



How targetless is Schwa in pretonic /CəC/ sequences?

Christian Geng¹ and Christine Mooshammer²

¹University of Edinburgh, U.K.

²Haskins Laboratories, New Haven, CT, USA



Motivation

The term and concept "police" is unknown to the majority of the magical community. In order to make sense of the word, officers are commonly referred to as please-men (some of which are said to carry firelegs or arms or whatever). (Rowling 2000)

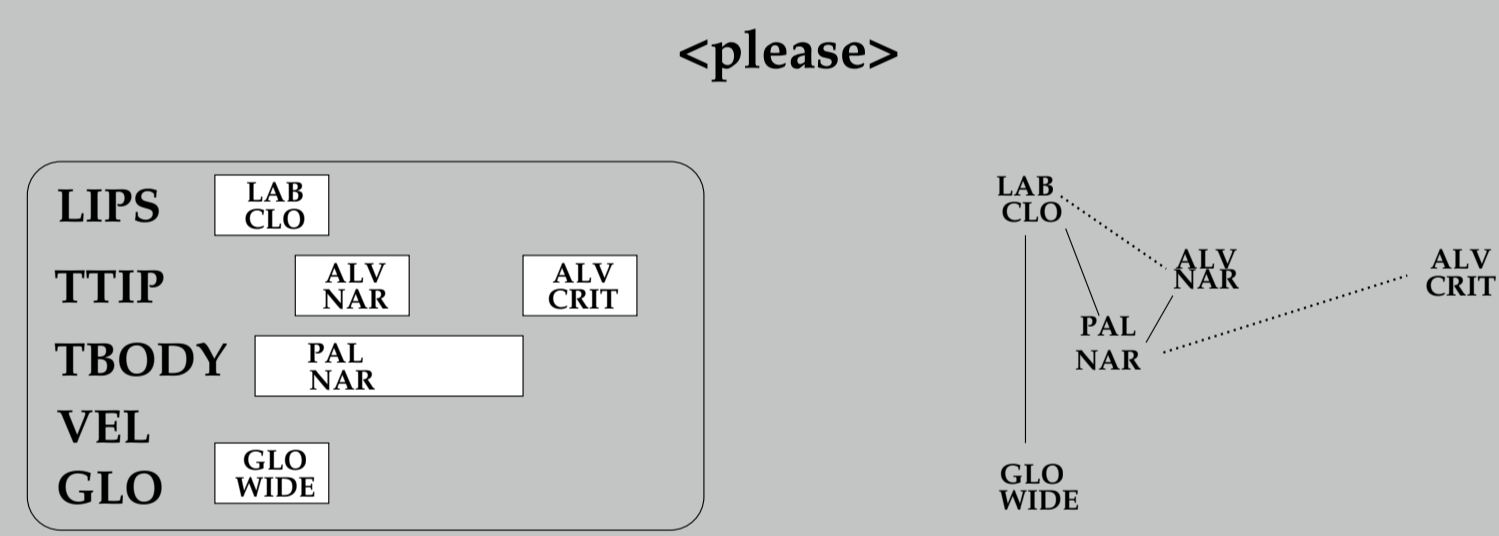


Questions I: Constriction Overlap

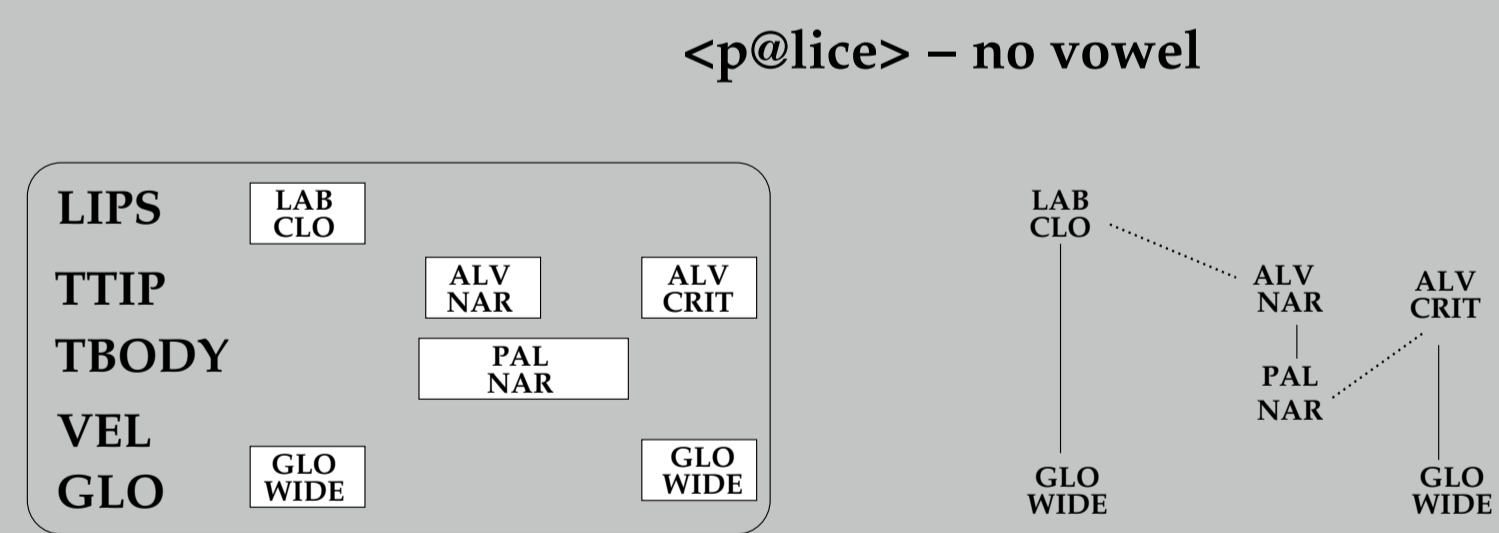
- Can accent manipulation trigger schwa deletion?

