

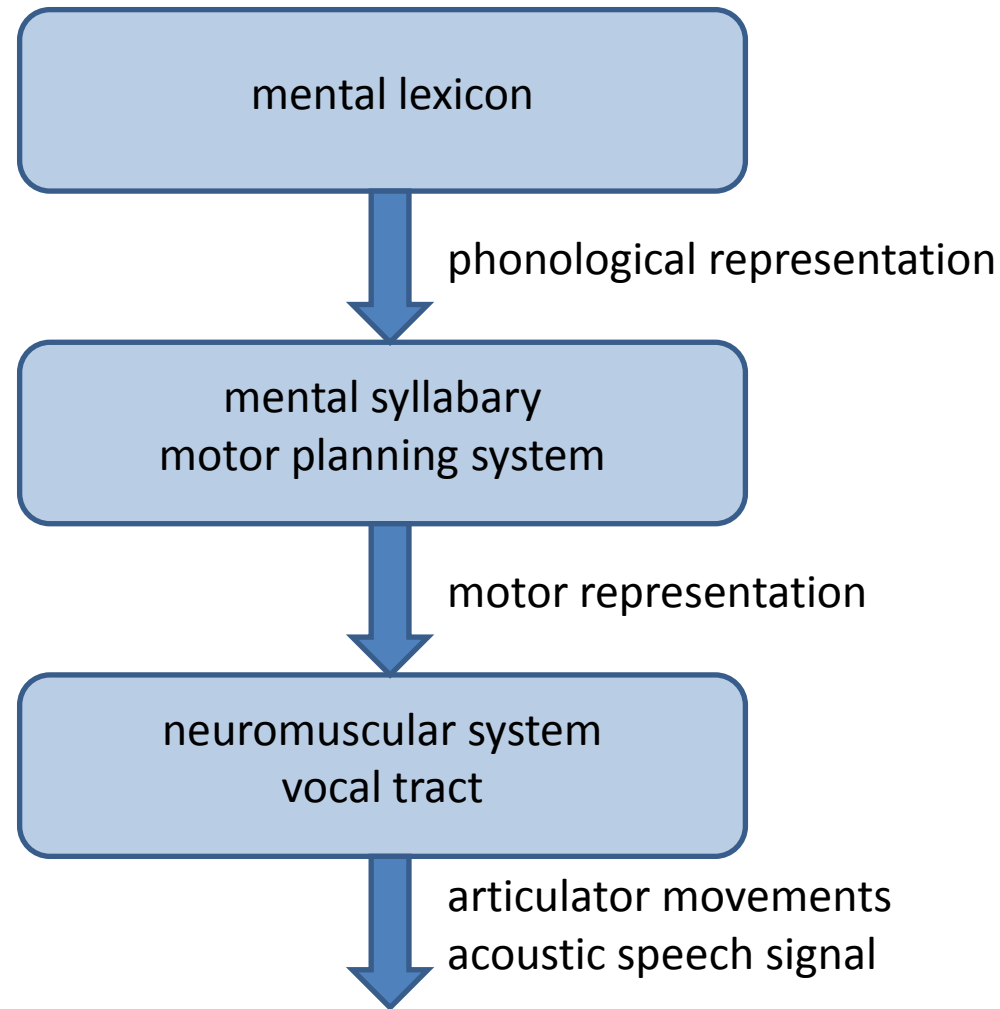
# AOS: A poorly understood speech disorder

Prof. Dr. Bernd J. Kröger  
Neurophonetics Group @DPPCD,  
RWTH Aachen University  
[www.speechtrainer.eu](http://www.speechtrainer.eu)

