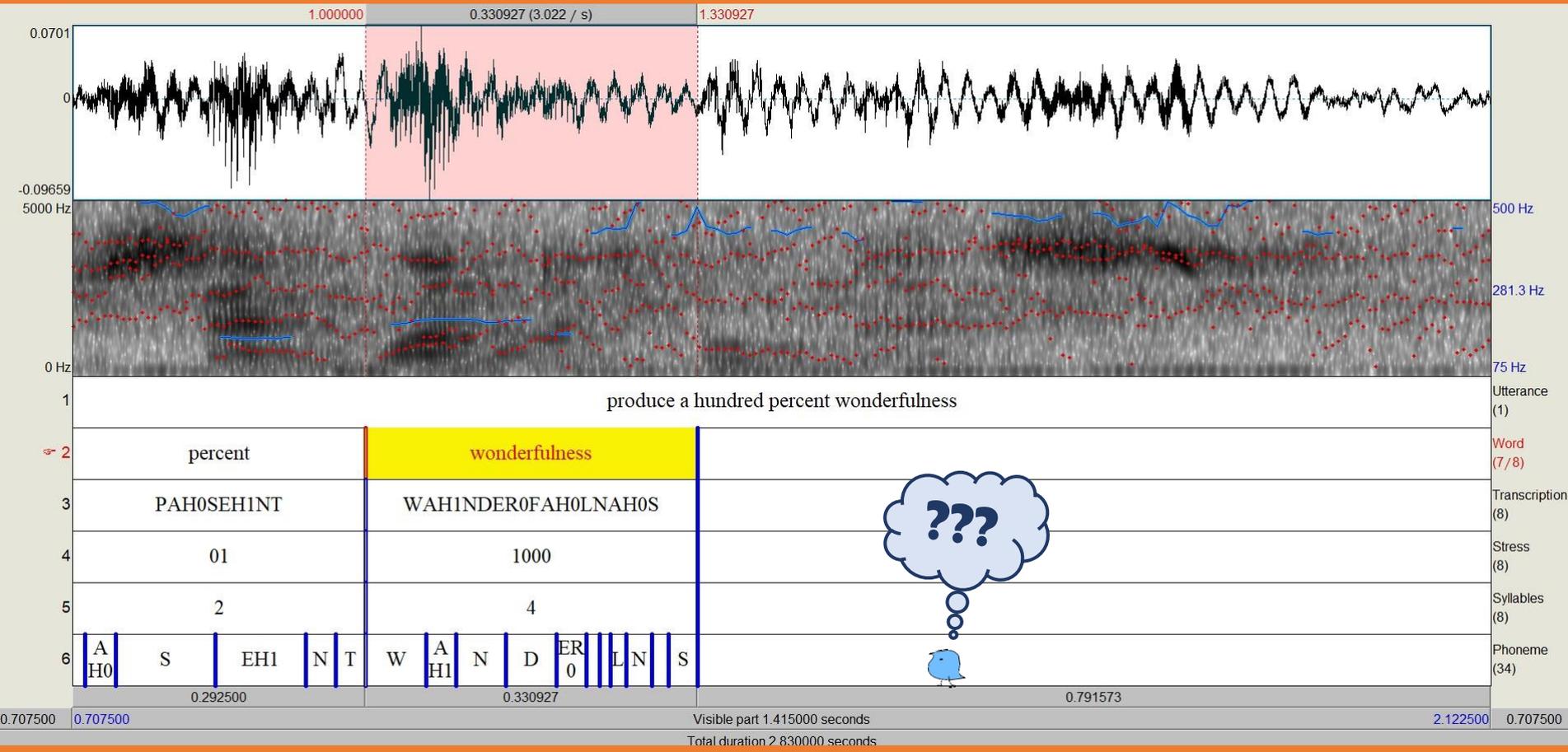




Automatic forced alignment



“Automatic failed alignment”



Data collection

- › AudioBNC
- › Forced Alignment
- › Praat textgrids
- › manual cleaning
of results

Data and measurement

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Affixes N

| | | | |
|---------------|------|-------------|-----|
| <i>-ness</i> | 363 | <i>pre-</i> | 123 |
| <i>-less</i> | 216 | <i>dis-</i> | 689 |
| <i>-wise</i> | 289 | <i>un-</i> | 960 |
| <i>-ize</i> | 476 | <i>in-</i> | 342 |
| <i>-ation</i> | 3979 | | |

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Modeling

- › multiple linear regression
in R using lm-function
- › variable transformations
- › trimming of datasets
- › backwards exclusion of
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Covariates

- › speech rate
- › number of syllables
- › biphone probability sum
- › bigram frequency

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- › **separate models for durations and frequencies: 81 models**

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- › number of syllables
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Frequency and segmentability effects

| duration | word | affix | base |
|--------------------|-------|-------|------|
| affix | -ness | | |
| word frequency | | | |
| base frequency | | | |
| relative frequency | | | |

 $p < .001$ expected direction

Frequency and segmentability effects

| duration | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|
| affix | -ness | | | -ize | | |
| word frequency | ■ | □ | ■ | □ | □ | □ |
| base frequency | □ | □ | □ | ■ | □ | ■ |
| relative frequency | ■ | □ | ■ | ■ | □ | ■ |

■ p < .001 expected direction
■ p < .001 unexpected direction

Frequency and segmentability effects

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | ■ | □ | ■ | □ | □ | □ | ■ | □ | ■ |
| base frequency | □ | □ | □ | ■ | □ | ■ | □ | □ | ■ |
| relative frequency | ■ | □ | ■ | ■ | □ | ■ | ■ | □ | ■ |

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Frequency and segmentability effects

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | ■ | □ | ■ | □ | □ | □ | ■ | □ | ■ |
| base frequency | □ | □ | □ | ■ | □ | ■ | □ | □ | ■ |
| relative frequency | ■ | □ | ■ | ■ | □ | ■ | ■ | □ | ■ |
| affix | -less | | | | | | | | |
| word frequency | □ | □ | □ | | | | | | |
| base frequency | □ | □ | □ | | | | | | |
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|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | ■ | □ | ■ | □ | □ | □ | ■ | □ | ■ |
| base frequency | □ | □ | □ | ■ | □ | ■ | □ | □ | ■ |
| relative frequency | ■ | □ | ■ | ■ | □ | ■ | ■ | □ | ■ |
| affix | -less | | | pre- | | | | | |
| word frequency | □ | □ | □ | □ | ■ | □ | | | |
| base frequency | □ | □ | □ | □ | □ | □ | | | |
| relative frequency | □ | □ | □ | □ | ■ | □ | | | |

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■ p < .001 unexpected direction

Frequency and segmentability effects

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | yellow | green | yellow | yellow | yellow | green | yellow | green |
| base frequency | yellow | yellow | yellow | green | yellow | green | yellow | yellow | green |
| relative frequency | green | yellow | green | blue | yellow | blue | green | yellow | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| base frequency | yellow |
| relative frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |

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Frequency and segmentability effects

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | ■ | □ | ■ | □ | □ | □ | ■ | □ | ■ |
| base frequency | □ | □ | □ | ■ | □ | ■ | □ | □ | ■ |
| relative frequency | ■ | □ | ■ | ■ | □ | ■ | ■ | □ | ■ |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | □ | □ | □ | □ | ■ | □ | □ | □ | ■ |
| base frequency | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| relative frequency | □ | □ | □ | □ | ■ | □ | □ | □ | ■ |
| affix | dis- | | | | | | | | |
| word frequency | □ | ■ | □ | | | | | | |
| base frequency | □ | □ | □ | | | | | | |
| relative frequency | □ | □ | □ | | | | | | |

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■ p < .001 unexpected direction

Frequency and segmentability effects

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | █ | | █ | | | | █ | | █ |
| base frequency | | | | █ | | █ | | | █ |
| relative frequency | █ | | █ | ▒ | | ▒ | █ | | █ |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | | | | | █ | | | | █ |
| base frequency | | | | | | | | | |
| relative frequency | | | | | █ | | | | █ |
| affix | dis- | | | un- | | | | | |
| word frequency | | █ | | █ | █ | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

█ p < .001 expected direction
▒ p < .001 unexpected direction

Frequency and segmentability effects

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| word frequency | ■ | □ | ■ | □ | □ | □ | ■ | □ | ■ |
| base frequency | □ | □ | □ | ■ | □ | ■ | □ | □ | ■ |
| relative frequency | ■ | □ | ■ | ■ | □ | ■ | ■ | □ | ■ |
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| word frequency | □ | □ | □ | □ | ■ | □ | □ | □ | ■ |
| base frequency | □ | □ | □ | □ | □ | □ | □ | □ | □ |
| relative frequency | □ | □ | □ | □ | ■ | □ | □ | □ | ■ |
| affix | dis- | | | un- | | | in- | | |
| word frequency | □ | ■ | □ | ■ | ■ | □ | □ | □ | □ |
| base frequency | □ | □ | □ | □ | □ | □ | □ | □ | □ |
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■ p < .001 unexpected direction

