Compounds in German – Influences on prosodic constituency

Pia Bergmann (pia.bergmann@germanistik.uni-freiburg.de)
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Prosodic constituency of complex words in German

The phonological word

- morphology-phonology interface mediated by prosodic constituent
  → the phonological word
- non-isomorphy of morphological and prosodic structure (e.g. Booij 1985, Nespor & Vogel 1986 /2007, Hall 1999, Raffelsiefen 2000, Szczepaniak 2007, Wiese 2000)

- syllabification pattern, e.g.
  - $[lieb]_{\omega}[+lich]_{\omega}$ ‚mellow' vs. $[ne.bl+ig]_{\omega}$ ‚misty'
- regulation of phonological processes, e.g.
  - $[U\mathbf{ŋ}garn]_{\omega}$ ‚*Hungary*'
  - $[u\mathbf{n}]_{\omega}[gern]_{\omega}$ *or* $[u\mathbf{ŋ}]_{\omega}[gern]_{\omega}$ ‚*reluctant*'

velar nasal assimilation

  - $[tan\mathbf{ts}t]_{\omega}$ from /tants/ + /st/ (2. Ps. Sg.) ‚*you dance*'
  - $[Schrift]_{\omega}[tum]_{\omega}$ ‚*literature*'
  - $[Schiff]_{\omega}[fahrt]_{\omega}$ ‚*shipping*'

degemination

However...

- Two points of criticism
  - most analyses on the pword in German based on introspection
  - systematic influences on boundary strength?
    - frequency-related measures (e.g. relative frequency *softly/soft* vs. *swiftly/swift*, Hay 2003; cf. Bell et al. 2009, Bush 2001, Bybee 2001, Bybee & Scheibmann 1999)
    - morphological informativeness (e.g. in *+igheid*, Pluymaekers et al. 2012)
    - semantic transparency? ‚semantic bleaching'? (Booij 1999, Giegerich 1985)

Aims of my paper

Results of two empirical studies

- Production study:

  Degemination across the pword boundary

- Corpus study of spontaneous speech:

  Durational reduction at the pword boundary

  ➢ token frequency, lexical class, morphological structure, phonological structure, semantic transparency

Production study (funded by the DFG, Au 72/18-1)

Degemination across the pword boundary

- n#n, l#l, s#s, t#t
- carefully selected words
- 14 speakers from north-western Germany (7f, 7m; age 19-35)

n#n				
	High(er) frequency		**Low(er) frequency**	
	VV	**V**	**VV**	**V**
Comp	Bahn#netz '*railroad network*'	Brenn#nessel 'stinging nettle'	Bahn#nutzung 'utilisation of a track'	Spann#netz 'safety net'
PV	ein#nehmen 'to take sth (medicine)' ein#nisten 'to nest'	hin#nehmen 'to put up with'	ein#nagen 'to gnaw at sth. (wood)' ein#nageln 'to nail sth.'	hin#neigen 'to lean in towards so./sth.'

Production study

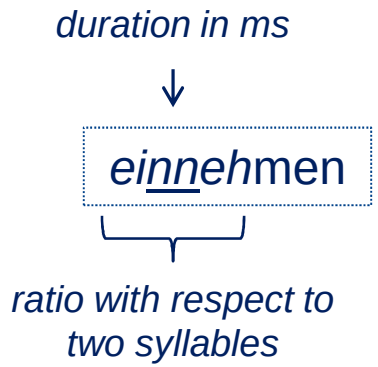
Degemination across the pword boundary

- target items embedded in carrier sentences, controlled for IP-position
- short „dialogues“

accented	(Wie äußert sich deine Allergie gegen das Medikament?) (How does your allergy to the medicament show?) **Wenn ich es EINnehme, bekomme ich MAGENkrämpfe.** when I it take get I stomach cramps ‘When I take it, I get stomach aches.’
unaccented	(Warum schluckst du ein Medikament, das du nicht gut verträgst?) (Why do you take a medicament you don’t tolerate?) **Wenn ich es NICHT einnehme, geht es mir NOCH schlechter.** when I it not take goes it me even worse ‘When I don’t take it, I feel even worse.’