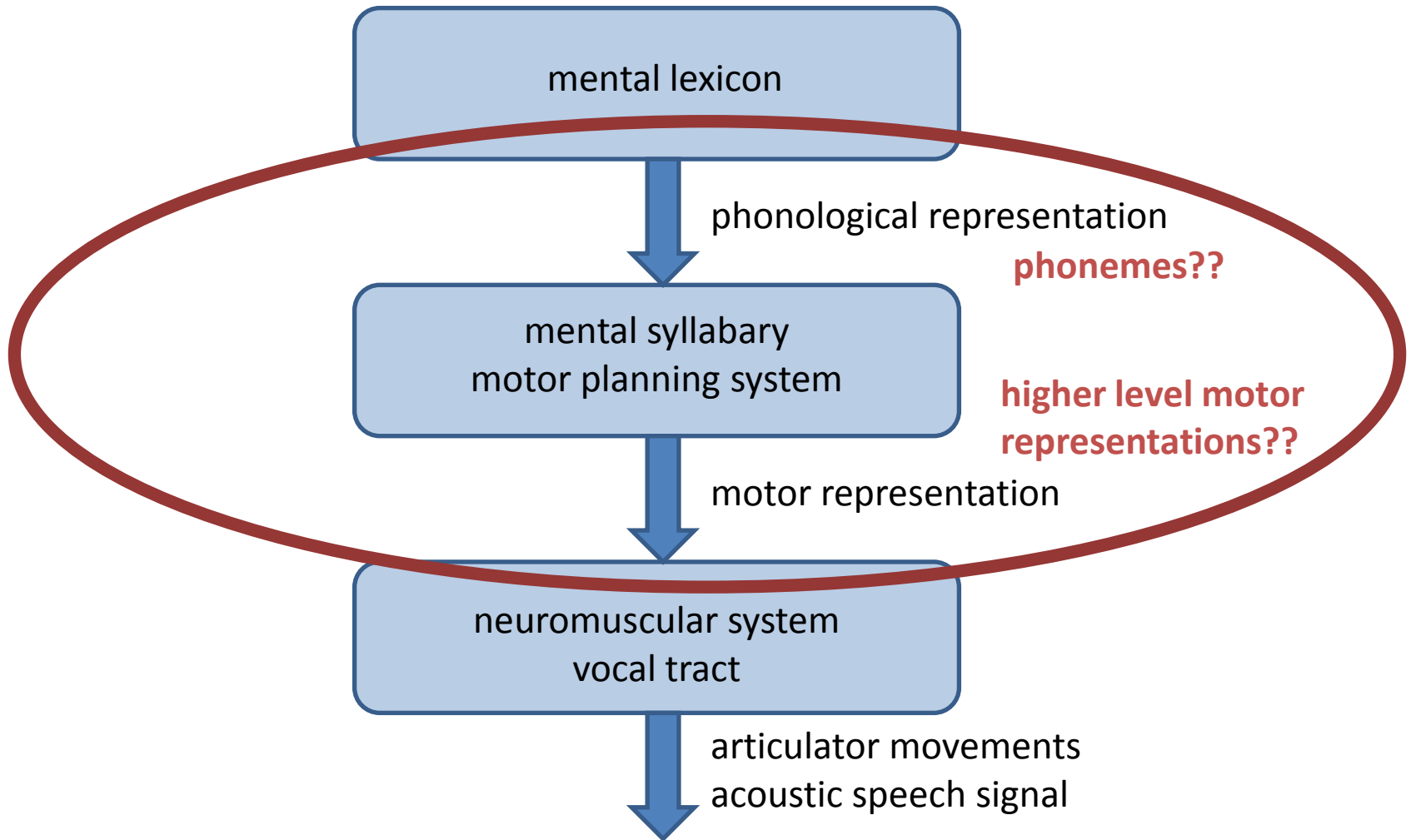
# Background

- Patients suffering from AOS = patients with deficits in motor planning

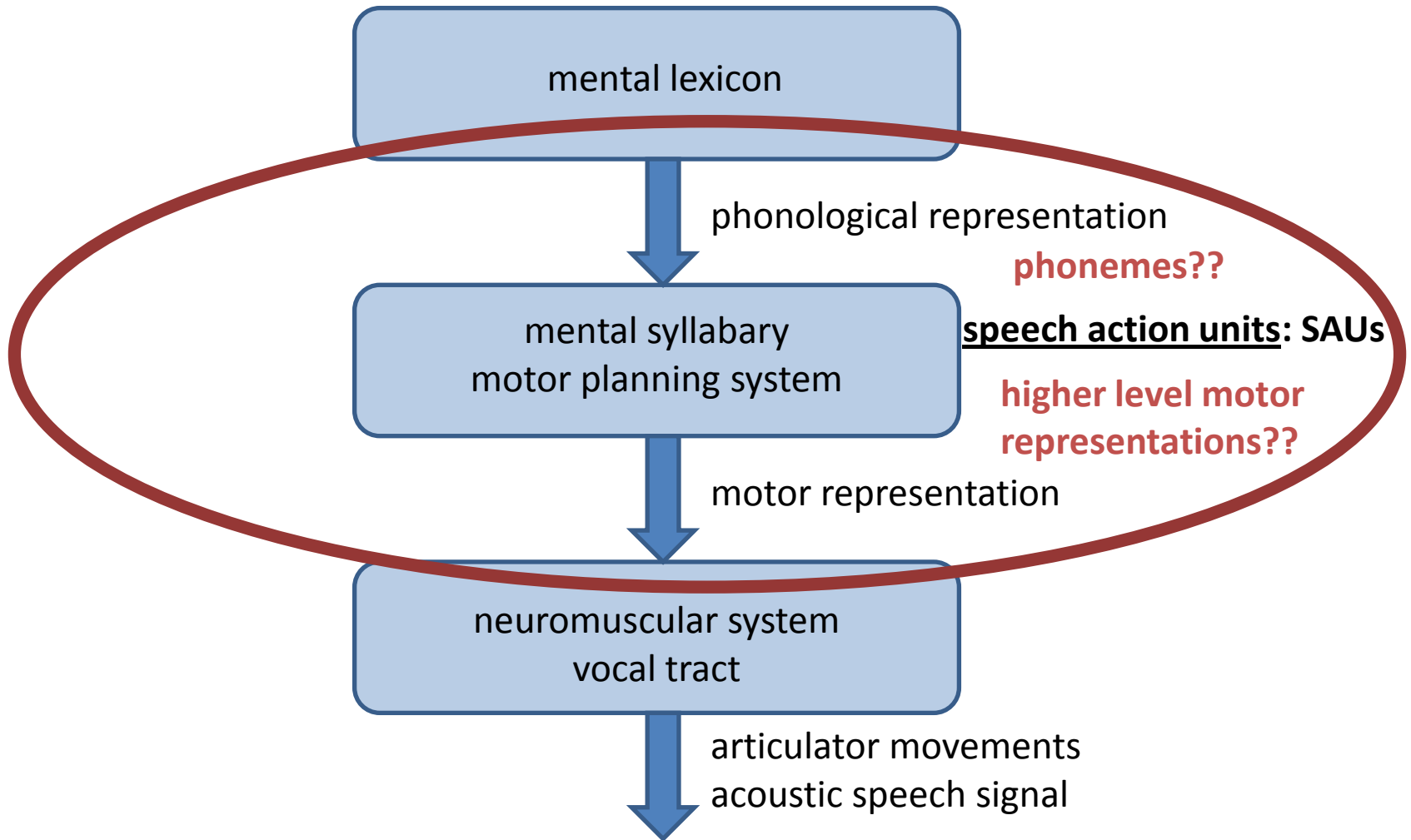
# Model of speech production



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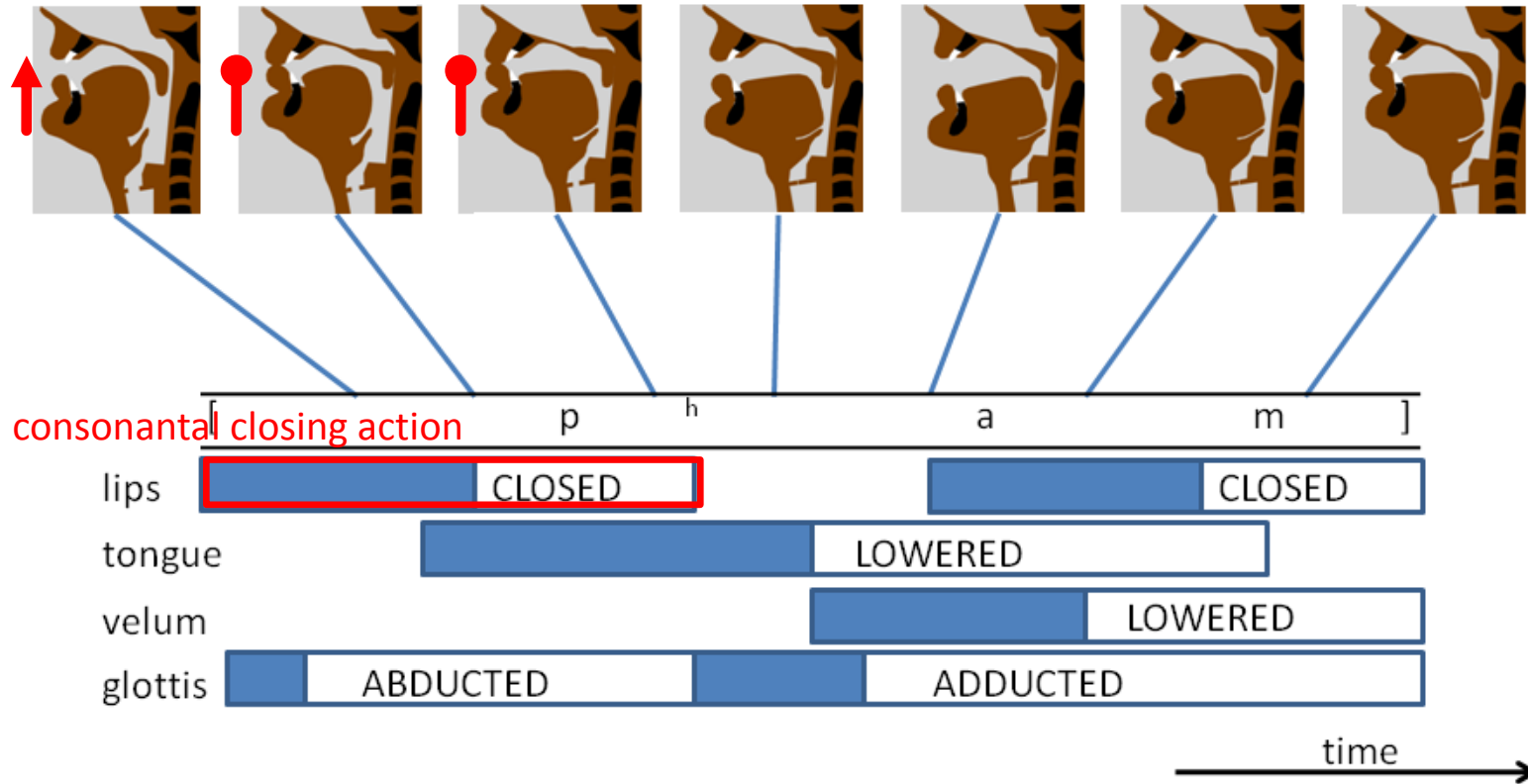