Frequency and segmentability effects

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|------------|------|------------|------------|------|-------|--------|------|
| affix | | -ness | | | -ize | | | -ation | |
| word frequency | Green | Green | | | | | Green | Green | |
| base frequency | | | | | | | | | |
| relative frequency | Green | Green | | | | | Green | Green | |
| affix | | -less | | | pre- | | | -wise | |
| word frequency | | | | Green | | | | Green | |
| base frequency | | | | | | | | | |
| relative frequency | | | | Green | | | | Green | |
| affix | | dis- | | | un- | | | in- | |
| word frequency | | Dark Green | | Dark Green | Dark Green | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

■ p < .001 expected direction
■ p < .001 unexpected direction

Frequency and segmentability effects

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | white | green | white | white | white | green | white | green |
| base frequency | white | white | white | green | white | green | white | white | green |
| relative frequency | green | white | green | blue | white | blue | green | white | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | white | white | white | white | green | white | white | white | green |
| base frequency | white | white | white |
| relative frequency | white | white | white | white | green | white | white | white | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | white | green | white | green | green | white | white | white | white |
| base frequency | white | white | white |
| relative frequency | white | white | white |

■ p < .001 expected direction
■ p < .001 unexpected direction

Frequency and segmentability effects

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | white | green | white | white | white | green | white | green |
| base frequency | white | white | white | green | white | green | white | white | green |
| relative frequency | green | white | green | blue | white | blue | green | white | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | white | white | white | white | green | white | white | white | green |
| base frequency | white | white | white |
| relative frequency | white | white | white | white | green | white | white | white | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | white | green | white | green | green | white | white | white | white |
| base frequency | white | white | white |
| relative frequency | white | white | white |

■ p < .001 expected direction Are the differences related to ...
■ p < .001 unexpected direction

Prefixes vs. suffixes

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | white | green | white | white | white | green | white | green |
| base frequency | white | white | white | green | white | green | white | white | green |
| relative frequency | green | white | green | blue | white | blue | green | white | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | white | white | white | white | green | white | white | white | green |
| base frequency | white | white | white |
| relative frequency | white | white | white | white | green | white | white | white | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | white | green | white | green | green | white | white | white | white |
| base frequency | white | white | white |
| relative frequency | white | white | white |

green p < .001
 blue p < .001

expected direction
 unexpected direction

Are the differences related to ... the type of affix?

Prefixes vs. suffixes

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-----------|-----------|-----------|------------|-----------|------------|-----------|-----------|-----------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | yellow | green | yellow | yellow | yellow | green | yellow | green |
| base frequency | yellow | yellow | yellow | green | yellow | green | yellow | yellow | green |
| relative frequency | green | yellow | green | light blue | yellow | light blue | green | yellow | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | yellow | yellow | yellow | dark grey | dark grey | dark grey | yellow | yellow | green |
| base frequency | yellow | yellow | yellow | dark grey | dark grey | dark grey | yellow | yellow | yellow |
| relative frequency | yellow | yellow | yellow | dark grey | dark grey | dark grey | yellow | yellow | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey |
| base frequency | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey |
| relative frequency | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey | dark grey |

suffixes

green p < .001
light blue p < .001

expected direction
unexpected direction

Are the differences related to ... the type of affix?



Prefixes vs. suffixes

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|------|-------|------|------|-------|------|-------|--------|------|
| affix | | -ness | | | -ize | | | -ation | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | | -less | | pre- | | | -wise | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | dis- | | un- | | | in- | | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

prefixes

p < .001
 p < .001

expected direction
 unexpected direction

Are the differences related to ... the type of affix?



Affix length

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | yellow | green | yellow | yellow | yellow | green | yellow | green |
| base frequency | yellow | yellow | yellow | green | yellow | green | yellow | yellow | green |
| relative frequency | green | yellow | green | blue | yellow | blue | green | yellow | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| base frequency | yellow |
| relative frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | yellow | green | yellow | green | green | yellow | yellow | yellow | yellow |
| base frequency | yellow |
| relative frequency | yellow |

■ p < .001
■ p < .001

expected direction
 unexpected direction

Are the differences related to ...

the type of affix?
 the affix length?



Affix length

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|------------|------------|------------|--------------|--------------|--------------|--------------|--------------|--------------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | dark green | grey | dark green | grey | grey | grey | dark green | grey | dark green |
| base frequency | grey | grey | grey | dark green | grey | dark green | grey | grey | grey |
| relative frequency | dark green | grey | dark green | grey | grey | grey | dark green | grey | dark green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | grey | grey | grey | grey | dark green | grey | grey | grey | dark green |
| base frequency | grey | grey | grey | grey | grey | grey | grey | grey | grey |
| relative frequency | grey | grey | grey | grey | dark green | grey | grey | grey | dark green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | grey | dark green | grey | light green | light green | light yellow | light yellow | light yellow | light yellow |
| base frequency | grey | grey | grey | light yellow |
| relative frequency | grey | grey | grey | light yellow |

around 100-150 ms

light green p < .001
 light blue p < .001

expected direction
 unexpected direction

Are the differences related to ...

the type of affix?
 the affix length?



Affix length

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | dis- | | | un- | | | in- | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

around
250–300
ms

■ p < .001
■ p < .001

expected direction
unexpected direction

Are the differences related to ...

the type of affix?
the affix length?

✗
✗

Manual resegmentation

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | yellow | green | yellow | yellow | yellow | green | yellow | green |
| base frequency | yellow | yellow | yellow | green | yellow | green | yellow | yellow | green |
| relative frequency | green | yellow | green | blue | yellow | blue | green | yellow | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| base frequency | yellow |
| relative frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | yellow | green | yellow | green | green | yellow | yellow | yellow | yellow |
| base frequency | yellow |
| relative frequency | yellow |

 p < .001
 p < .001

expected direction
 unexpected direction

Are the differences related to ...

- the type of affix? 
- the affix length? 
- the segmentation?

Manual resegmentation

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | dis- | | | un- | | | in- | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

- p < .001 expected direction
- p < .001 unexpected direction
- p < .01 weaker effect

Are the differences related to ...

- the type of affix? ✗
- the affix length? ✗
- the segmentation? ✗

Type of prosodic integration

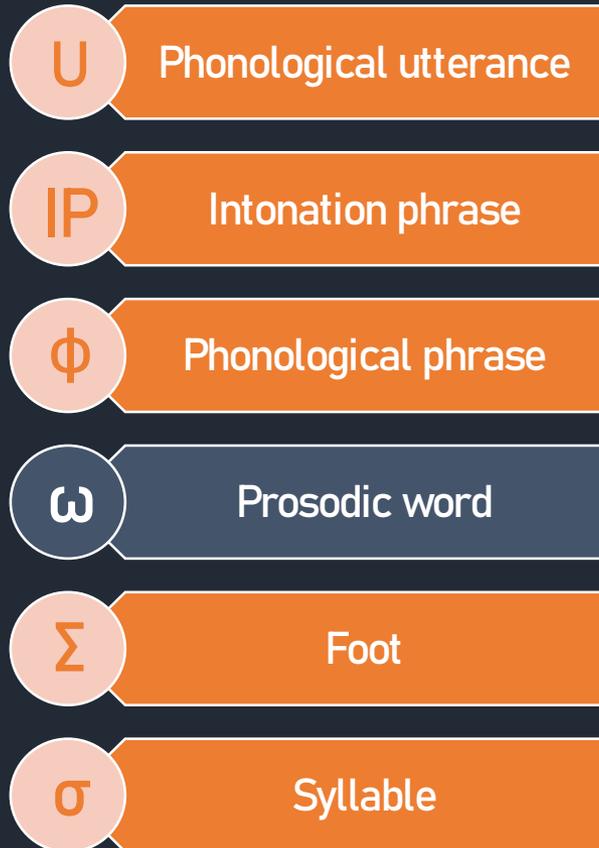
Type of prosodic integration

The prosodic hierarchy



Type of prosodic integration

The prosodic hierarchy



Type of prosodic integration

The prosodic hierarchy



Some pword-diagnostics

- › onset or coda conditions, LOI-violations
- › ambisyllabicity
- › stress and relative prominence
- › trisyllabic laxing, vowel reduction
- › minimal word requirements
- › compositionality, type of base

Type of prosodic integration

The prosodic hierarchy



Some pword-diagnostics

- › onset or coda conditions, LOI-violations
- › ambisyllabicity
- › stress and relative prominence
- › trisyllabic laxing, vowel reduction
- › minimal word requirements
- › compositionality, type of base

Morpho-prosodic alignment

- › A morpheme **cannot** include multiple pwords, but a pword **can** include multiple morphemes.

Type of prosodic integration

pword-forming



Type of prosodic integration

pword-forming



clitic group



Type of prosodic integration

yword-forming



clitic group



integrating



Type of prosodic integration



yword-forming



clitic group



integrating



Type of prosodic integration



pword-forming



clitic group



integrating



Type of prosodic integration

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | yellow | green | yellow | yellow | yellow | green | yellow | green |
| base frequency | yellow | yellow | yellow | green | yellow | green | yellow | yellow | green |
| relative frequency | green | yellow | green | blue | yellow | blue | green | yellow | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| base frequency | yellow |
| relative frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | yellow | green | yellow | green | green | yellow | yellow | yellow | yellow |
| base frequency | yellow |
| relative frequency | yellow |

 p < .001
 p < .001

expected direction
 unexpected direction

Are the differences related to ...