Theories: AP

(A) Cluster



(B) C@.CVC - no vowel gesture



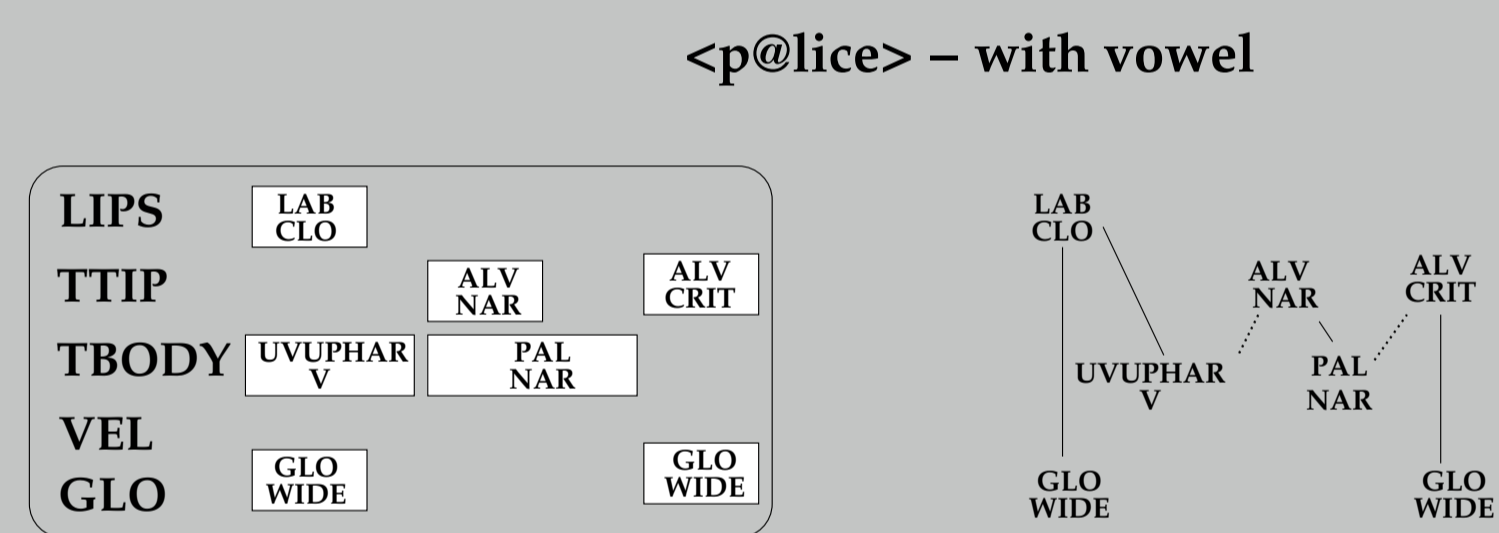
Questions II: C-Centre

- Alignment of a consonantal anchor
 - Strong version: Temporal stability of consonant center.
 - Weak version: Leftward shift of C₁ and rightward shift of C₂ (Goldstein et al. 2010). "multiply linked onset"

Questions III: Spatial Organization:

- Targetlessness of the schwa.
 - Does schwa in pretonic position have a specified vowel target?
 - Or is schwa just transitional?