# Hypothesis

- Patients suffering from AOS = patients with deficits in motor planning
- Basic units of motor planning are speech action units (SAUs) (gestures, vocal tract units)  
(Evidence: Goldstein et al. 2007, Cognition)

# Motor planning

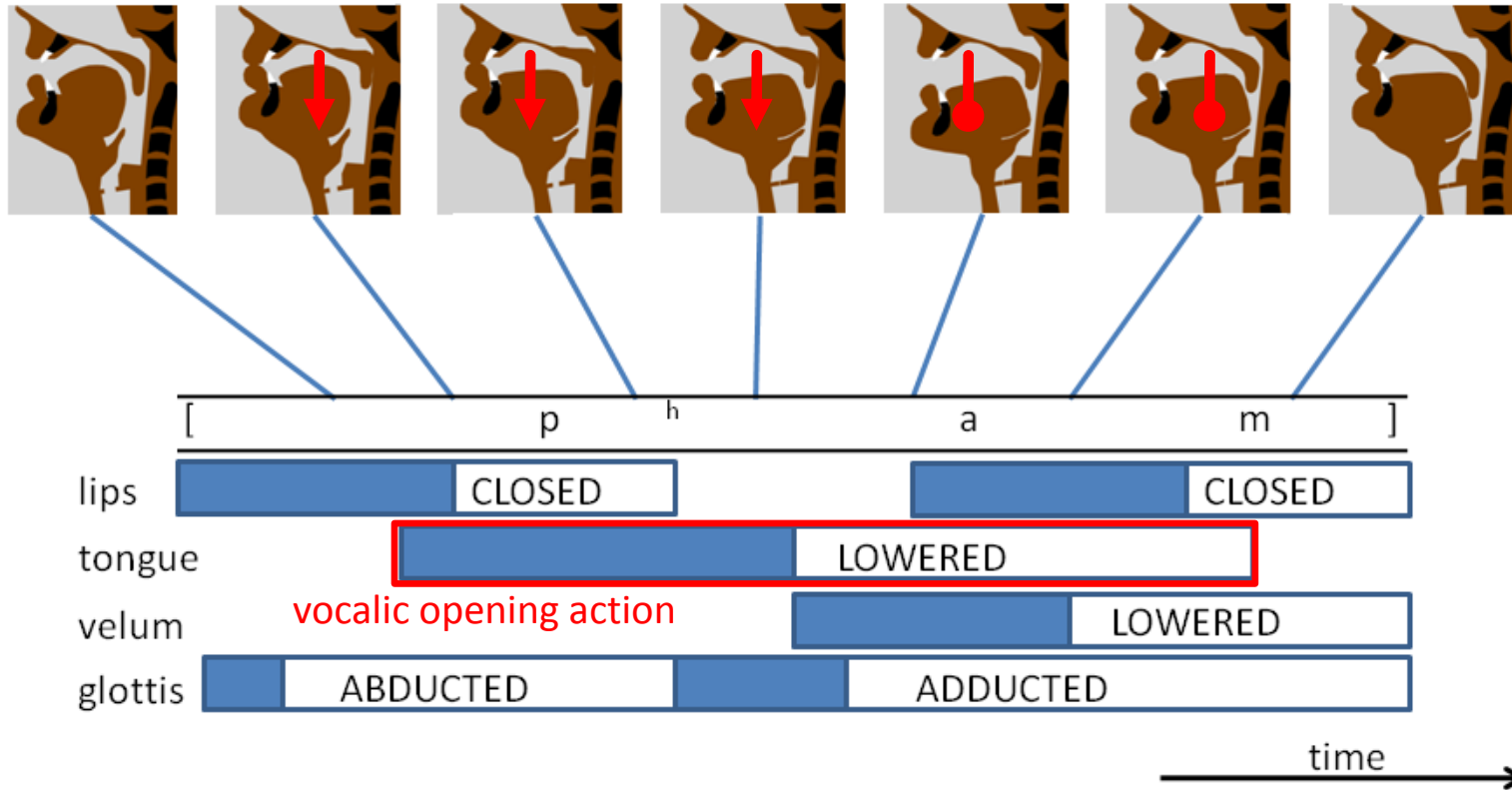
A syllable is a score of **speech action units**. Example: “palm” [p<sup>h</sup>am]



- ... comprise **movement** (blue) and **target phase** (white) -> goal-directed movements (cp. manual reaching movements)