- the type of affix? 
- the affix length? 
- the segmentation? 
- prosodic structure?

Type of prosodic integration

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | dis- | | | un- | | | in- | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

prosodic words

p < .001
 p < .001

expected direction
 unexpected direction

Are the differences related to ...

- the type of affix? ✗
- the affix length? ✗
- the segmentation? ✗
- prosodic structure?

Type of prosodic integration

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|--------|------------|--------|------------|------------|------|------|--------|------------|
| affix | -ness | | | | | | | -ation | |
| word frequency | green | yellow | green | | | | | | |
| base frequency | yellow | yellow | yellow | | | | | | |
| relative frequency | green | yellow | green | | | | | | |
| affix | -less | | | | pre- | | | -wise | |
| word frequency | yellow | yellow | yellow | | dark green | | | | |
| base frequency | yellow | yellow | yellow | | | | | | |
| relative frequency | yellow | yellow | yellow | | dark green | | | | dark green |
| affix | | dis- | | | un- | | | in- | |
| word frequency | | dark green | | dark green | dark green | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

clitic groups

green p < .001
 blue p < .001

expected direction
 unexpected direction

Are the differences related to ...

- the type of affix? x
- the affix length? x
- the segmentation? x
- prosodic structure?

Type of prosodic integration

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | dis- | | | un- | | | in- | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

integrating

 p < .001
 p < .001

expected direction
 unexpected direction

Are the differences related to ...

- the type of affix? 
- the affix length? 
- the segmentation? 
- prosodic structure?

Type of prosodic integration

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | dis- | | | un- | | | in- | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

integrating

 p < .001
 p < .001

expected direction
 unexpected direction

Are the differences related to ...

- the type of affix? 
- the affix length? 
- the segmentation? 
- prosodic structure? 

Type of prosodic integration

Meta-model including all affixes

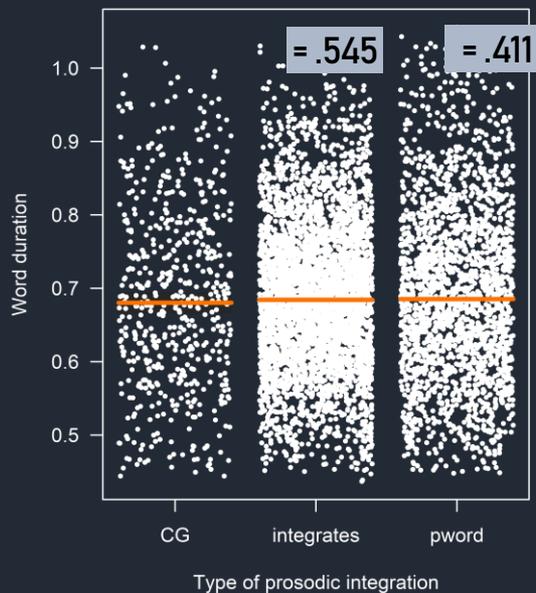
- › Additional predictor: **type of prosodic integration**
- › Additional covariate: **number of timing slots**
- › **N = 7441**

Type of prosodic integration

Meta-model including all affixes

- › Additional predictor: **type of prosodic integration**
- › Additional covariate: **number of timing slots**
- › **N = 7441**

Effect of prosodic category on word duration

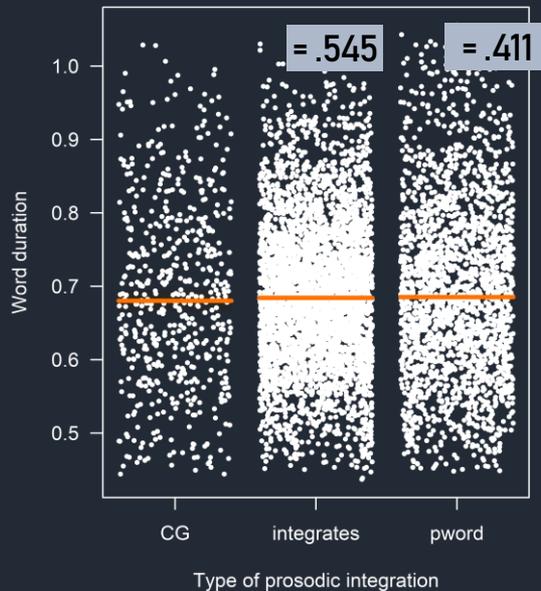


Type of prosodic integration

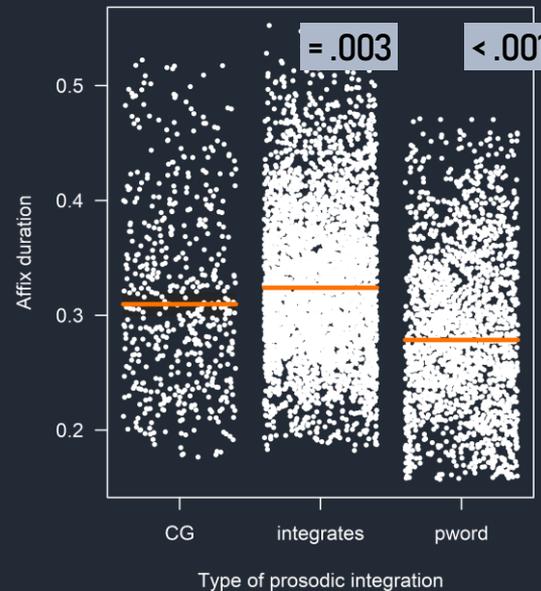
Meta-model including all affixes

- › Additional predictor: **type of prosodic integration**
- › Additional covariate: **number of timing slots**
- › **N = 7441**

Effect of prosodic category on word duration



Effect of prosodic category on affix duration

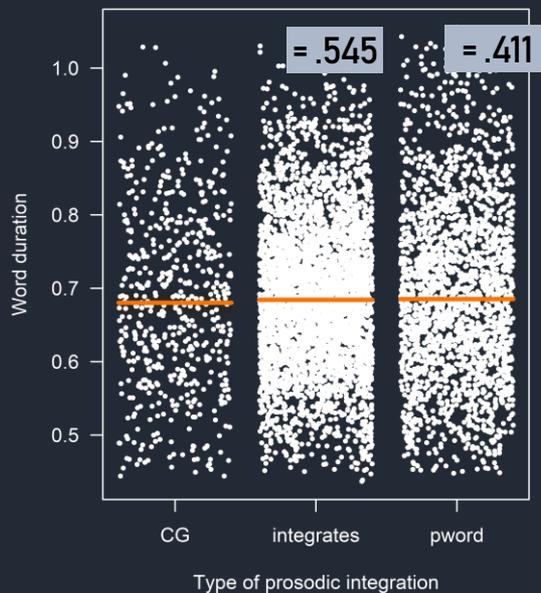


Type of prosodic integration

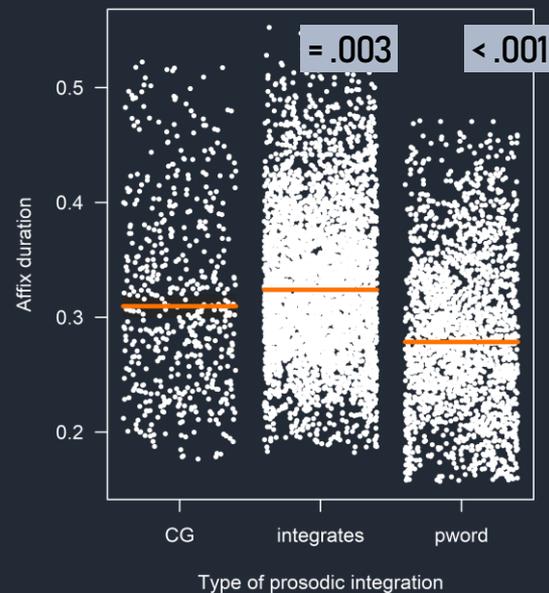
Meta-model including all affixes

- › Additional predictor: **type of prosodic integration**
- › Additional covariate: **number of timing slots**
- › **N = 7441**

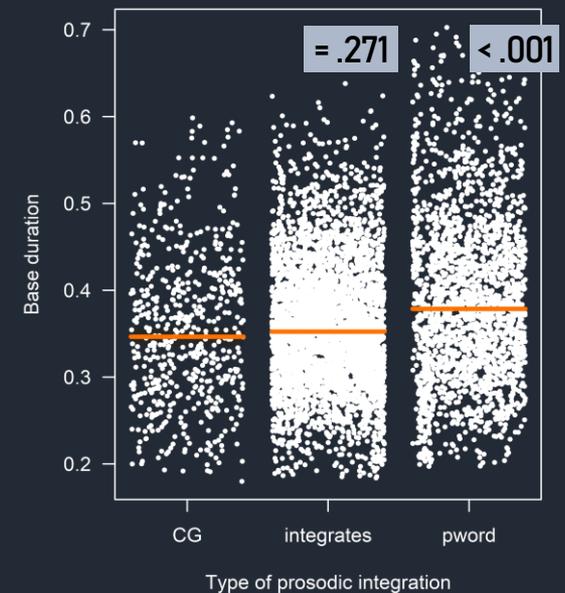
Effect of prosodic category on word duration