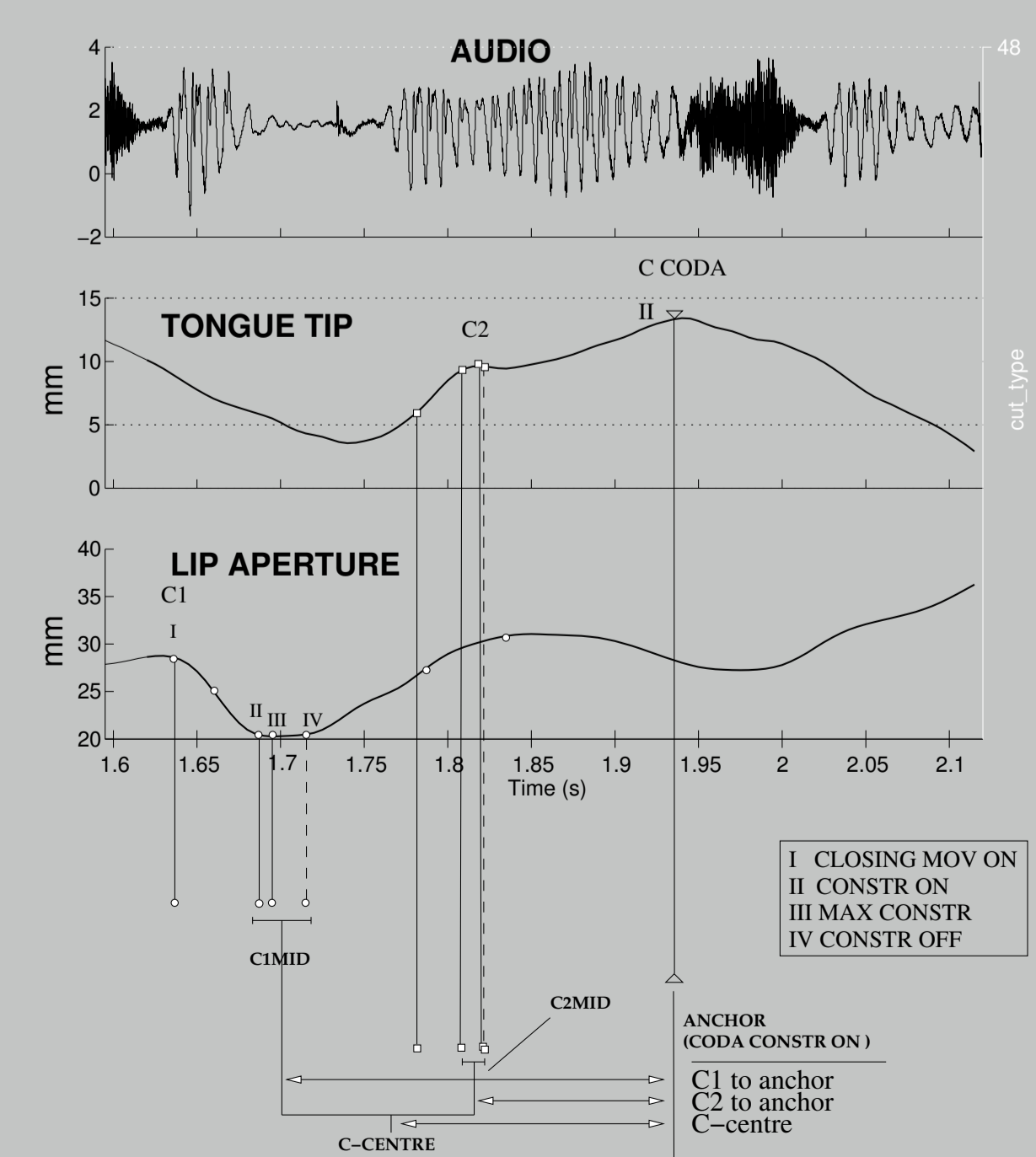
(C) C@.CVC - with schwa



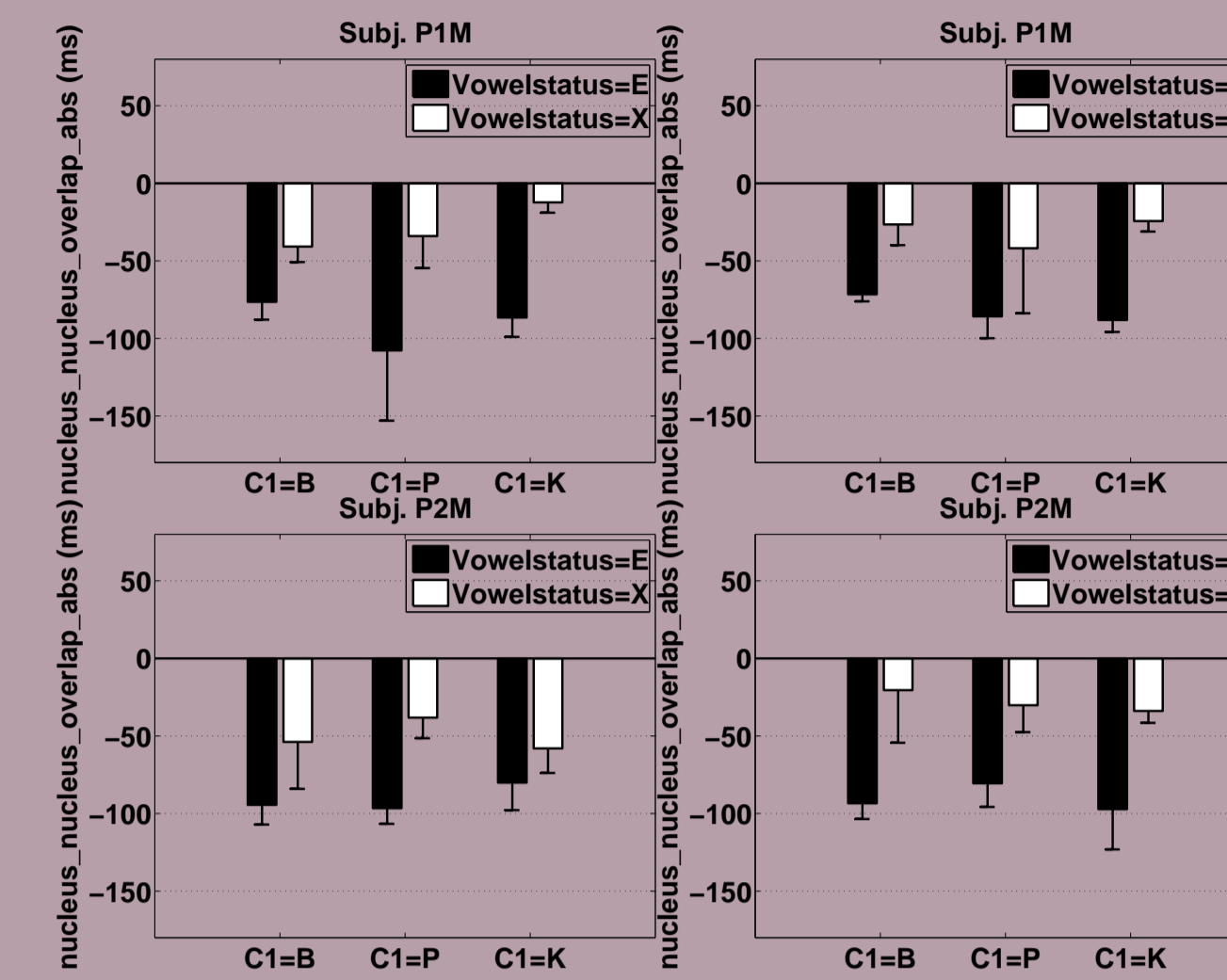
Cluster
Schwa targetless - no underlying vowel
Schwa targetful - with vowel representation