Production study
Degemination across the pword boundary

- Dependent variables
  - absolute duration (log) of the sound sequence
  - relative duration (log) of the sound sequence



- Independent variables
  - token frequency (log transformed; COSMAS II)
  - lexical class (noun compound – particle verb)
  - vowel quantity (V – VV)
  - segment (n#n, l#l, s#s, t#t)
  - accentuation (accented – unaccented)

- Statistic analysis: linear mixed-effects regression model (cf. Baayen 2008)

Production study

Degemination across the pword boundary

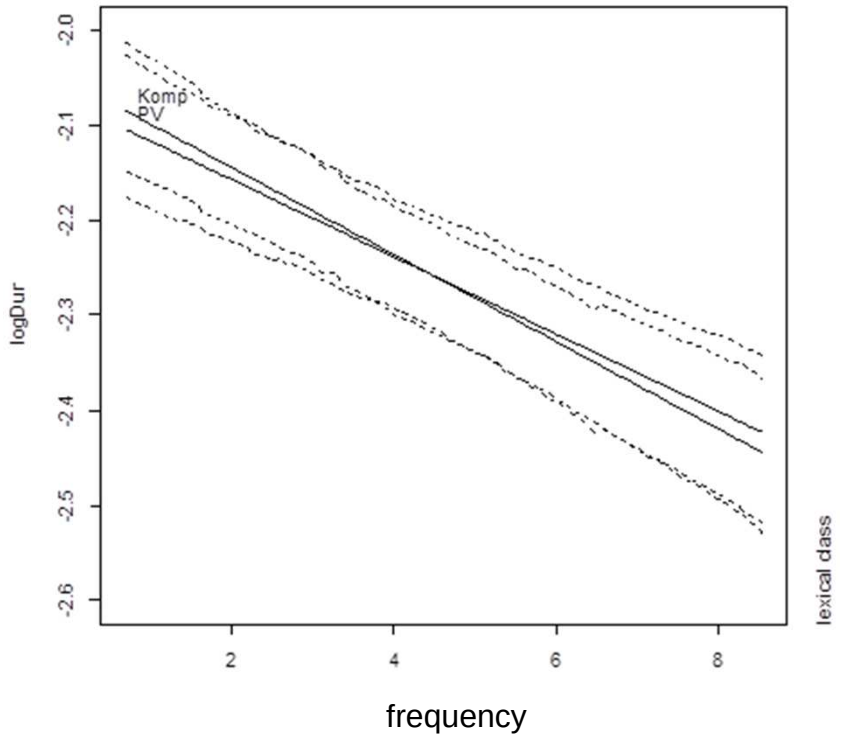
- Results

	frequ	lex	frequ* lex	acc	V	segment	frequ* segment	
compounds only (n = 668) / R^2 = 0.72	*	--	--	*	*	*	*	abs. duration
compounds + PV (n = 1083) / R^2 = 0.69	*	n.s.	*	*	*	*	*	abs. duration
compounds + PV reduced set (n = 999) / R^2 = 0.70	*	n.s.	n.s.	*	*	*	*	abs. duration
compounds + PV reduced set (n = 997) / R^2 = 0.70	*	(*) (t-value -1.98)	* (t-value 3.61)	*	*	*	*	rel. duration

