Morphological Structure, Plosive Deletion and Acoustic Reduction: The Case of NNN Compounds

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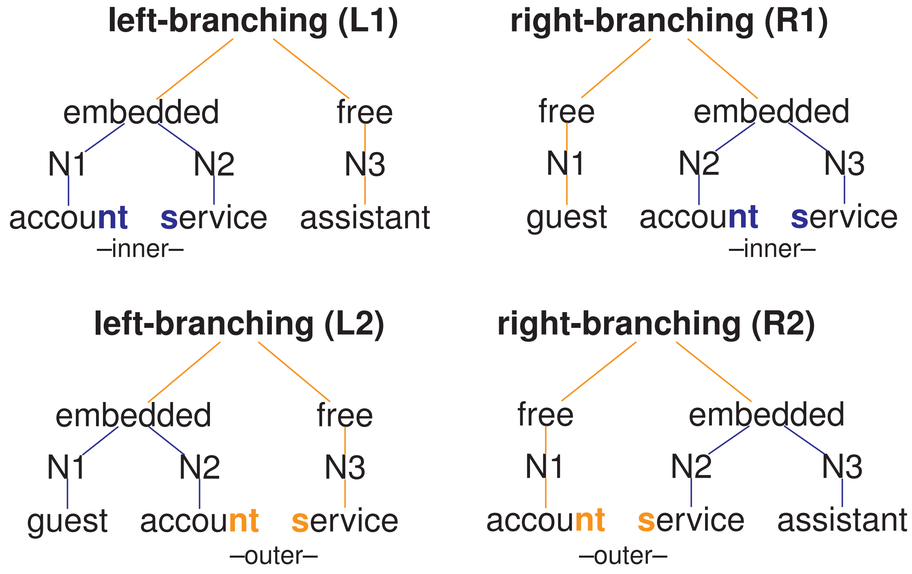
Does the morphological structure of NNN affect the acoustic signal?



Morphological boundary strength leads to correlations of

- segment duration and morphological segmentability (Hay 2003, 2007, Plag & Ben Hedia 2017)
- segment duration and different degrees of boundary strength (Sproat & Fujimura 1993)
- constituent duration and different degrees of boundary strength (Kunter & Plag 2016)

Embedded Reduction Hypothesis (Kunter & Plag 2016, Schebesta & Kunter (in prep.)):

In a complex word [X Y] Z,
there is more phonetic reduction at the inner, weaker boundary between X and Y than at the outer, stronger boundary between Y and Z. This is valid for both branching directions.

Method:

production experiment with 41 native speakers of North American English;
25 target word pairs (**account service**) triggering 4 conditions (**L1, L2, R1, R2**)
= 4100 data points

Data:

/t,d/ reduction at morphological boundaries (Hay 2003) in environments susceptible to plosive deletion (Tagliamonte & Temple 2005):

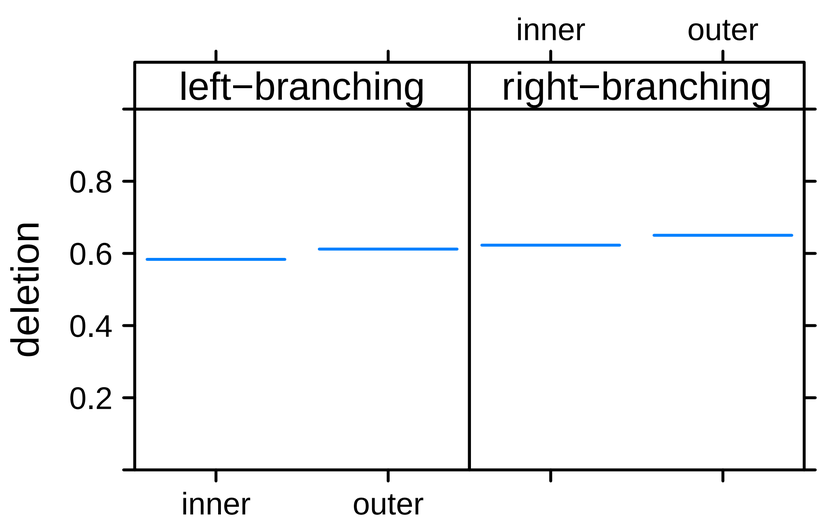
environment:	nasal + /t,d/ + fricative		fricative + /t,d/ + nasal	
	/**nts**/	*account service*	/**stn**/	*quest narrative*
	/**nds**/	*fund support*	/**stm**/	*activist movement*
	/**ntf**/	*tent fabric*	/**ftm**/	*shift managers*