Labelling Procedure

- Elementary temporal landmarks
 - CLOSING MOV ON (I) Movement onset towards constriction (20% crit.).
 - CONSTR ON (II) Begin constriction phase.
 - MAX CONSTR (III) Maximum constriction (max. vert. displacement).
 - CONSTR OFF (IV) End constriction phase.
- Temporal Features:
 - C1MID/C2MID: Timepoint temporally equidistant to CONSTR ON and CONSTR OFF
 - C-centre Midpoint of [C1MID to C2MID] to anchor point.
 - ANCHOR: Alias for CONSTR ON

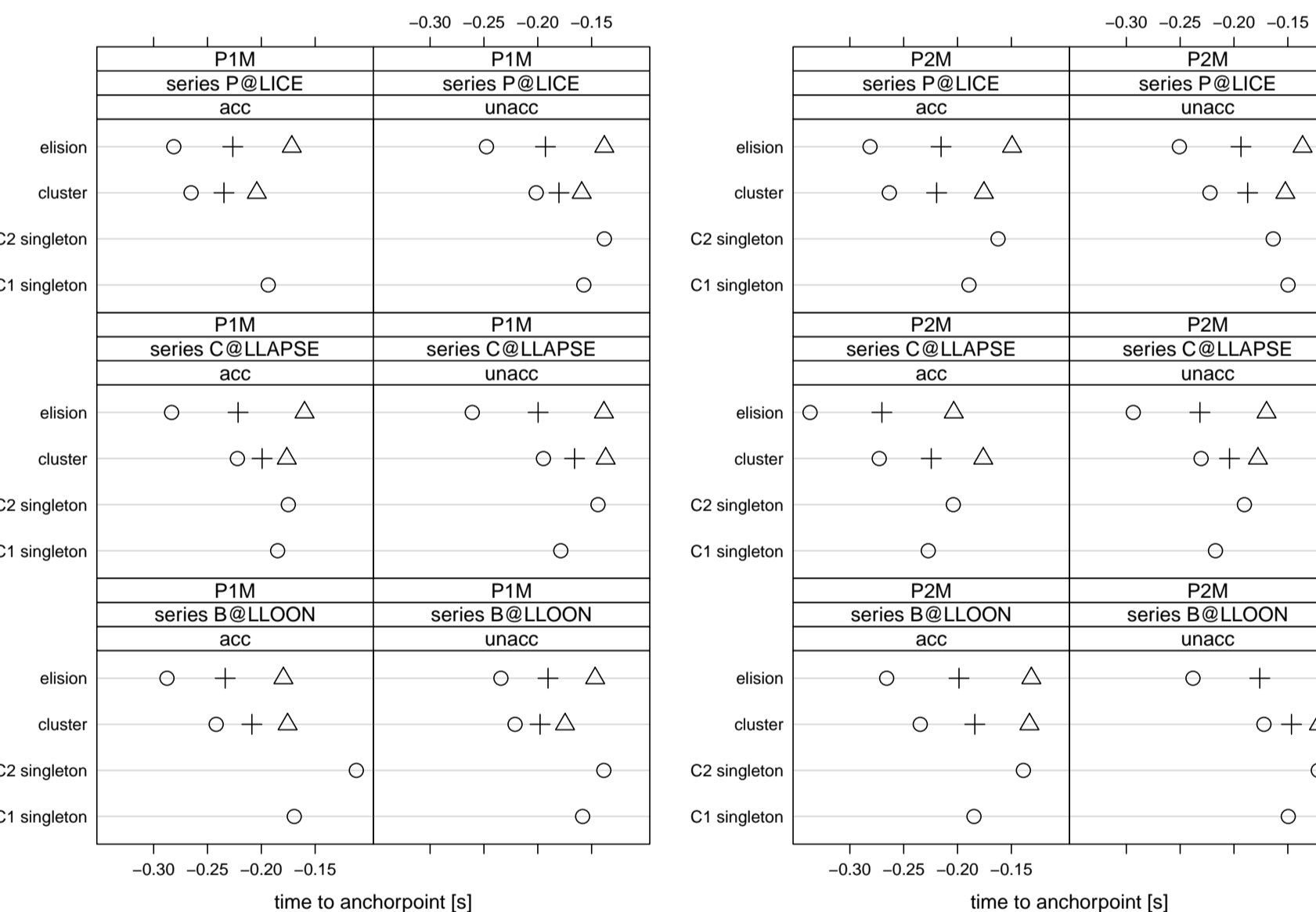