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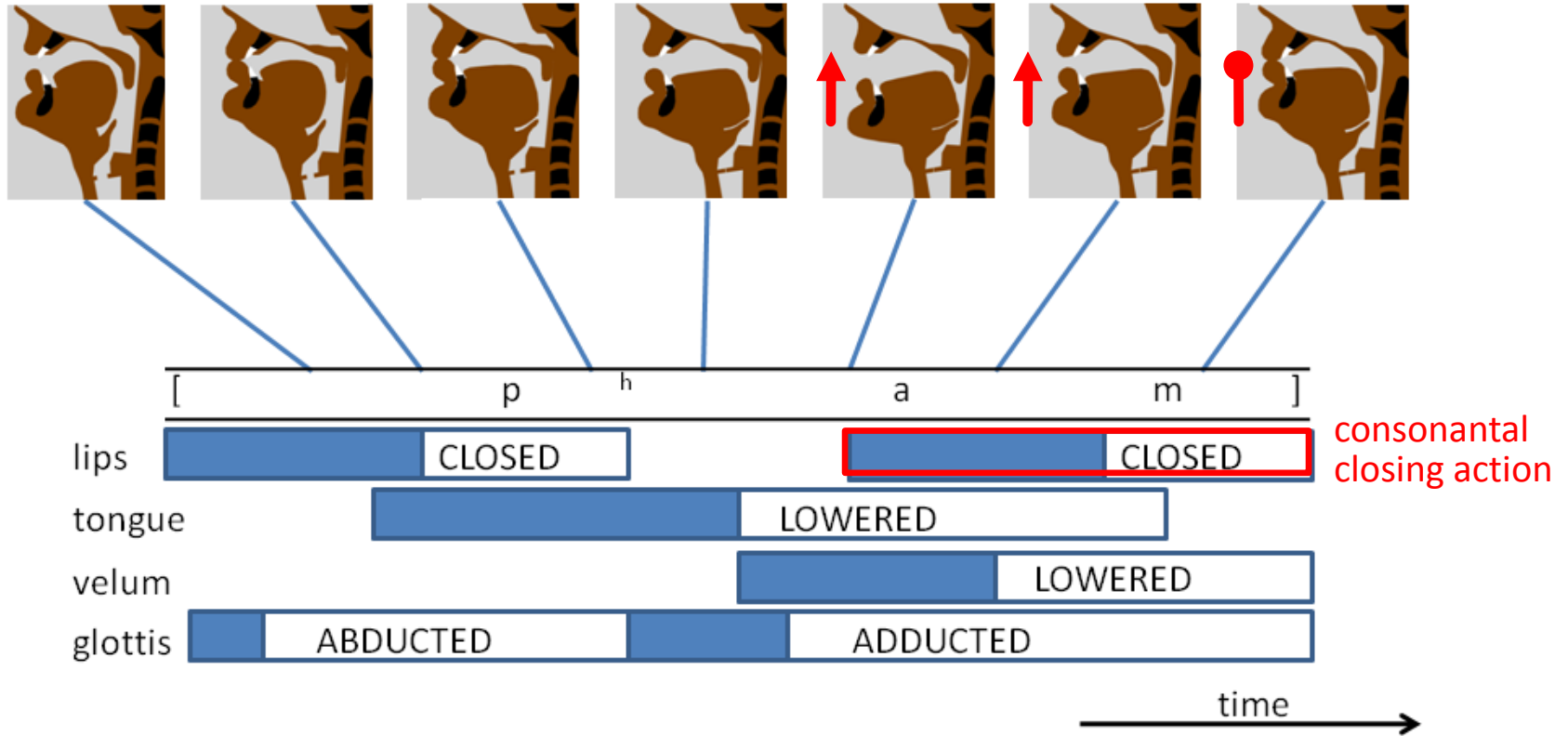


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# Motor planning

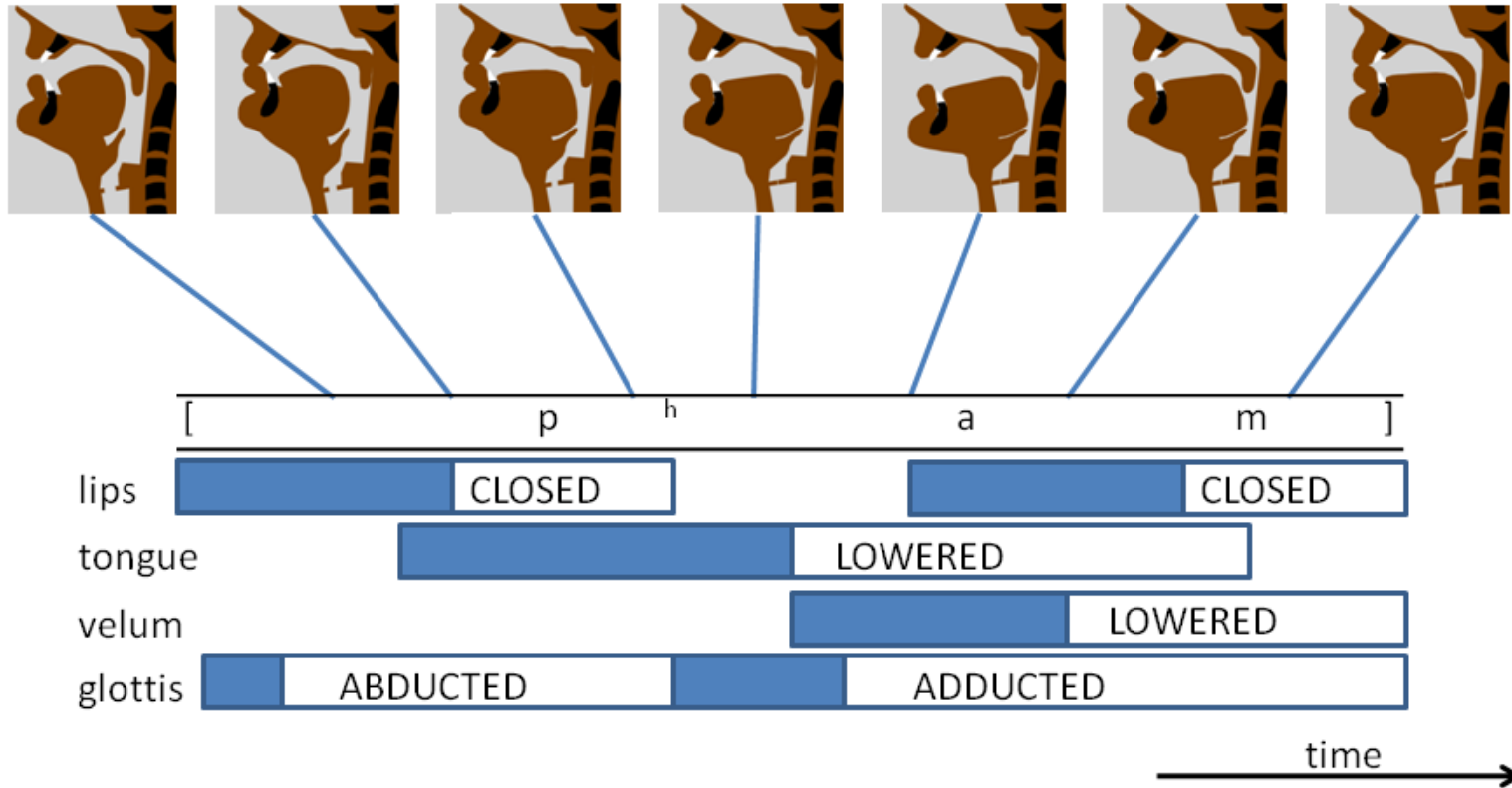
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# Motor planning