Effect of prosodic category on affix duration



Effect of prosodic category on base duration

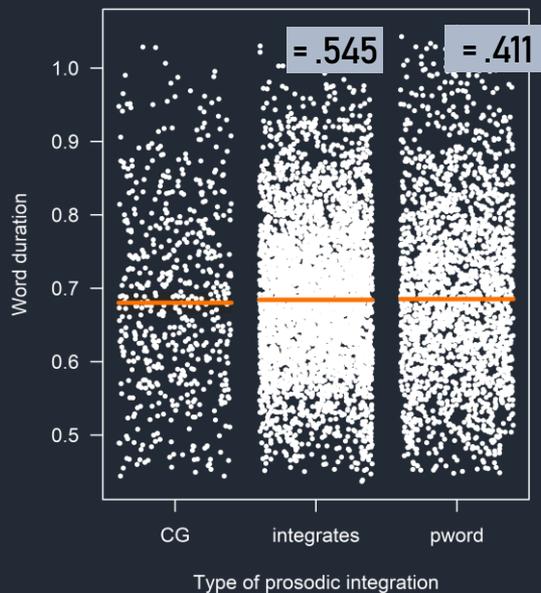


Type of prosodic integration

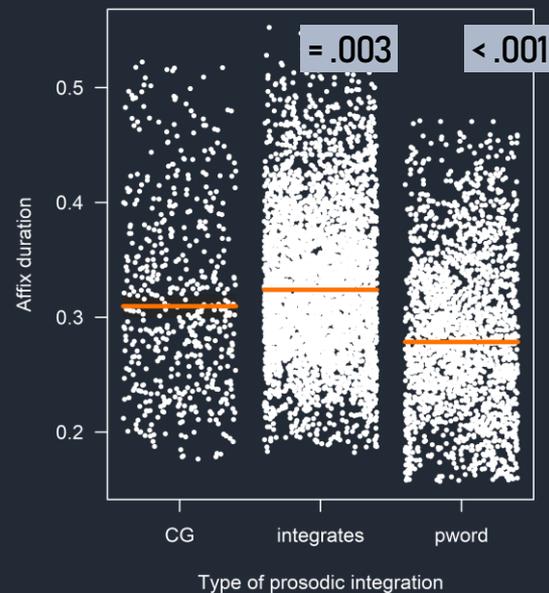
Meta-model including all affixes

- › Additional predictor: **type of prosodic integration**
- › Additional covariate: **number of timing slots**
- › **N = 7441**
- › **This does not support the predictions of pword integration.**

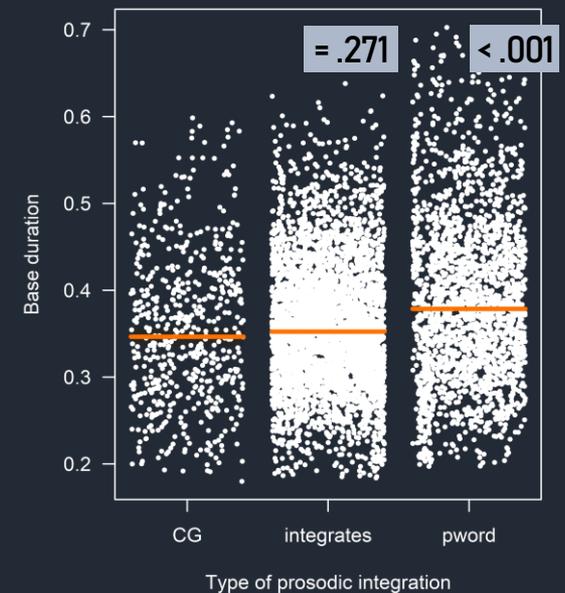
Effect of prosodic category on word duration



Effect of prosodic category on affix duration



Effect of prosodic category on base duration



Informativity

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | yellow | green | yellow | yellow | yellow | green | yellow | green |
| base frequency | yellow | yellow | yellow | green | yellow | green | yellow | yellow | green |
| relative frequency | green | yellow | green | blue | yellow | blue | green | yellow | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| base frequency | yellow |
| relative frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | yellow | green | yellow | green | green | yellow | yellow | yellow | yellow |
| base frequency | yellow |
| relative frequency | yellow |

green p < .001

expected direction

blue p < .001

unexpected direction

Are the differences related to ...

- the type of affix? ✗
- the affix length? ✗
- the segmentation? ✗
- prosodic structure? ✗
- affix informativity?

Measured in two ways:

Informativity

Measured in two ways:

Semantic information load score

Informativity

Measured in two ways:

Semantic information load score

5-point Likert scales coded for:

- › clearness of semantic meaning
- › type of base: free vs. bound root
- › semantic transparency
- › productivity

Measured in two ways:

Semantic information load score

5-point Likert scales coded for:

- › clearness of semantic meaning
- › type of base: free vs. bound root
- › semantic transparency
- › productivity



Affix-specific semantic
segmentability hierarchy

Informativity

Measured in two ways:

Semantic information load score

5-point Likert scales coded for:

- › clearness of semantic meaning
- › type of base: free vs. bound root
- › semantic transparency
- › productivity



Affix-specific semantic
segmentability hierarchy

**H: The higher the semantic information
load, the longer the duration.**

Informativity

Measured in two ways:

Semantic information load score

Conditional affix probability C_{aff}

5-point Likert scales coded for:

- › clearness of semantic meaning
- › type of base: free vs. bound root
- › semantic transparency
- › productivity



Affix-specific semantic
segmentability hierarchy

**H: The higher the semantic information
load, the longer the duration.**

Informativity

Measured in two ways:

Semantic information load score

5-point Likert scales coded for:

- › clearness of semantic meaning
- › type of base: free vs. bound root
- › semantic transparency
- › productivity



Affix-specific semantic
segmentability hierarchy

H: The higher the semantic information
load, the longer the duration.

Conditional affix probability C_{aff}

Affix probability given preceding word:

| SUFFIX EXAMPLE | | PREFIX EXAMPLE | | |
|----------------|------------|----------------|-------------|------------|
| A | B | A | B | C |
| <i>random</i> | <i>ize</i> | <i>her</i> | <i>pre-</i> | <i>...</i> |

Informativity

Measured in two ways:

Semantic information load score

5-point Likert scales coded for:

- › clearness of semantic meaning
- › type of base: free vs. bound root
- › semantic transparency
- › productivity



Affix-specific semantic
segmentability hierarchy

H: The higher the semantic information
load, the longer the duration.

Conditional affix probability C_{aff}

Affix probability given preceding word:

| SUFFIX EXAMPLE | | PREFIX EXAMPLE | | |
|----------------|------------|----------------|-------------|------------|
| A | B | A | B | C |
| <i>random</i> | <i>ize</i> | <i>her</i> | <i>pre-</i> | <i>...</i> |



$$C_{aff} = \frac{Freq(AB)}{Freq(A)}$$

Informativity

Measured in two ways:

Semantic information load score

5-point Likert scales coded for:

- › clearness of semantic meaning
- › type of base: free vs. bound root
- › semantic transparency
- › productivity



Affix-specific semantic
segmentability hierarchy

H: The higher the semantic information load, the longer the duration.

Conditional affix probability C_{aff}

Affix probability given preceding word:

| SUFFIX EXAMPLE | | PREFIX EXAMPLE | | |
|----------------|------------|----------------|-------------|------------|
| A | B | A | B | C |
| <i>random</i> | <i>ize</i> | <i>her</i> | <i>pre-</i> | <i>...</i> |



$$C_{aff} = \frac{Freq(AB)}{Freq(A)}$$

H: The higher the conditional affix probability, the shorter the duration.

Informativity: Semantic information load score

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | yellow | green | yellow | yellow | yellow | green | yellow | green |
| base frequency | yellow | yellow | yellow | green | yellow | green | yellow | yellow | green |
| relative frequency | green | yellow | green | blue | yellow | blue | green | yellow | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| base frequency | yellow |
| relative frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | yellow | green | yellow | green | green | yellow | yellow | yellow | yellow |
| base frequency | yellow |
| relative frequency | yellow |

green p < .001
 blue p < .001

expected direction
 unexpected direction

Are the differences related to ...

- the type of affix? ✗
- the affix length? ✗
- the segmentation? ✗
- prosodic structure? ✗
- affix informativity?

Informativity: Semantic information load score

| duration | word | affix | base | word | affix | base | word | affix | base | |
|--------------------|--------|------------|--------|--------|--------|--------|------|--------|------|--|
| affix | -ness | | | | | | | -ation | | |
| word frequency | green | yellow | green | | | | | | | |
| base frequency | yellow | yellow | yellow | | | | | | | |
| relative frequency | green | yellow | green | | | | | | | |
| affix | -less | | | | pre- | | | -wise | | |
| word frequency | | | | | | | | | | |
| base frequency | | | | | | | | | | |
| relative frequency | | | | | | | | | | |
| affix | dis- | | | un- | | | in- | | | |
| word frequency | | dark green | | green | green | yellow | | | | |
| base frequency | | | | yellow | yellow | yellow | | | | |
| relative frequency | | | | yellow | yellow | yellow | | | | |

high information load

green p < .001
 blue p < .001

expected direction
 unexpected direction

Are the differences related to ...