Results I: Constriction Overlap



- No consistent accentuation effect.
 - Lag longer when schwa is lexically present.
 - No consistent difference in variability between cluster and lexical schwa contexts.
- Accentuation manipulation only partially successful.

Results II: Intrasyllable Timing



"strong" versus versions of C-Centre ↓
"weak" version C-centre-Hypothesis

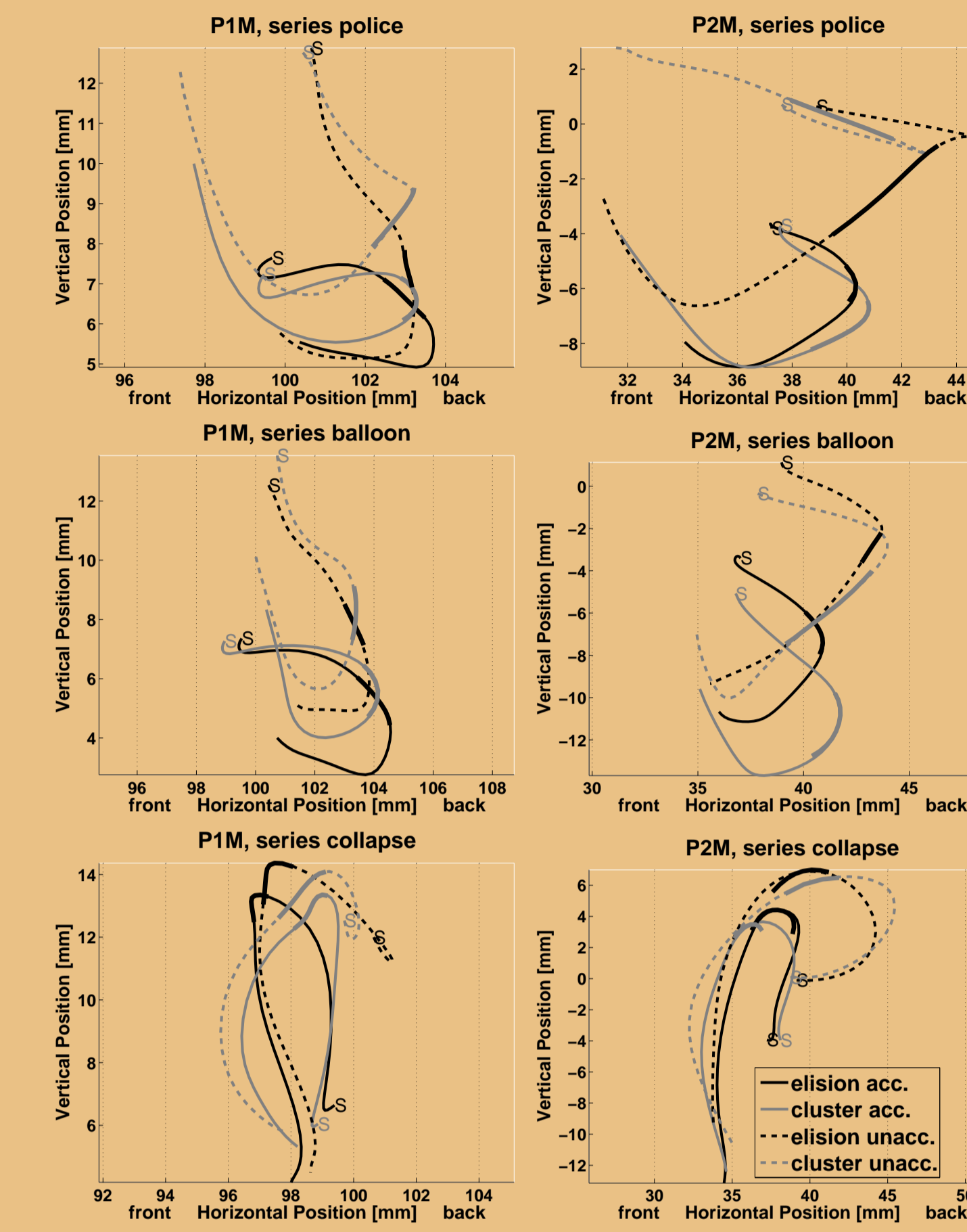
- Left-shift of C₁: yes
- Only partial right-shift of C₂