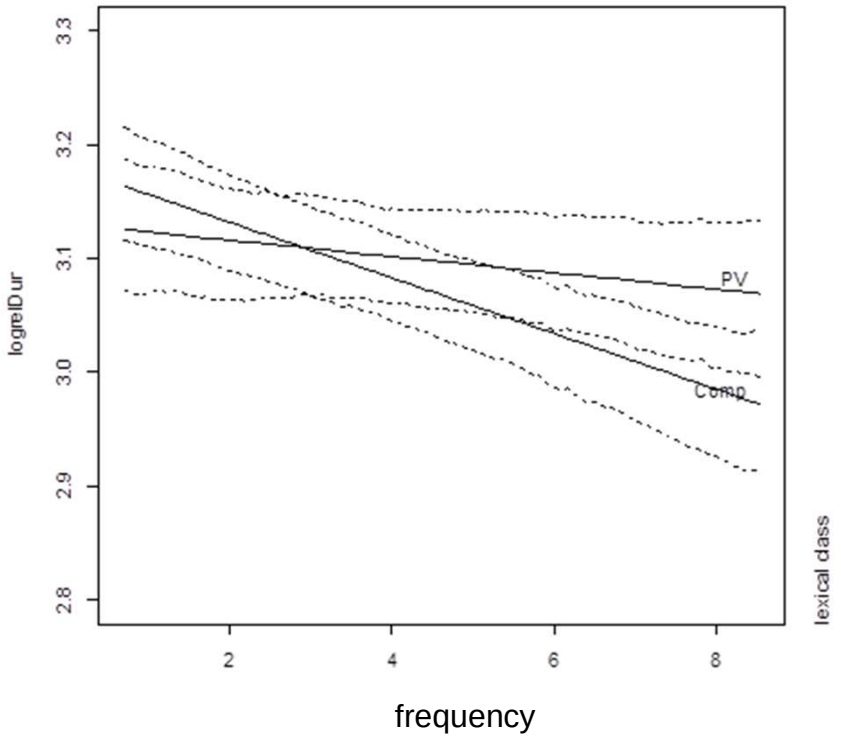
Production study

Degemination across the pword boundary

Absolute duration



Relative duration



Production study
Degemination across the pword boundary

- Summary: Duration of geminate sequences

- token frequency ✓	LF > HF
- vowel quantity ✓	V > VV
- segment ✓	obstruents > sonorants
- accentuation ✓	accented > unaccented
- lexical class	particle verbs less influenced by frequency than noun compounds

Corpus study of spontaneous speech
Durational reduction at the pword boundary

- Corpora
  - CallHome (LDC), DFG-Dialektintonation, BigBrother (Season 1)

type of word formation	examples		semantic transparency	
derivations with *-los*	arbeits	**l**os	yes	*‚unemployed‘*
	trost	**l**os	no	*‚bleak‘*
noun compounds	arbeits	**l**ohn	yes	*‚wages‘*
	nord	**l**icht	no	*‚person from the north‘*
duration of	C1	**C2**		

Corpus study of spontaneous speech
Durational reduction at the pword boundary

- dependent variable: duration of C2 (/l/) in ms
- independent variables: frequency, semantic transparency, word formation type
- co-variates
  - rhyme structure and manner of articulation (C1)
  - metrical structure of the word and syllables per word
  - pitch accent and IP-position
  - speech rate
  - random factor: speaker

- linear mixed-effects regression model (Baayen 2008)
- methods
  - acoustic-phonetic analysis (Praat), visual inspection, manual segmentation

Corpus study of spontaneous speech
Durational reduction at the pword boundary

- Hypotheses:
  - low frequency > high frequency
  - transparent > non-transparent
  - compounding = derivation (?)

Corpus study of spontaneous speech

Durational reduction at the pword boundary

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Linear mixed model fit by REML
Random effects:
 Groups   Name        Variance   Std.Dev.
 Sprecher (Intercept) 5.5482e-05 0.0074486
 Residual             3.4205e-04 0.0184945
Number of obs: 382, groups: Sprecher, 137

