

Word-final /s/ durations in spoken German

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Data

Ten L1 German speakers were recruited in Berlin, Brandenburg, and Saxony in 2017, asked for their written consent, and paid 10 Euros for their contribution to a German language corpus.

While reading lists of German sentences and a short story at a comfortable speed, they were recorded with a ZoomH4n digital audio recorder and a Sennheiser ME67 microphone.

Table 1: Carrier sentences.

<i>Sentence with target words in bold</i>	<i>Type of /s/</i>
Eine Alternative wäre es, ein anderes System zu verwenden.	Inflection
Er ist zur Erkenntnis gelangt, dass es ohne sie nicht geht.	Phoneme, phoneme, phoneme
Sie spielt Flöte seit sie ein kleines Kind war.	Inflection
Alle Wohnungen in der Prager Innenstadt sind besonders groß.	Derivation
Lebkuchen-Rezepturen inkludieren fast immer Anis .	Phoneme
Die Blaumeise und die Kohlmeise unterscheiden sich anhand des Gefieders am Kopf.	Phoneme, genitive
Bei uns lebt ein Dachs in der Garage.	Phoneme
Jedes Antibiotikum sollte genau überdacht werden, bevor es den Patienten.	Inflection
Das sind zwei Autos .	Plural
Kebabs bestehen meist aus Lammfleisch.	Plural
Bei den Dänen gibt es immer Gutes zu essen.	Inflection
Die Mücken sind dieses Jahr sehr lästig.	Inflection
Ist dir heute schon etwas geglückt?	Phoneme
Der Sims am Fenster ist etwas zu mickrig geraten.	Phoneme
Das ist mir alles zu müssig.	Phoneme, inflection
Ich bin glücklich und aufgeregt, als ich gemeinsam mit anderen gut gekleideten Leuten das Haus betrete.	Phoneme
Noch drei Minuten bis zum Konzertbeginn.	Phoneme
Sie fällt hinter mir ins Schloss .	Clitic, phoneme
Es ist ganz hell und heiß , da wo ich stehe.	Phoneme
Ich muss mich ans Klavier setzen.	Phoneme, clitic
Was ist denn das?	Phoneme
Die Drohnen des Militärs eignen sich gut für Observation aus der Luft.	Genitive
Wir mussten am Los rubbeln, bevor wir unseren Gewinn gesehen haben.	Phoneme
Die Mieder, die bei Palmers verkauft werden, sind alle qualitativ hochwertig.	Phoneme

Die Pizza war sehr groß und auch ziemlich kross gebacken.
--

Phoneme

Target words were cut with Audacity and saved as WAV files. They were processed with the *Penn Phonetics Lab Forced Aligner for English* (Yuan and Liberman, 2009), and the output files were post-alignment edited in Praat. Word durations and word-final /s/ durations were annotated on two different tiers. 5% of the manually corrected files were checked by a second rater and interrater reliability (Pearson's r , root mean square error/ RMSE) were calculated on overall word durations (as these were identified to contain errors) and excellent agreement was established ($r = .99$, RMSE = .023). Word durations and durations of the word-final /s/ were read from the Textgrid files with a script. The following variables were measured and additionally entered into the spreadsheet:

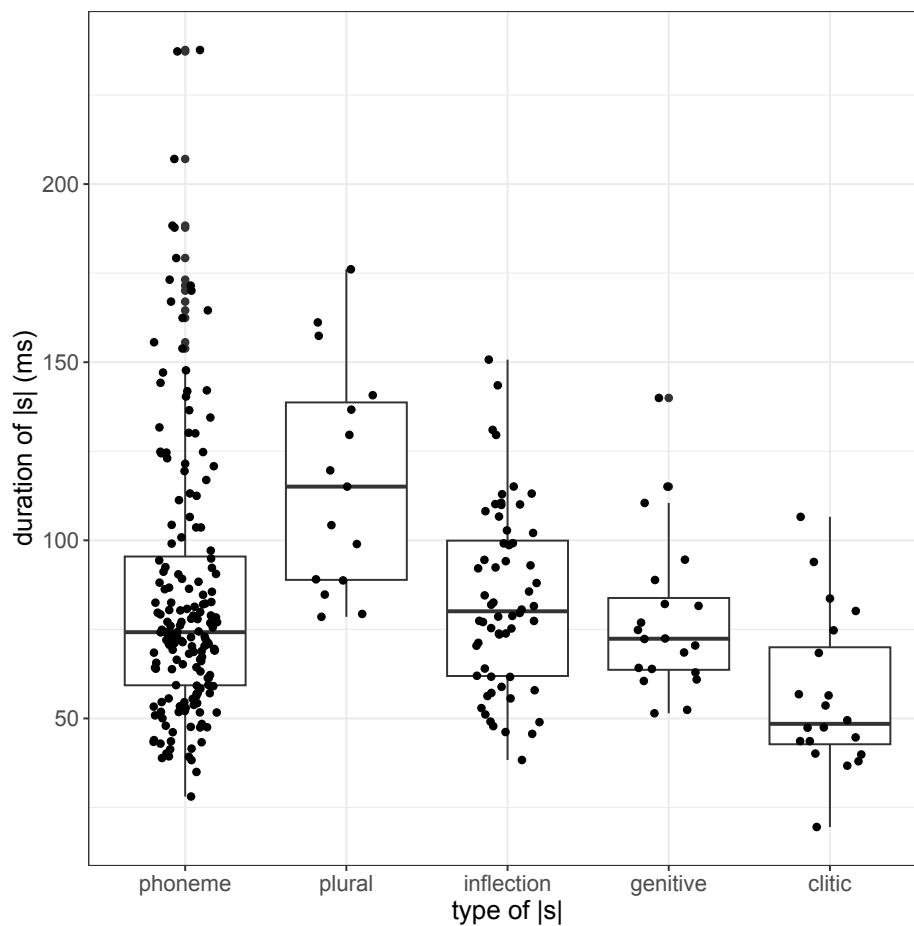
- type of |s| (i.e., phoneme, plural, inflection, genitive, clitic)
- type of |s| (i.e., phoneme, morpheme)
- |s|-type frequency
- lexical frequency rate
- preceding sound (plosive, liquid/nasal, vowel)
- following sound
- grapheme (s, ss, ß)
- number of syllables per word
- sentence position (medial, final)