Experimental Materials

Series	Condition	Item
b/l	Elision	balloon
	Cluster	bloom
	C ₁	boon
p/l	Elision	police
	Cluster	please
	C ₂	pease
p/l	Elision	collapse
	Cluster	claps
	C ₂	laps

Method 5-dimensional Electromagnetic Articulography.
Target sensor placement Three tongue sensors (tb,tm,tt), two lip sensors (ul,il)
Participants 2 speakers of British English with no pronounced dialectal background.
Example Sentences
ACC: What did you say? I said a POLICE again
DEACC: Was it the NICER police?
No, it was the NICER police again.

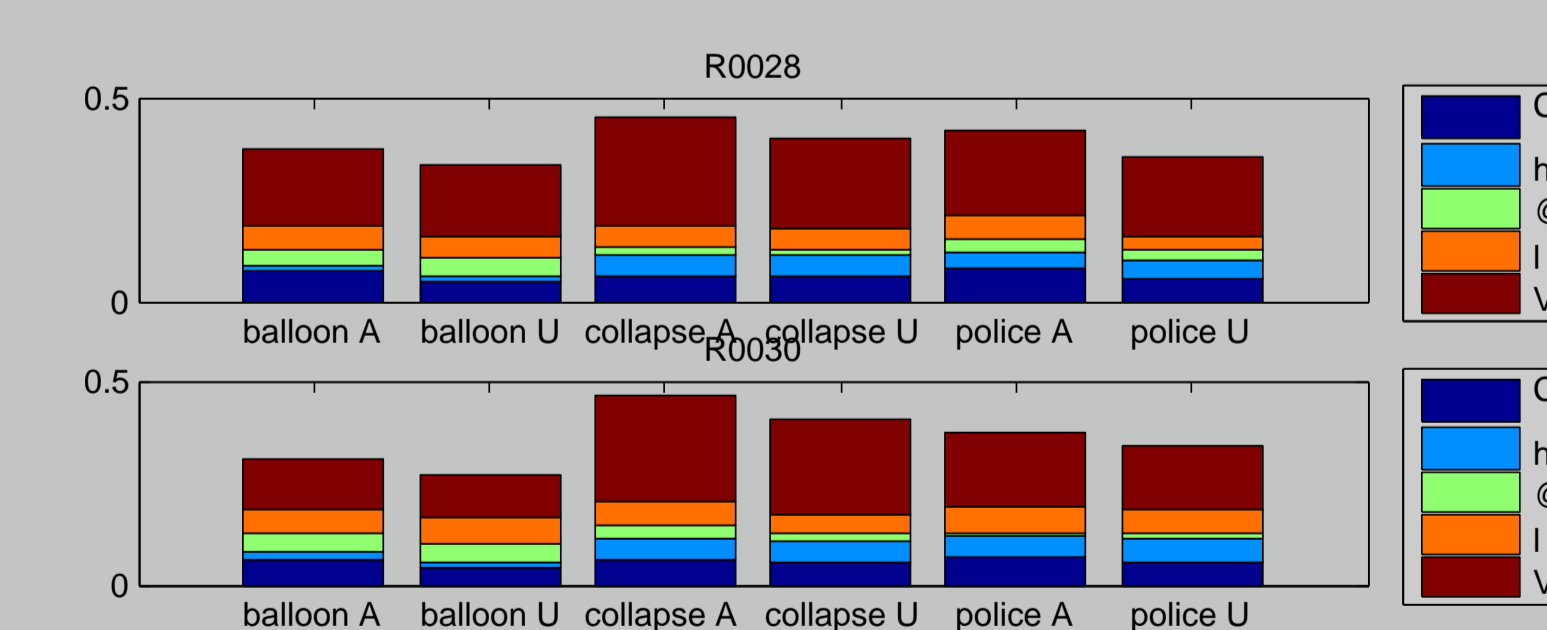
Results III: Spatial Patterns



Targetless of the Schwa: Trajectory shape is mainly controlled by accentuation condition and consonantal environment.

- more evidence for targetlessness → confirms results by Browman and Goldstein (1990) on /ə/ in pretonic condition.
- BUT: Idiosyncrasies for P1M (left).
- Most interesting: Regrouping for the collapse series (bottom left).

Additional Acoustic Durations



- Consistent accentual lengthening of VC-part (red).
 - Pretonic syllable: Neither C₁ (dark blue), aspiration (light blue), schwa (green) or C₂ consistently affected.
- "left-right" asymmetries of accentual lengthening (e.g Cambier-Langeveld and Turk 1999)

General Discussion - Future Directions

- (A): Redesign of the current study to better control for the effect of coda voicing (Chen 1970) and onset cluster composition ("l-idiosyncrasies") which could have caused inconsistencies in C-Centre results.
- (B): Extension to glottal behavior: Glottal timing relationships as in e.g support (CVC. syllable with C voiceless.)
- (C): Simultaneous variation of speech rate and prosodic parameters: "shift" in grouping from "by accent" to "by elision condition" in spatial patterning.