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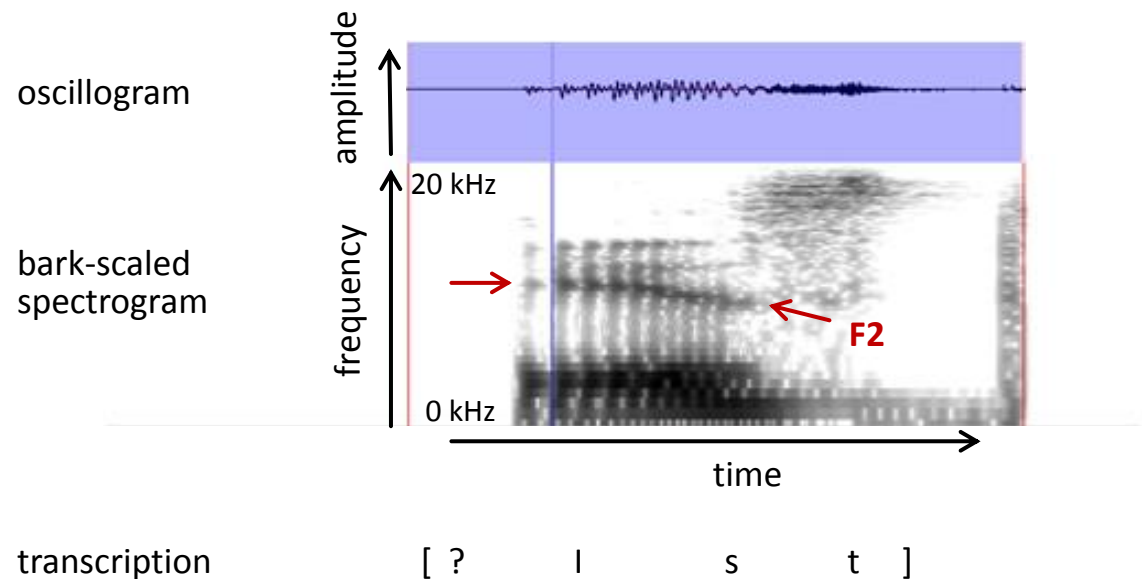
- ... comprise **movement** (blue) and **target phase** (white) -> goal-directed movements (cp. manual reaching movements)
- Complex **temporal arrangement!** (temporal overlap of movement actions) ... there is a need for motor planning!

# Note: Speech is Movement!

- Speech is NOT a transformation of cognitive units (phonemes, letters) into an acoustic signal; SPEECH is MOVEMENT (production and perception of lip, tongue, ... movements)
- Basis for production: syllable = basic unit of temporal coordination

# Note: Action units from the auditory viewpoint

- Formant trajectories directly encode articulator movements perceptually
- Formants = resonances of vocal tract



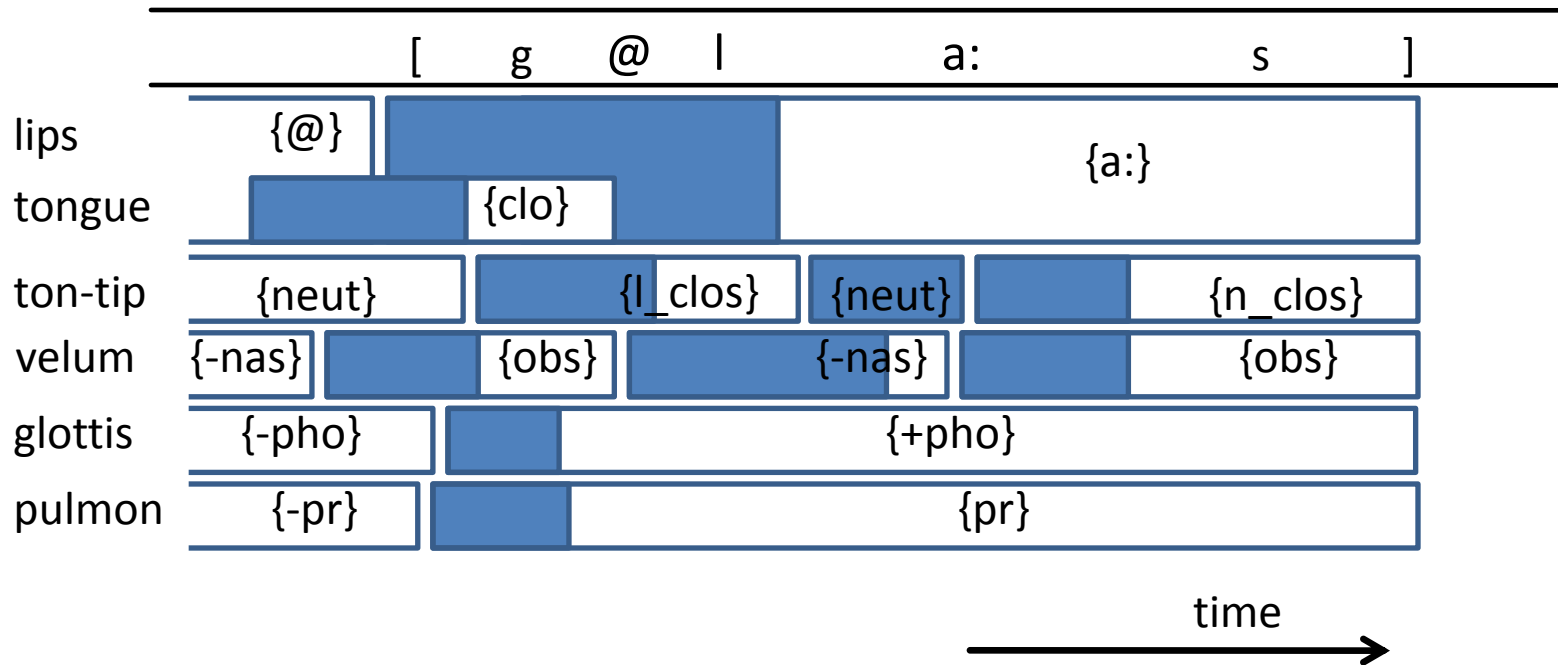
# Understand AOS from viewpoint of motor planning

- A lot of speech errors, occurring in AOS can be explained easily from the viewpoint of motor planning, if **speech action units** are seen as basic units of speech production
- Major point: **Temporal coordination (TC)** of these units over time: only TC of SAUs changes, but not the basic set of SAUs
- Examples (German):