Frequency rates of word-final |s|-types were calculated from the *FOLK Archiv für Gesprochenes Deutsch* (Schmidt and Schütte, 2010) where all transcriptions of spoken German discourse (with the exception of child-directed and Austrian speech) were searched for words ending in |s|. These were extracted, the |s|-types were classified (see above), and a frequency

rate was calculated by dividing the total number of an |s|-type occurrence by the overall token number of the corpus (81,498 words). Lexical frequency rates for the German target words were determined with German Clearpond (Marian et al., 2012). All frequency variables were log transformed.

The data can be found in form of a .csv file that accompanies this document in the Lindat database.

Results



Luef, 2023 (supplementary material)

```
> one.way <- aov(S_msec ~ type_of_s, data = Ger)
>
> summary(one.way)
          Df Sum Sq Mean Sq F value    Pr(>F)
type_of_s  4 33087    8272   7.033 2.06e-05 ***
Residuals 286 336377    1176
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
> library(sandwich)
> library(multcomp)
Loading required package: mvtnorm
Loading required package: survival
Loading required package: TH.data
Loading required package: MASS

Attaching package: 'TH.data'

The following object is masked from 'package:MASS':

    geyser

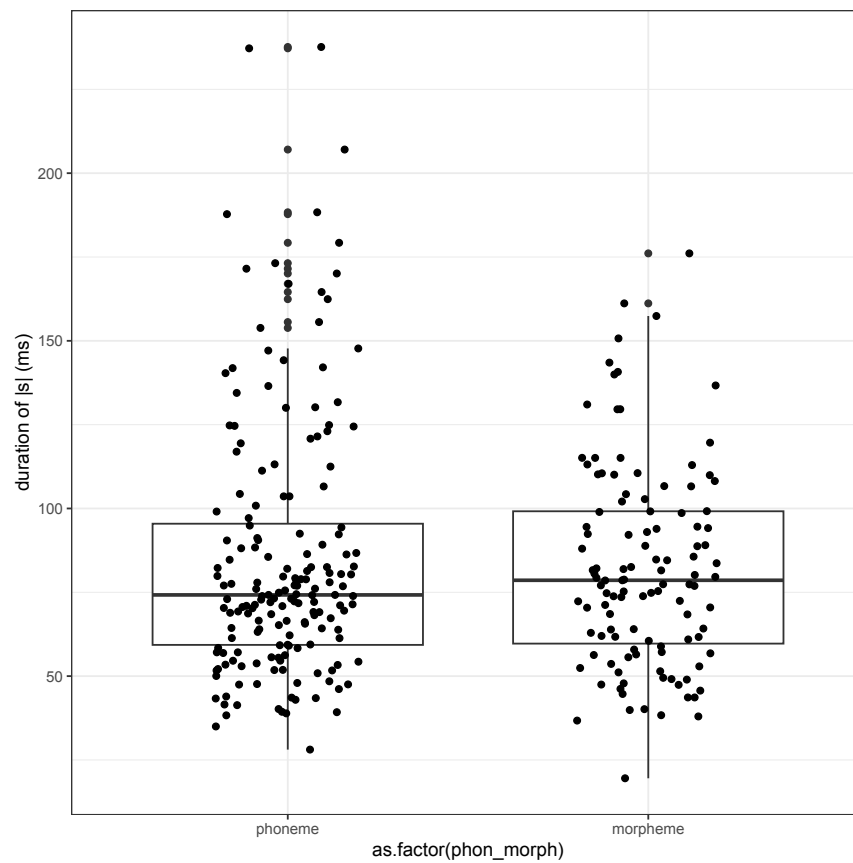
> Ger$type_of_s = as.factor(Ger$type_of_s)
> amod <- aov(S_msec ~ type_of_s, data = Ger)
> amod_glht <- glht(amod, mcp(type_of_s="Tukey"), vcov=vcovHC)
>
> summary(amod_glht)

      Simultaneous Tests for General Linear Hypotheses
      |
Multiple Comparisons of Means: Tukey Contrasts

Fit: aov(formula = S_msec ~ type_of_s, data = Ger)

Linear Hypotheses:

              Estimate Std. Error t value Pr(>|t|)
genitive - clitic == 0    21.976     7.159   3.070 0.01800 *
inflection - clitic == 0  27.117     5.988   4.529 < 0.001 ***
phoneme - clitic == 0    29.119     5.802   5.019 < 0.001 ***
plural - clitic == 0     61.086     9.869   6.189 < 0.001 ***
inflection - genitive == 0  5.141     6.095   0.843 0.91120
phoneme - genitive == 0    7.142     5.912   1.208 0.73361
plural - genitive == 0    39.109     9.935   3.937 < 0.001 ***
phoneme - inflection == 0  2.002     4.422   0.453 0.99062
plural - inflection == 0   33.968     9.127   3.722 0.00195 **
plural - phoneme == 0     31.967     9.006   3.550 0.00385 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
(Adjusted p values reported -- single-step method)
```



Please see Luef, E. M., *Subphonemic detail and foreign language learning: Acoustical substitution of morpho-phonological gaps in Korean learners of L2 English and L3 German*