Fixed effects:
                                 Estimate  Std. Error  t value
(Intercept)                      0.1111590  0.0107554  10.335
Frequency                       -0.0023105  0.0008662  -2.667 *
Sem transparency: no            -0.0062024  0.0027295  -2.272 *
Morph2: compound                -0.0148795  0.0099586  -1.494
Frequency*Morph2: compound       0.0016976  0.0009876   1.719
Syll per word                   -0.0022685  0.0012079  -1.878
Speech rate                     -0.0026246  0.0009236  -2.842 *
IP-position: medial             -0.0050884  0.0020225  -2.516 *
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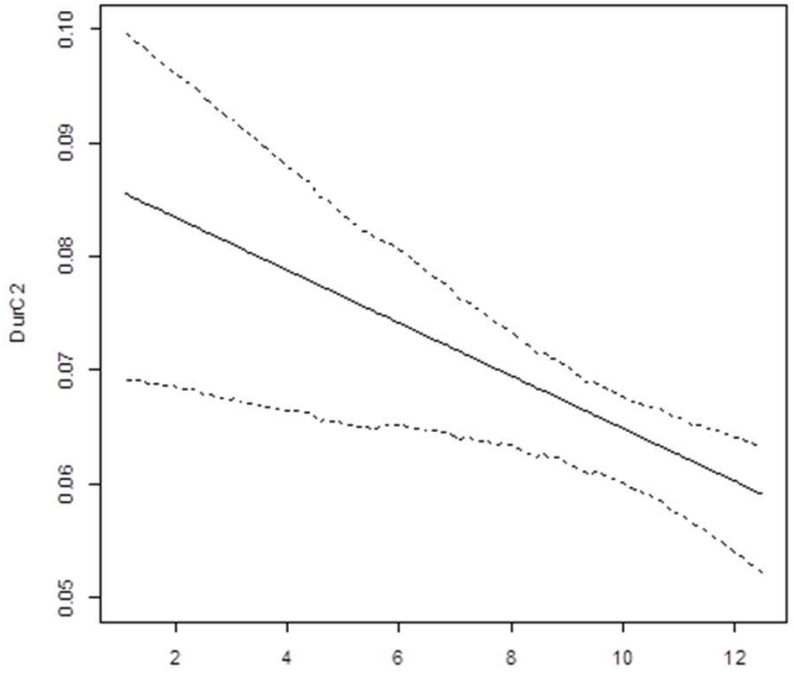
($R^2 = 0.33$)

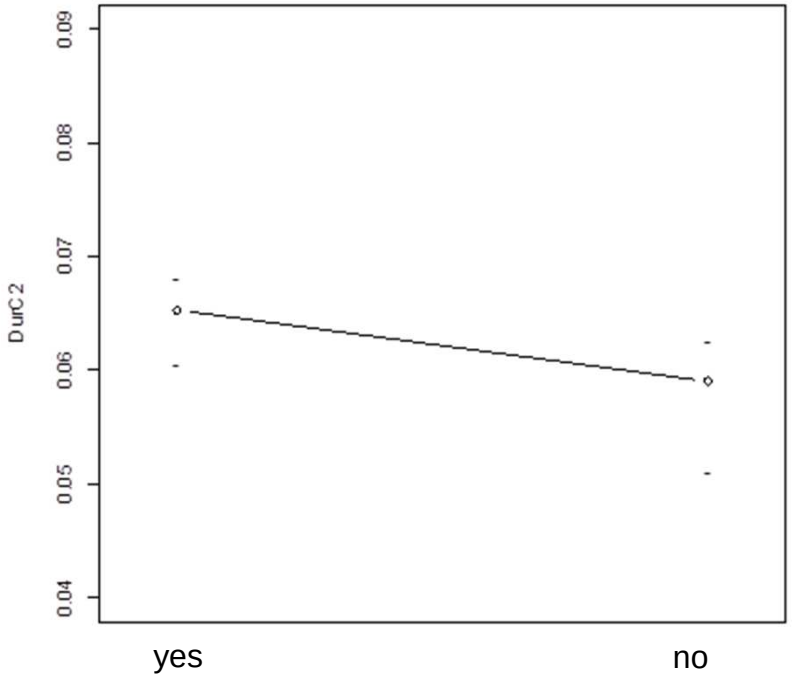
Corpus study of spontaneous speech

Durational reduction at the pword boundary

- /l/-duration (ms)



frequency



semantic transparency

Corpus study of spontaneous speech
Durational reduction at the pword boundary

- Summary: Duration of pword-initial segment (/l/)

  - token frequency ✓ LF > HF
  - semantic transparency ✓ yes > no

  - word formation type --

Summary and conclusions

- degemination in prosodic compounds is common and systematic in read speech
  - gradient durational reduction with
    - usage-based factor token-frequency
    - prosodic factor accentuation
    - phonological structure
  - no stable effect of lexical class per se
- durational reduction at the pword-boundary is common and systematic in spontaneous speech
  - no effect of word formation type
  - influenced by frequency, semantic transparency

➢ corroborates non-isomorphy of (categorical) morphological and prosodic structure

➢ highlights systematic influences on gradient reduction

Köszönöm!

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