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A Corpus Analysis of the Word Segmentation Cues in German Child-Directed Speech

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Introduction

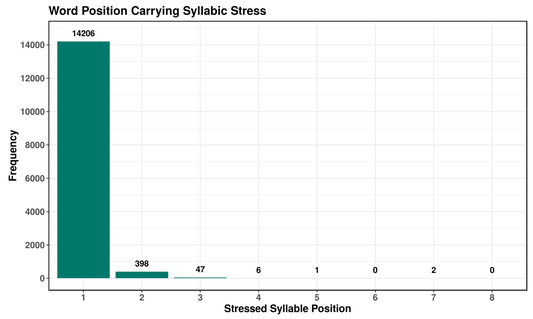
- One of the first challenges in language acquisition is speech segmentation
- Multiple cues have been found to aid segmentation[1,2]
  - → Stress[3]
  - → Highly frequent function words[4,5]
  - → Transitional probabilities[6,7]
- Availability and reliabitlity of cues differs between languages → RQ: which segmentation cues are available in German CDS?

Method

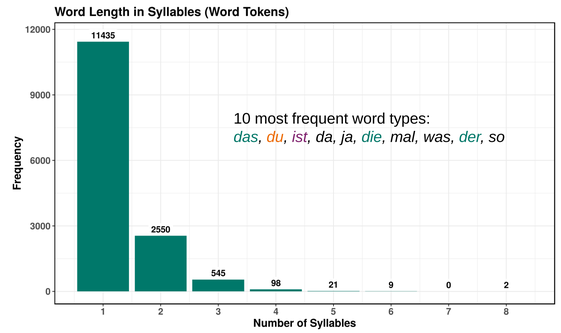
- Corpus analysis, performed on data from German CHILDES[8]
- Coded ~16,000 words (~4,000 utterances) = ca. 1 day of input[9]
- Coded for: *primary word stress*, *word length* (number of syllables), *word category* (function/content word), *syllable structure*, *TPs*

Results

- Stress: 97% of words contained word-initial stress (87% of unique word tokens (frequency-controlled), 86% excluding monosyllabic words)



- Word length: 78% monosyllabic, 17% disyllabic, (37% mono-, 40% disyllabic for unique word tokens)



- Word category: 62% of all words were monosyllabic function words; 45/50 most frequent words were function words (90%)
- Syllable structure: Varied depending on syllable position within words: intermediate syllables were often open, wheras initial and final syllables tended to be closed

	overall		initial		intermediate		final	
1	CVC	3777	CVV	3190	CV	338	CVC	3305
2	CVV	3482	CVC	3008	CVV	157	CVV	2633
3	CV	2993	CV	1324	CVC	120	CV	1748
4	CVVC	1449	CVVC	1318	CCVV	42	CVVC	1312
5	CVVV	1061	CVVV	1025	CCV	39	CVVV	1004

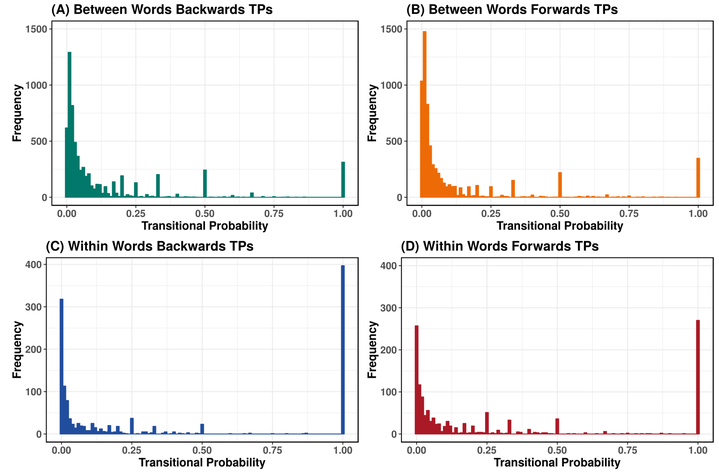
- Transitional probabilities (TPs): We found two main effects and an interaction, controlling for the frequency of the syllable pair

	Forwards TPs	Backwards TPs
Within-word	M = 0.296	M = 0.364
	(SD = 0.388)	(SD = 0.436)
Between-words	M = 0.097	M = 0.124
	(SD = 0.207)	(SD = 0.224)

→ TPs were higher within than between words (β = -0.222, SE = 0.006, t = -38.524, p < .001)

→ TPs were higher backwards than forwards (β = 0.025, SE = 0.003, t = 8.851, p < .001)

→ There was a larger difference within/between-words for the backwards TPs (β = -0.025, SE = 0.006, t = 8.851, p < .001)



Summary

- First corpus analysis on word segmentation cues in German
- Multiple segmentation cues are available
  - → Stress as almost perfect cue to wordhood in German CDS
  - → High proportion of high frequency function words, which may act as anchors during segmentation[4,5]
  - → Statistical cues to segmentation (TPs) are present but seem to be weaker than stress cue

REF: 1) Aslin et al. (1996). *Models of Word Segmentation in Fluent Maternal Speech to Infants*; 2) Lehiste (1970). *Suprasegmentals*; 3) Friederici, et al. (2007). *Curr. Biol.*; 4) Bortfeld et al. (2005). *Psych. Sci.*; 5) Frost et al. (2019). *JEP: LMC*; 6) Saffran et al. (1996). *Science*; 7) Aslin et al. (1998). *Psych. Sci.*; 8) MacWhinney (2000). *The CHILDES Project*; 9) Rowland et al., (unpubl.). *The Language 0-5 Project*