- the type of affix? ✗
- the affix length? ✗
- the segmentation? ✗
- prosodic structure? ✗
- affix informativity? ✗

Informativity: Semantic information load score

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|-------|-------|------|------|-------|------|--------|-------|------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |
| affix | dis- | | | un- | | | in- | | |
| word frequency | | | | | | | | | |
| base frequency | | | | | | | | | |
| relative frequency | | | | | | | | | |

low information load

 p < .001
 p < .001

expected direction
 unexpected direction

Are the differences related to ...

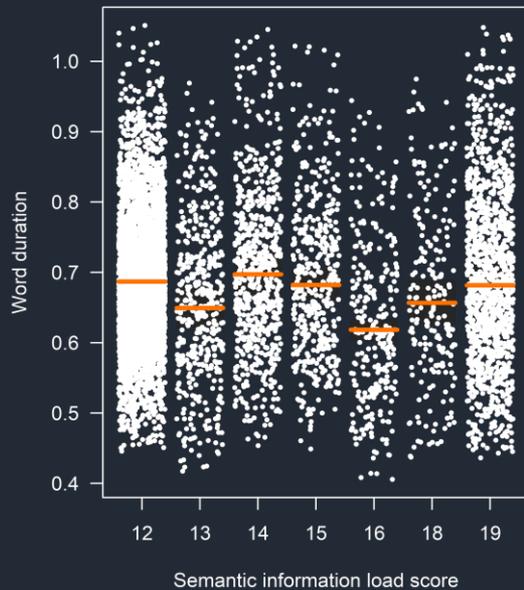
- the type of affix? 
- the affix length? 
- the segmentation? 
- prosodic structure? 
- affix informativity? 

Informativity: Semantic information load score

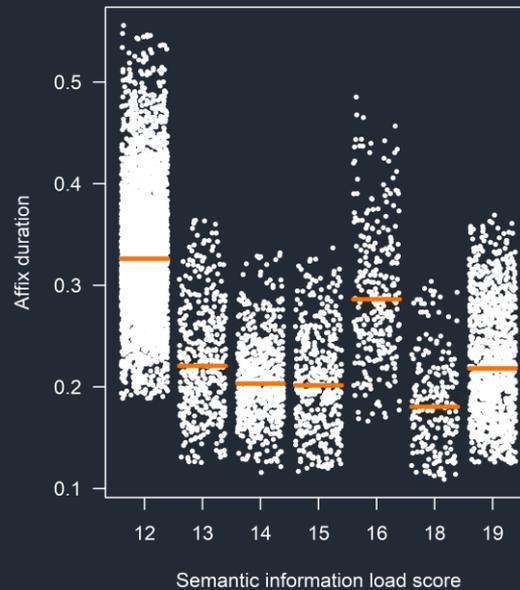
Meta-model including all affixes

- › Additional predictor: **semantic information load score**
- › Additional covariate: **number of timing slots**
- › N = 7441
- › **This does not support the predictions of semantic information load.**

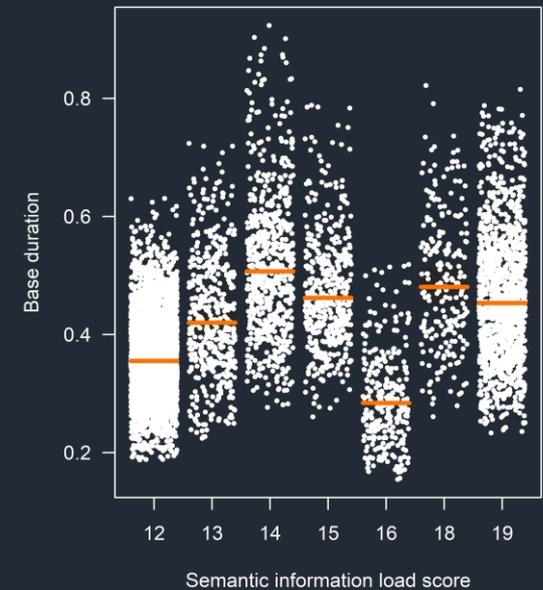
Effect of information load on word duration



Effect of information load on affix duration



Effect of information load on base duration



Informativity: Conditional affix probability

| duration | word | affix | base | word | affix | base | word | affix | base |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| affix | -ness | | | -ize | | | -ation | | |
| word frequency | green | yellow | green | yellow | yellow | yellow | green | yellow | green |
| base frequency | yellow | yellow | yellow | green | yellow | green | yellow | yellow | green |
| relative frequency | green | yellow | green | blue | yellow | blue | green | yellow | green |
| affix | -less | | | pre- | | | -wise | | |
| word frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| base frequency | yellow |
| relative frequency | yellow | yellow | yellow | yellow | green | yellow | yellow | yellow | green |
| affix | dis- | | | un- | | | in- | | |
| word frequency | yellow | green | yellow | green | green | yellow | yellow | yellow | yellow |
| base frequency | yellow |
| relative frequency | yellow |

■ p < .001
■ p < .001

expected direction
 unexpected direction

Are the differences related to ...

- the type of affix? ✗
- the affix length? ✗
- the segmentation? ✗
- prosodic structure? ✗
- affix informativity?

Informativity: Conditional affix probability

| | | | | | | | | | |
|-------------------|-------|-------|------|------|-------|------|--------|-------|------|
| duration | word | affix | base | word | affix | base | word | affix | base |
| affix | -ness | | | -ize | | | -ation | | |
| affix probability | | | | | | | | | |

| | | | | | | | | | |
|-------------------|-------|--|--|------|--|--|-------|--|--|
| affix | -less | | | pre- | | | -wise | | |
| affix probability | | | | | | | | | |

| | | | | | | | | | |
|-------------------|------|--|--|-----|--|--|-----|--|--|
| affix | dis- | | | un- | | | in- | | |
| affix probability | | | | | | | | | |

$p < .001$ negative correlation

Are the differences related to ...

- the type of affix? ✗
- the affix length? ✗
- the segmentation? ✗
- prosodic structure? ✗
- affix informativity? ✗

In sum, we have a mixed picture.

- › Some results are in line with Caselli et al. 2016:
 - › All three frequency measures **can** independently predict duration.
 - › This is evidence for both types of storage in the mental lexicon, as well as for segmentability effects.

In sum, we have a mixed picture.

- › Some results are in line with Caselli et al. 2016:
 - › All three frequency measures **can** independently predict duration.
 - › This is evidence for both types of storage in the mental lexicon, as well as for segmentability effects.

- › However, there are also null effects, which require explanation.
 - › So far, we cannot attribute the differences to:
 - › the domain of durational measurement (word, affix, base)
 - › the type of affix (prefix, suffix)
 - › the prosodic category (pword, clitic group, integrating)
 - › the informativity of the affix (information load, probability).

Our findings imply that ...

- › morphological structure can at least partly influence the phonetic output.

Our findings imply that ...

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- › models that prohibit post-lexical access of morphological information (e.g. Kiparsky 1982, Levelt et al. 1999, Bermúdez-Otero 2018) should be revised.

Our findings imply that ...

- › morphological structure can at least partly influence the phonetic output.
- › models that prohibit post-lexical access of morphological information (e.g. Kiparsky 1982, Levelt et al. 1999, Bermúdez-Otero 2018) should be revised.
- › we need to investigate further factors that might cause frequency effects to surface or to not surface.

Plans

Plans

More corpus data

ONZE, Quakebox

Plans

More corpus data

ONZE, Quakebox

Experimental data

Production experiments planned to be carried out at UC next year

Plans

More corpus data

ONZE, Quakebox

Some things I have to do next or think about:

Experimental data

Production experiments planned to be carried out at UC next year

Plans

More corpus data

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Some things I have to do next or think about:

- › Get familiar with the LaBB-CAT interface, query structure, and variables

Experimental data

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Some things I have to do next or think about:

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- › Learn how to write scripts that can deal with the new textgrid files

Experimental data

Production experiments planned to be carried out at UC next year

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Some things I have to do next or think about:

- › Get familiar with the LaBB-CAT interface, query structure, and variables
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- › Which affixes can I extract, depending on the token counts?

Experimental data

Production experiments planned to be carried out at UC next year

Plans

More corpus data

ONZE, Quakebox

Some things I have to do next or think about:

- › Get familiar with the LaBB-CAT interface, query structure, and variables
- › Learn how to write scripts that can deal with the new textgrid files
- › Which affixes can I extract, depending on the token counts?
- › Which subcorpora should I include?

Experimental data

Production experiments planned to be carried out at UC next year

Thank you for listening.

Thank you for listening.