Results: Plosive Deletion

Prediction 1
There is more plosive deletion between *account* and *service* at the inner boundaries (L1, R1) than at the outer boundaries (L2, R2).
This is valid for both branching directions.

Analysis
logistic regression model (glmer),
dependent variable = plosive deletion; interaction = boundary × branching direction
noise variables (e.g. environment, lexical frequency, no. of phonemes,...)

Results
experiment successfully elicits plosive deletion (∼ 55 percent)
boundary × branching direction statistically insignificant:
as much plosive deletion at left-branching inner (L1) as at outer (L2) boundary
as much plosive deletion at right-branching inner (R1) as at outer (R2) boundary

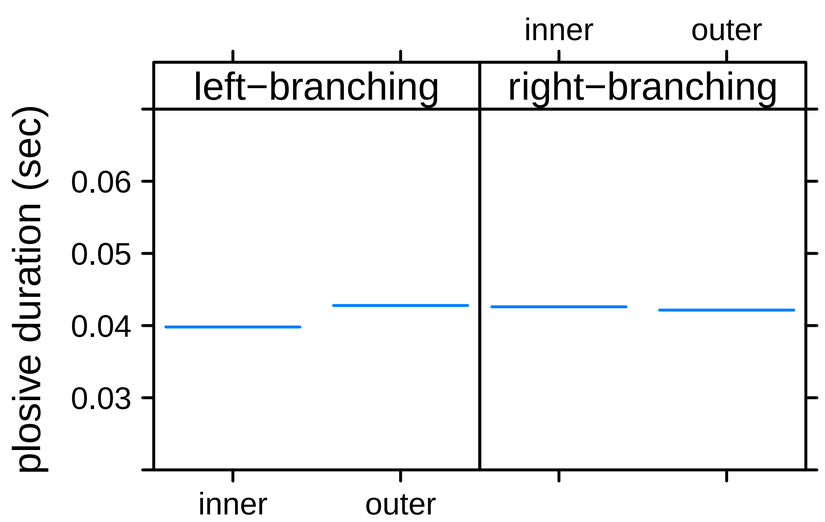


Results: Plosive Reduction

Prediction 2
There is more plosive reduction between *account* and *service* at the inner boundaries (L1, R1) than at the outer boundaries (L2, R2).
This is valid for both branching directions.

Analysis
linear regression model (lmer),
dependent variable = plosive duration (start of closure to end of release);
interaction = boundary × branching direction
noise variables (e.g. environment, lexical frequency, no. of phonemes,...)

Results
boundary × branching direction statistically significant:
more plosive reduction at left-branching inner (L1) than at outer (L2) boundary
as much plosive reduction at right-branching inner (R1) as at outer (R2) boundary



Discussion & Conclusion

Prediction 1: rejected
Morphological boundary strength does not play a role in plosive deletion.

Prediction 2: rejected
Morphological boundary strength does not play a role in plosive reduction in both branching directions.

Consequences for the Embedded Reduction Hypothesis

little evidence found for the hypothesis:
morphological organization of NNN compounds can hardly be traced in the acoustic signal

experiment design suitable for testing segment reduction

- environment affects plosive deletion and plosive reduction
- higher speechrate leads to more plosive reduction
- higher no. of phonemes/syllables leads to more plosive reduction

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Acknowledgments

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