- (D): This should go hand in hand with a less artificial elicitation procedure. → dialog?

References:

Browman, C. and Goldstein, L. (1990). Gestural specification using dynamically-defined articulatory structures. *Journal of Phonetics*, 18:299–320.

Browman, C. and Goldstein, L. (1994). "Targetless" schwa: an articulatory analysis. In Docherty, G. and Ladd, D., editors, *Papers in Laboratory Phonology II: Gesture, Segment, Prosody*, pages 26–56. Cambridge University Press: Cambridge.

Cambier-Langeveld, T. and Turk, A. (1999). A cross-linguistic study of accentual lengthening: Dutch vs. english. *Journal of Phonetics*, 27.

Chen, M. (1970). Vowel length variation as a function of the variety of the consonant environment. *Phonetica*, 22:129–159.

Davidson, L. (2006). Schwa elision in fast speech: segmental deletion or gestural overlap? *Phonetica*, 63:79–112.

Goldstein, L., Nam, H., Saltzman, E., and Chitoran, I. (2010). Coupled oscillator planning model of speech timing and syllable structure. In Fant, G., Fujisaki, H., and Shen, J., editors, *Frontiers in Phonetics and Speech Science, Festschrift for Wu Zongji*, pages 239–250. Commercial Press, Beijing.

Rowling, J. (2000). *Harry Potter and the Goblet of Fire*. Bloomsbury Publishing, London.

Turk, A. and Shattuck-Hufnagel, S. (2000). Word-boundary-related durational patterns in English. *Journal of Phonetics*, 28:397–440.

Acknowledgments:

This research was funded by grants to the EPSRC (EP/E01609X/1, EP/E016359/1), the NIH (NIDCD DC008780) and the German Research Council (HO3271/3-2). We also wish to thank Pascal Perrier and Susanne Fuchs for invaluable comments on this work.