- › Ben Hedia, Sonia. 2018. *Gemination and Degemination in English Affixation: Investigating the Interplay between Morphology, Phonology and Phonetics*. Ph.D. dissertation: Heinrich-Heine-Universität Düsseldorf.
- › Bermúdez-Otero, Ricardo. 2018. Stratal Phonology. In S. J. Hannahs & Anna Bosch (eds.), *Routledge handbook of phonological theory*, 100–143. London: Routledge.
- › Blazej, Laura J. & Ariel M. Cohen-Goldberg. 2015. Can we hear morphological complexity before words are complex? *Journal of Experimental Psychology. Human perception and performance* 41.1: 50–68.
- › Boersma, Paul & David J. M. Weenik. 2014. Praat: Doing phonetics by computer (Version 5.4.04). Computer program. <http://www.praat.org/>.

Thank you for listening.

- › Caselli, Naomi K, Michael K. Caselli, and Ariel M. Cohen-Goldberg. 2016. Inflected words in production: Evidence for a morphologically rich lexicon. *The Quarterly Journal of Experimental Psychology* 69.3: 432–454.
- › Cho, Taehong. 2001. Effects of morpheme boundaries on intergestural timing: Evidence from Korean. *Phonetica* 58: 129–162.
- › Cohen-Goldberg, Ariel M. 2013. Towards a theory of multimorphemic word production: The heterogeneity of processing hypothesis. *Language and Cognitive Processes*. DOI: 10.1080/01690965.2012.759241.
- › Coleman, John, Ladan Baghai-Ravary, John Pybus & Sergio Grau. 2012. *Audio BNC: The audio edition of the Spoken British National Corpus*. Phonetics Laboratory, University of Oxford. <http://www.phon.ox.ac.uk/AudioBNC>.
- › Davies, Mark. 2008–. *The Corpus of Contemporary American English: 450 million words, 1990–present*. <http://corpus.byu.edu/coca/>.

Thank you for listening.

- › Godfrey, J. E. Holliman & J. McDaniel. 1992. Telephone speech corpus for research and development. *Proceedings of ICASSP-92*, 517–520.
- › Gordon, Elizabeth, Margaret Maclagan & Jennifer B. Hay. 2007. The ONZE corpus. In Joan C. Beal, Karen P. Corrigan & Hermann L. Moisl (eds.), *Creating and digitizing language corpora, Volume 2: Diachronic corpora*. Basingstoke: Palgrave Macmillan. 82–104.
- › Hanique, Iris & Mirjam Ernestus. 2012. The role of morphology in acoustic reduction. *Lingue e Linguaggio* 11: 147–164.
- › Hay, Jennifer. 2001. Lexical frequency in morphology: Is everything relative? *Linguistics* 39.6: 1041–1070.
- › Hay, Jennifer. 2003. *Causes and consequences of word structure*. New York, London: Routledge.

Thank you for listening.

- › Hay, Jennifer. 2007. The phonetics of *un*. In Judith Munat (ed.), *Lexical creativity, texts and contexts*, 39–57. Amsterdam & Philadelphia: John Benjamins.
- › Hildebrandt, Kristine A. 2015. The prosodic word. In John R Taylor (ed.), *The Oxford Handbook of the Word*. Oxford: Oxford University Press.
- › Kiparsky, Paul. 1982. Lexical morphology and phonology. In In-Seok Yang (ed.), *Linguistics in the morning calm: Selected papers from SICOL*, 3–91. Seoul: Hanshin.
- › Lee-Kim, Sang-Im, Lisa Davidson & Sangjin Hwang. 2013. Morphological effects on the darkness of English intervocalic /ɹ/. *Laboratory Phonology* 4.2: 475–511.
- › Levelt, William J. M., Ardi Roelofs & Antje S. Meyer. 1999. A theory of lexical access in speech production. *Behavioral and Brain Sciences* 22.1: 1–38.

Thank you for listening.

- › Plag, Ingo & Sonia Ben Hedia. 2018. The phonetics of newly derived words: Testing the effect of morphological segmentability on affix duration. In Sabine Arndt-Lappe, Angelika Braun, Claudine Moulin & Esme Winter-Froemel (eds.), *Expanding the Lexicon: Linguistic Innovation, Morphological Productivity, and Ludicity*. Berlin & New York: de Gruyter Mouton.
- › Raffelsiefen, Renate. 1999. Diagnostics for prosodic words revisited: The case of historically prefixed words in English. In Tracy A. Hall & Ursula Kleinhenz (eds.), *Studies of the phonological word*. 133–201. Amsterdam, Philadelphia: Benjamins.
- › Raffelsiefen, Renate. 2007. Morphological word structure in English and Swedish: The evidence from prosody. In Geert Booij, Luca Ducceschi, Bernard Fradin, Ernesto Guevara, Angela Ralli & Sergio Scalise (eds.), *Online Proceedings of the Fifth Mediterranean Morphology Meeting (MMM5)*, Fréjus, 15–18 September 2005, 209–268.

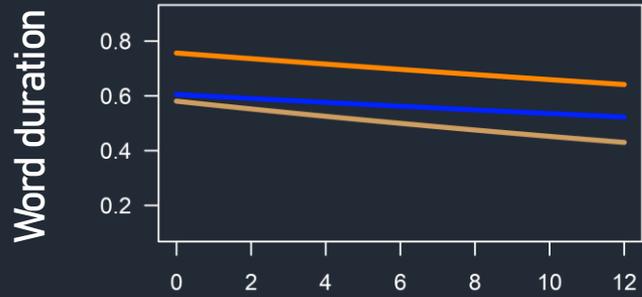
Thank you for listening.

- › R Core Team 2017. *R: A language and environment for statistical computing*. R Foundation for Statistical Computing Vienna, Austria. <http://www.R-project.org/>.
- › Seyfarth, Scott, Marc Garellek, Gwendolyn Gillingham, Farrell Ackerman & Robert Malouf. 2017. Acoustic differences in morphologically-distinct homophones. *Language, Cognition and Neuroscience*. 1–18.
- › Sugahara, Mariko & Alice Turk. 2009. Durational correlates of English sublexical constituent structure. *Phonology* 26: 477–524.
- › Vitevitch, Michael S., & Luce, Paul A. 2004. A web-based interface to calculate phonotactic probability for words and nonwords in English. *Behavior Research Methods, Instruments, and Computers* 36.3: 481–487.

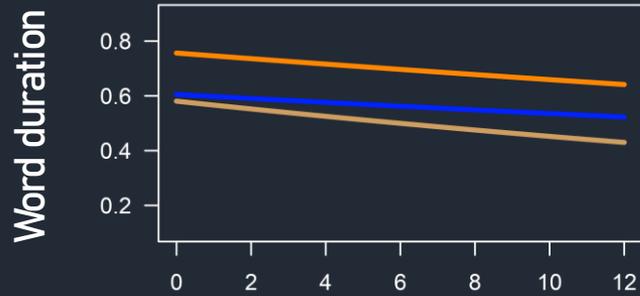
Thank you for listening.

- › Walsh, Liam, Jennifer Hay, Bent Derek, Liz Grant, Jeanette King, Paul Millar, Viktoria Papp & Kevin Watson. 2013. The UC QuakeBox Project: Creation of a community-focused research archive. *New Zealand English Journal* 27: 20–32.

Log word frequency



Log word frequency

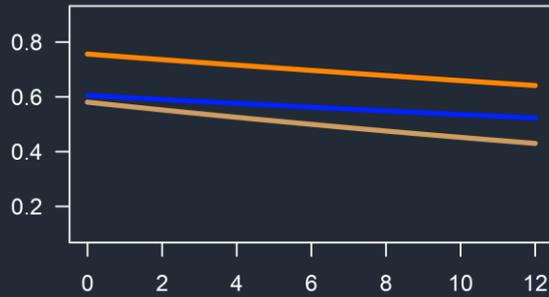


- ation
- ness
- un-

Effect size comparison between affixes. Effects with $p > .001$ omitted.

Log word frequency

Word duration



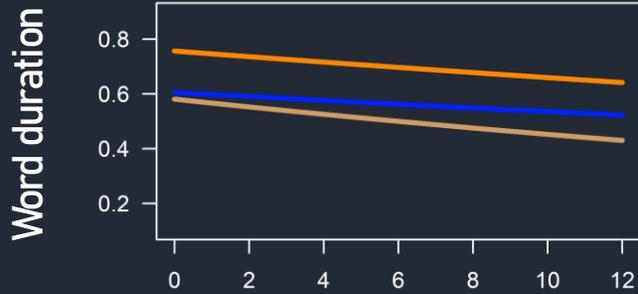
Log base frequency



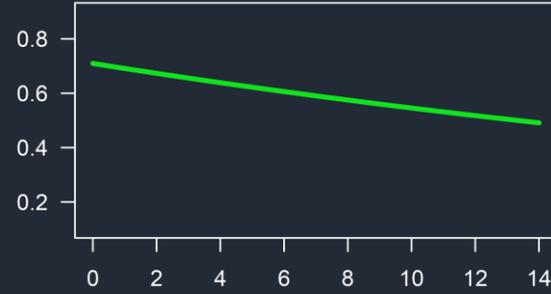
- -ation
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Effect size comparison between affixes. Effects with $p > .001$ omitted.