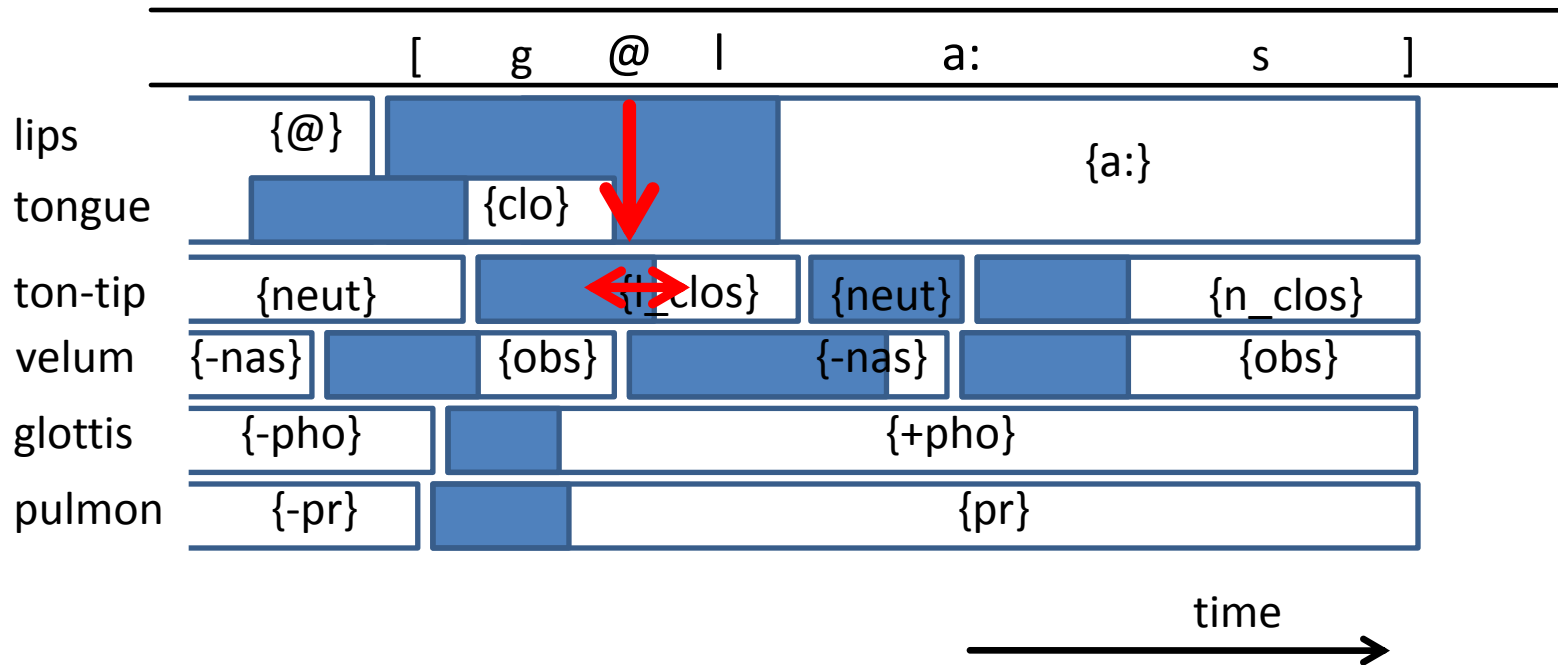
# Understand AOS from viewpoint of motor planning

- Examples (German): only timing-problems:
  - schwa-epenthesis in consonant clusters:  
z.B. „Glasdose“  $\leftrightarrow$  „Gelasdose“ [gla:s]
  - nasal-epenthesis between nasal and obstruent (plosive):  
z.B. „Lokomotive“  $\leftrightarrow$  „Lokomonitive“ [mo:ti:]
  - [h]-epenthesis preceding (difficult) voiceless consonant:  
z.B. „Giraffe“ (r als stimmloser Frikativ)  $\leftrightarrow$  „Gihraffe“ [gi:Xa]
  - voiced-voiceless-alternation in plosives:  
z.B. „bellen“  $\leftrightarrow$  „pellen“ [bE]
- All these processes can be phonological OR motor level processes!
- Here the motor level explanation for these processes:

# [g(@)la:s] epenthesis

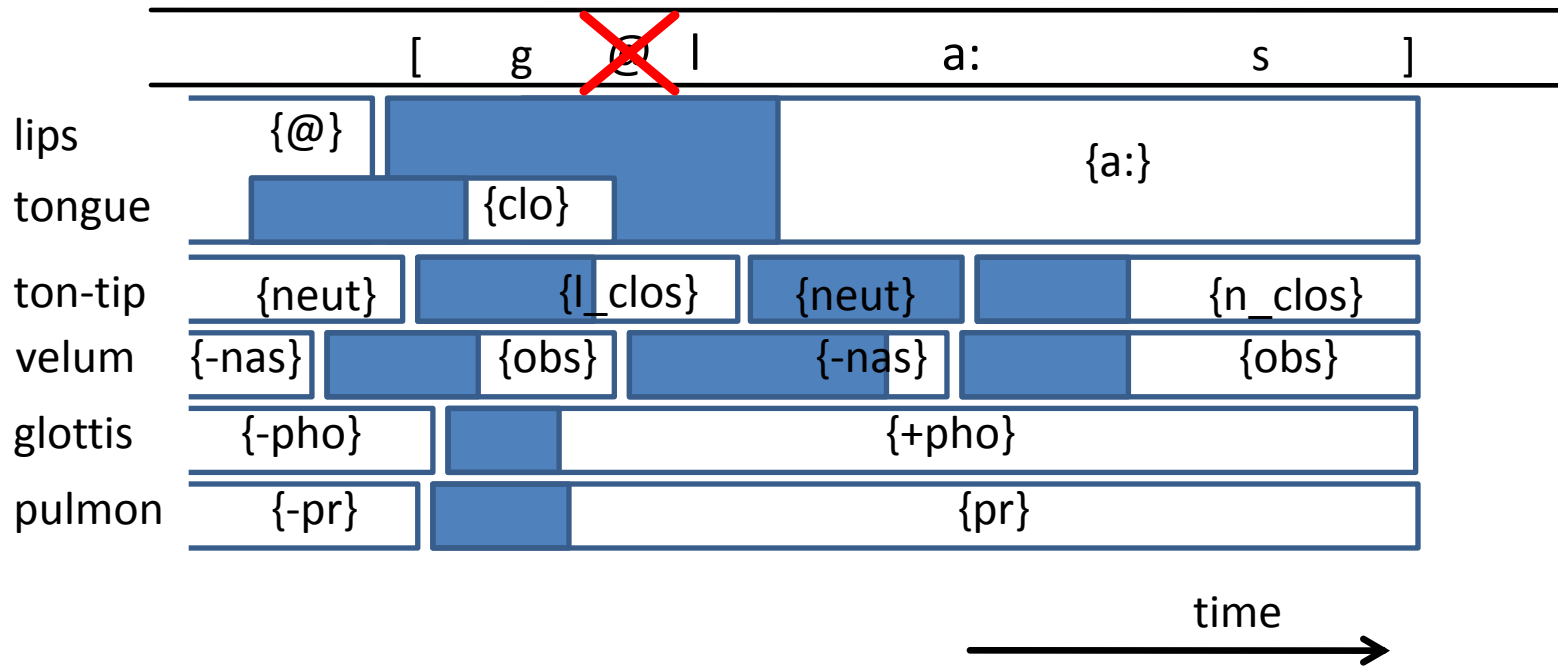


# [g(@)la:s] epenthesis

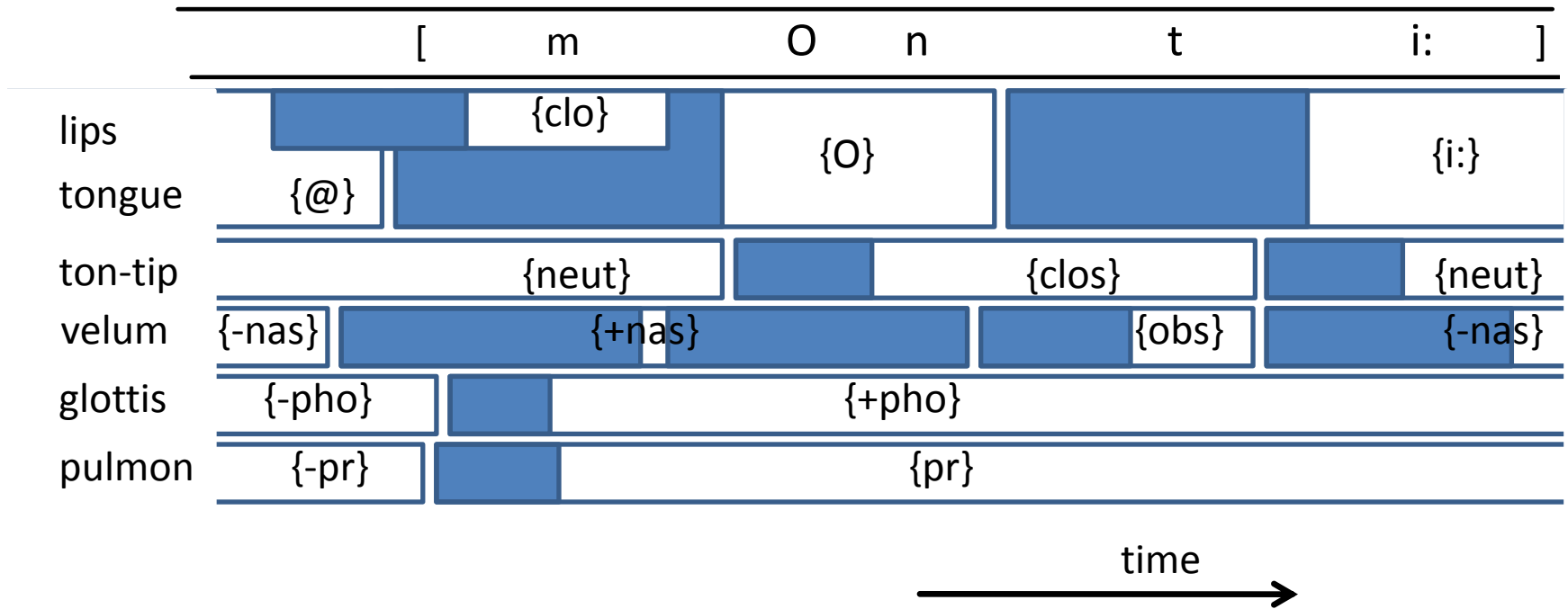




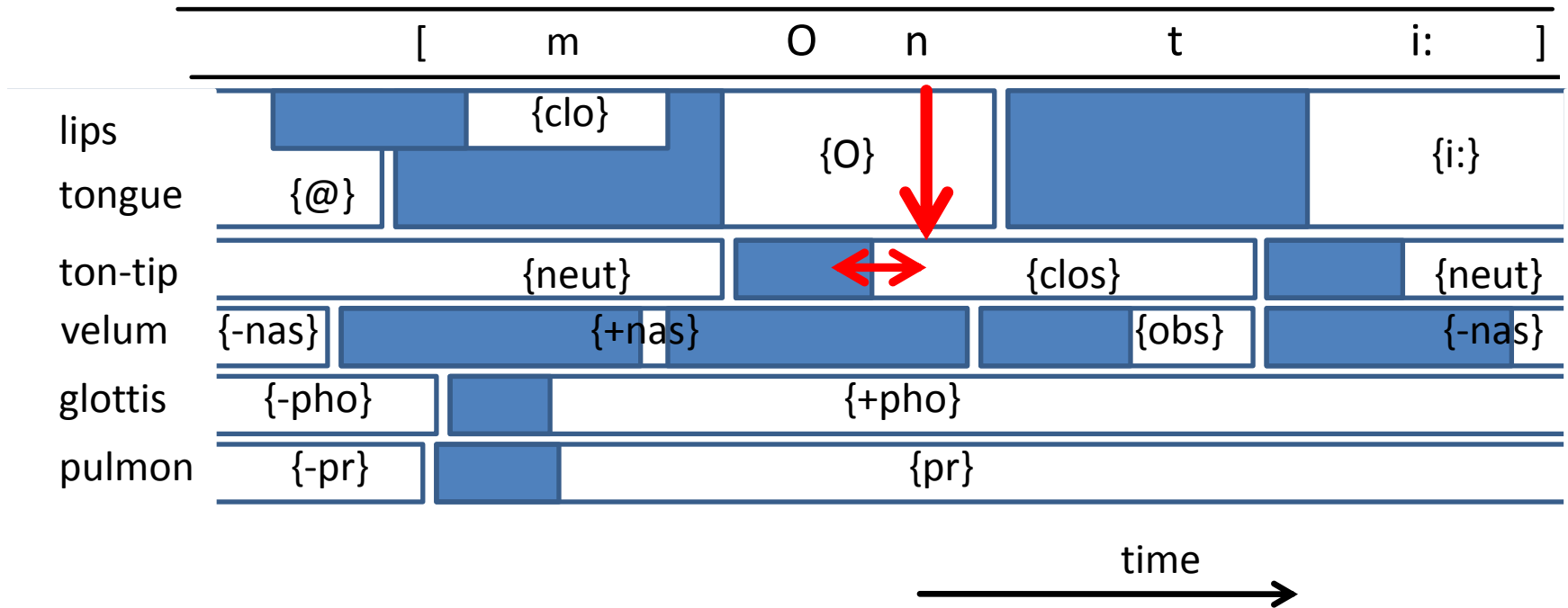