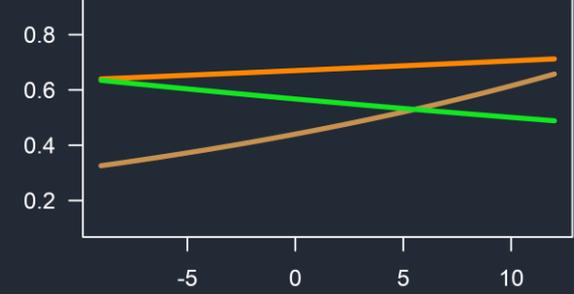
Log word frequency



Log base frequency



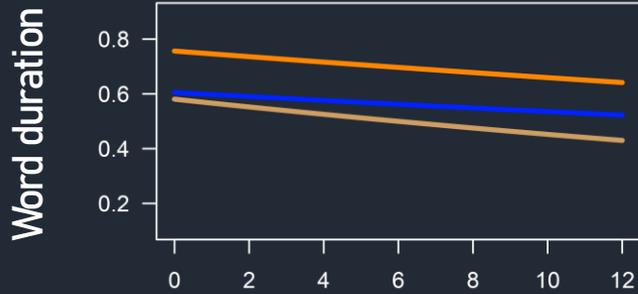
Log relative frequency



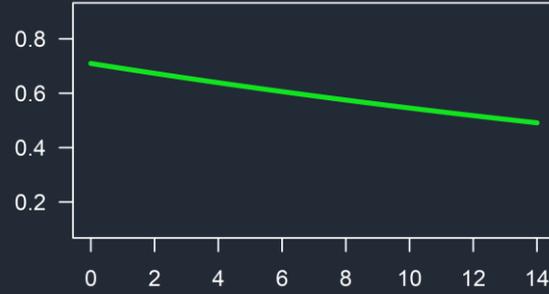
■ -ation ■ -ize
■ -ness
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Effect size comparison between affixes. Effects with $p > .001$ omitted.

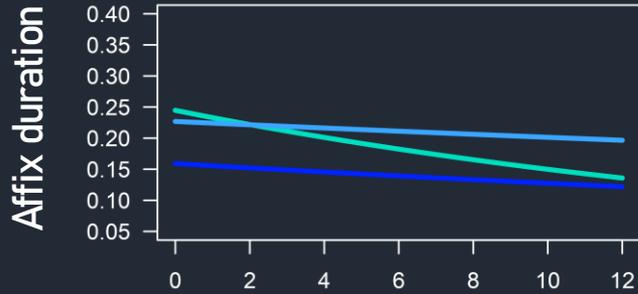
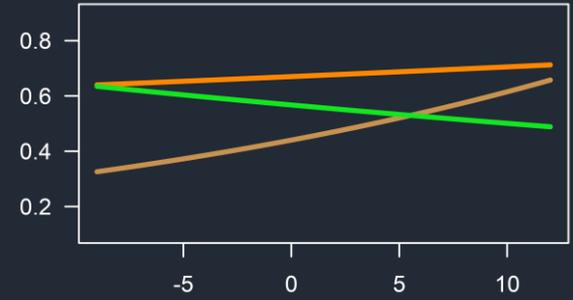
Log word frequency



Log base frequency



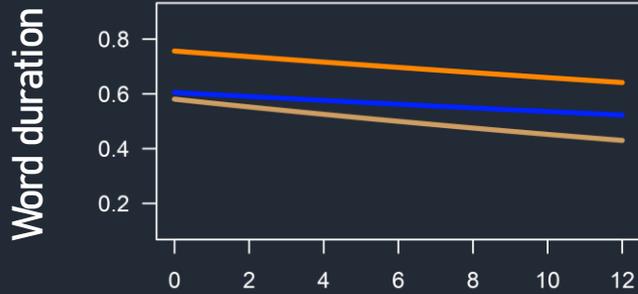
Log relative frequency



■ -ation ■ -ize ■ pre-
■ -ness ■ dis-
■ un-

Effect size comparison between affixes. Effects with $p > .001$ omitted.

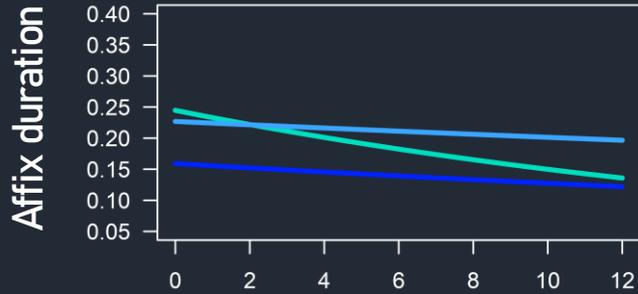
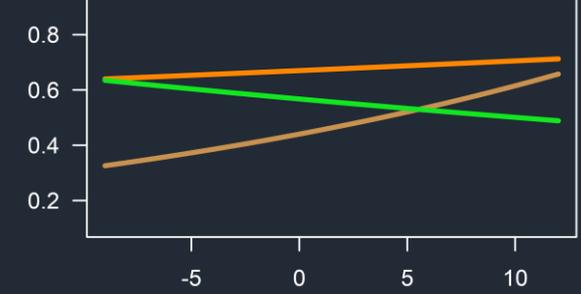
Log word frequency



Log base frequency

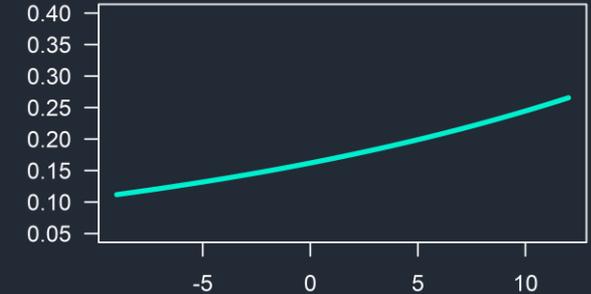


Log relative frequency

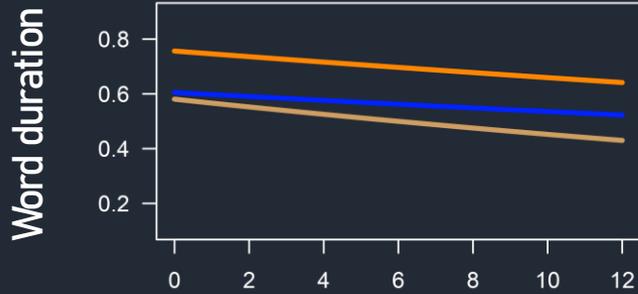


■ -ation ■ -ize ■ pre-
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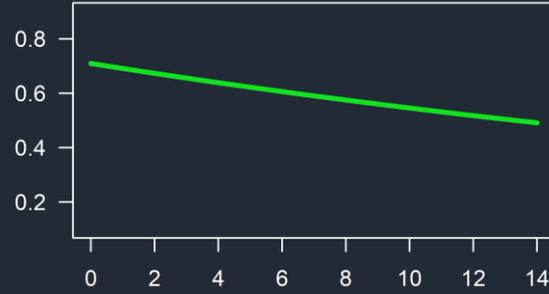
Effect size comparison between affixes. Effects with $p > .001$ omitted.



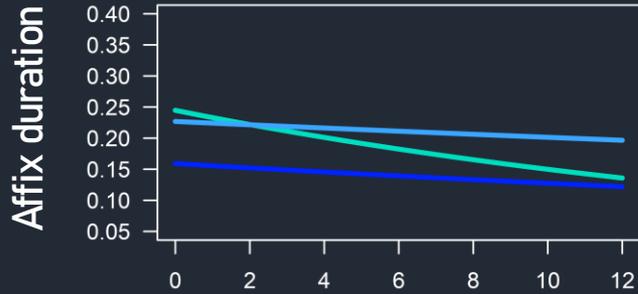
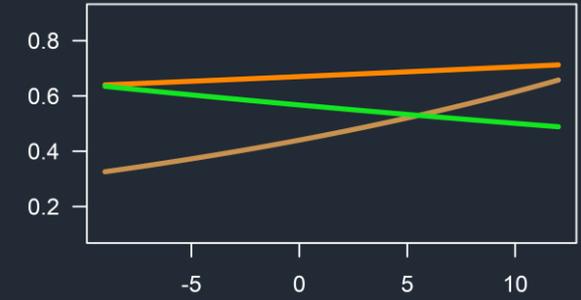
Log word frequency



Log base frequency

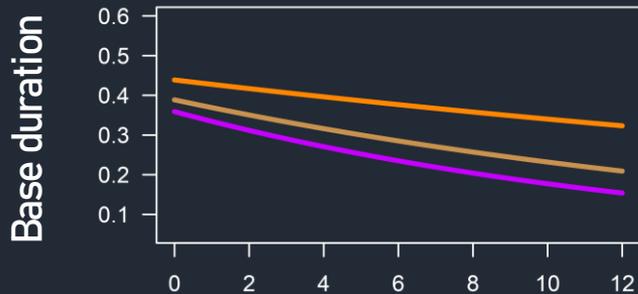
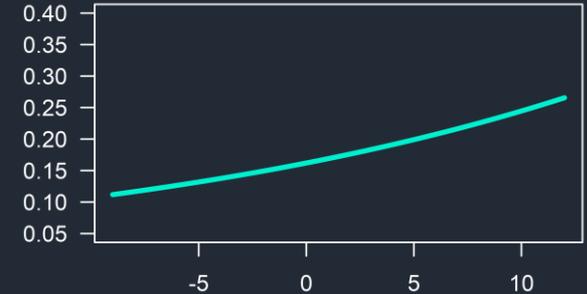


Log relative frequency

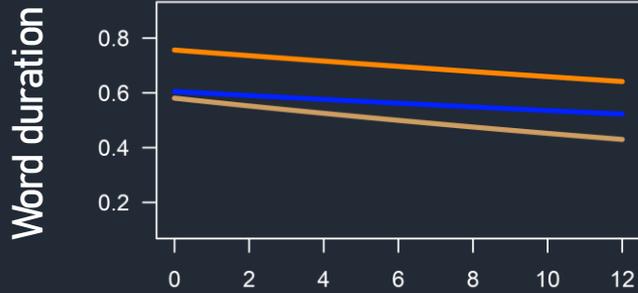


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Effect size comparison between affixes. Effects with $p > .001$ omitted.



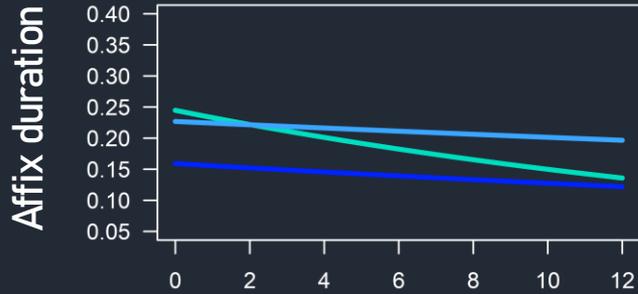
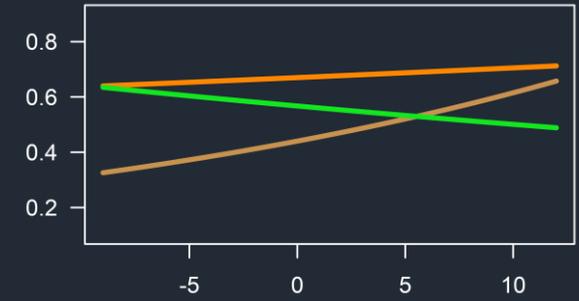
Log word frequency



Log base frequency

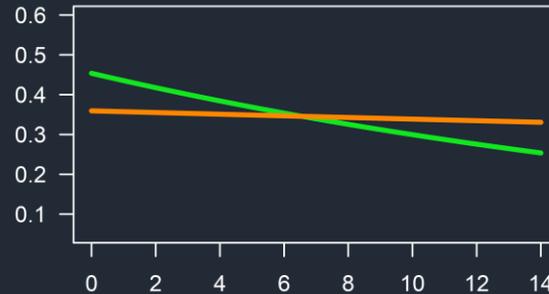
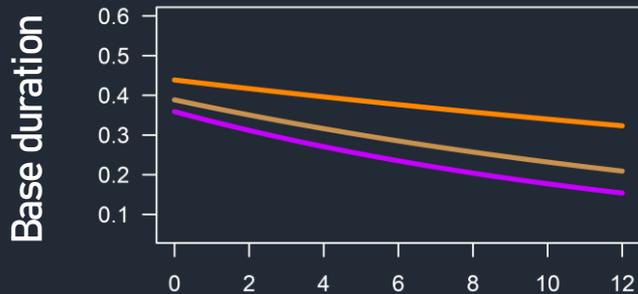
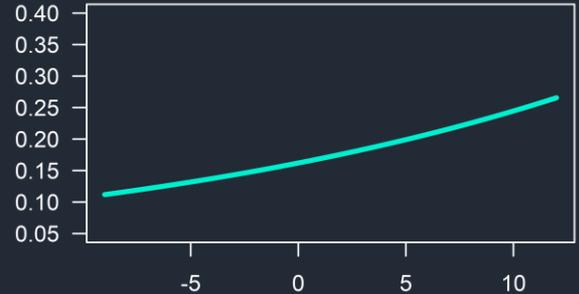


Log relative frequency

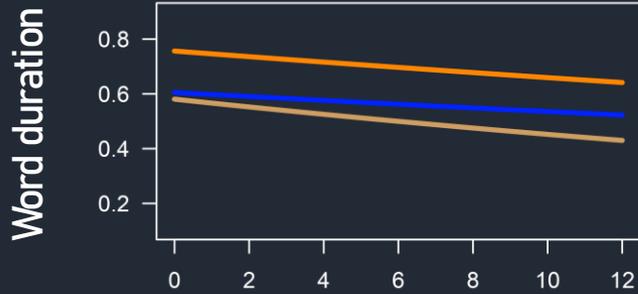


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■ un-

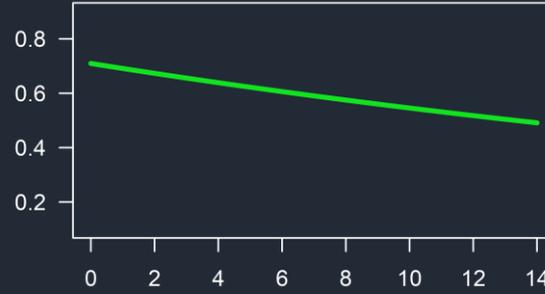
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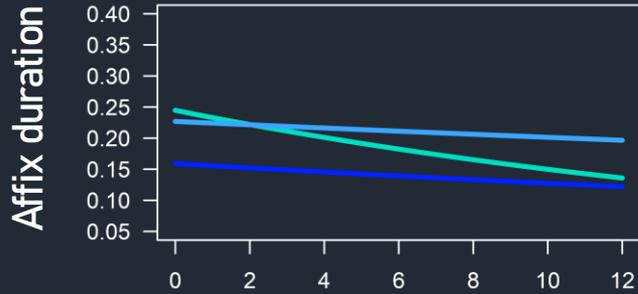
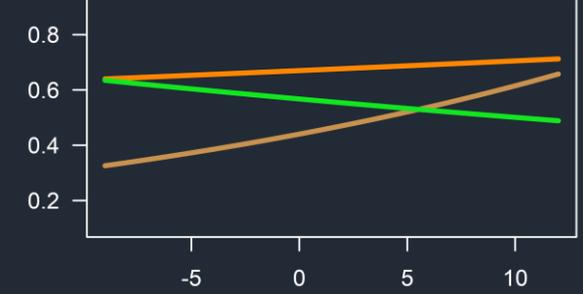
Log word frequency



Log base frequency

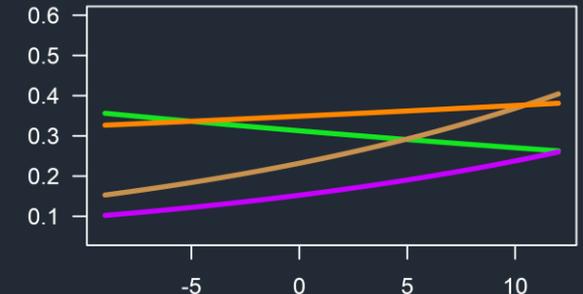
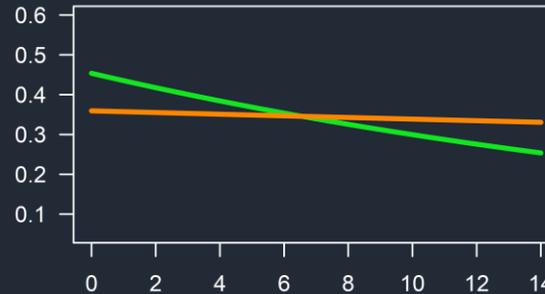
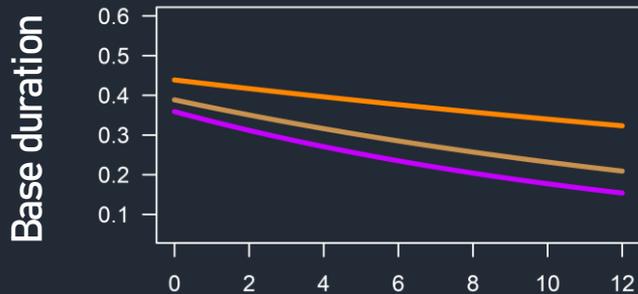
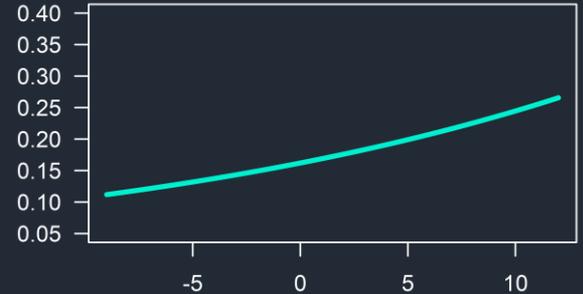


Log relative frequency



■ -ation ■ -ize ■ pre-
■ -ness ■ dis- ■ -wise
■ un-

Effect size comparison between affixes. Effects with $p > .001$ omitted.



Prosodic word predictions



yword-forming



clitic group



integrating



Prosodic word predictions



pword-forming



clitic group



integrating