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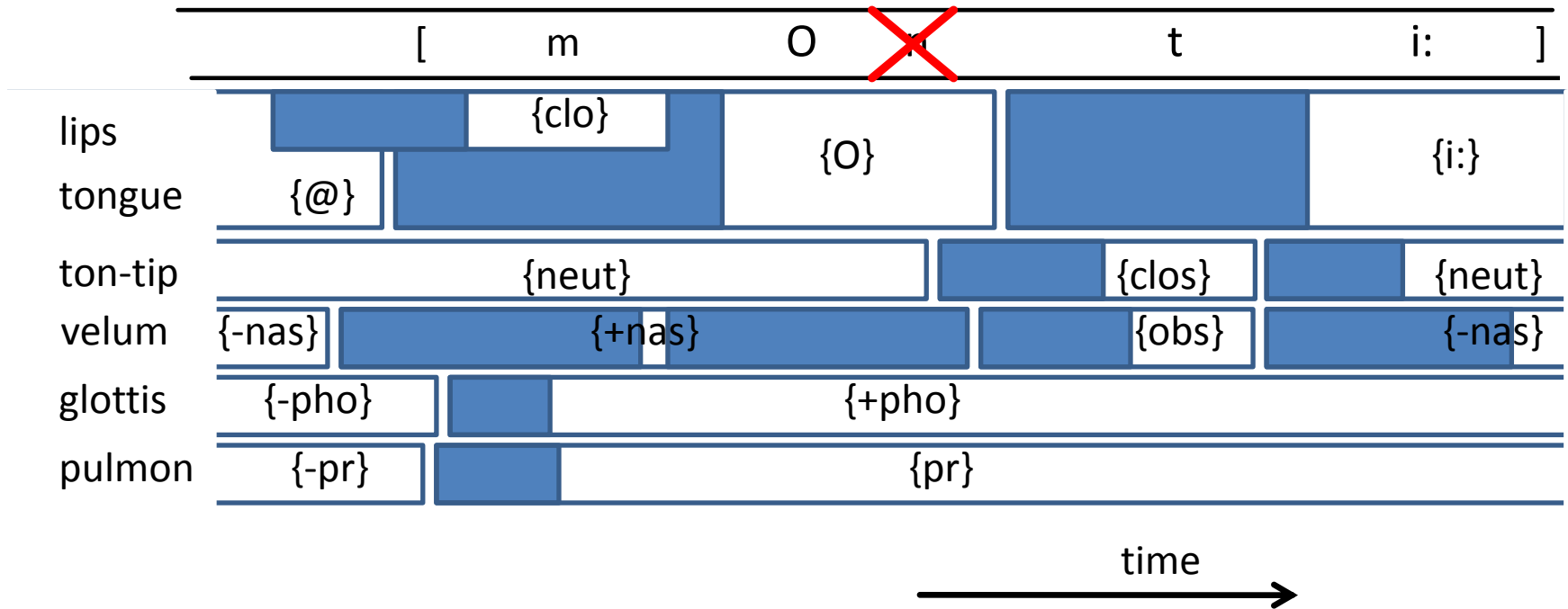
# [mo(n)ti:] epenthesis



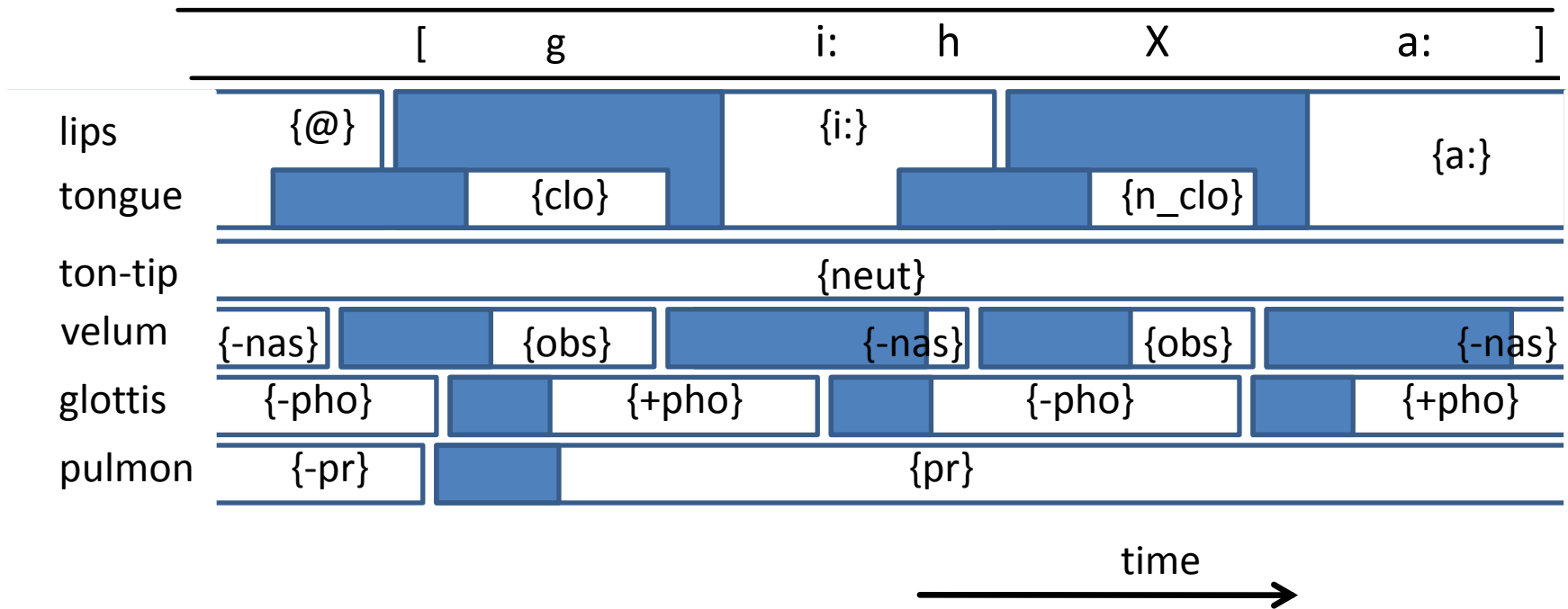
# [mo(n)ti:] epenthesis



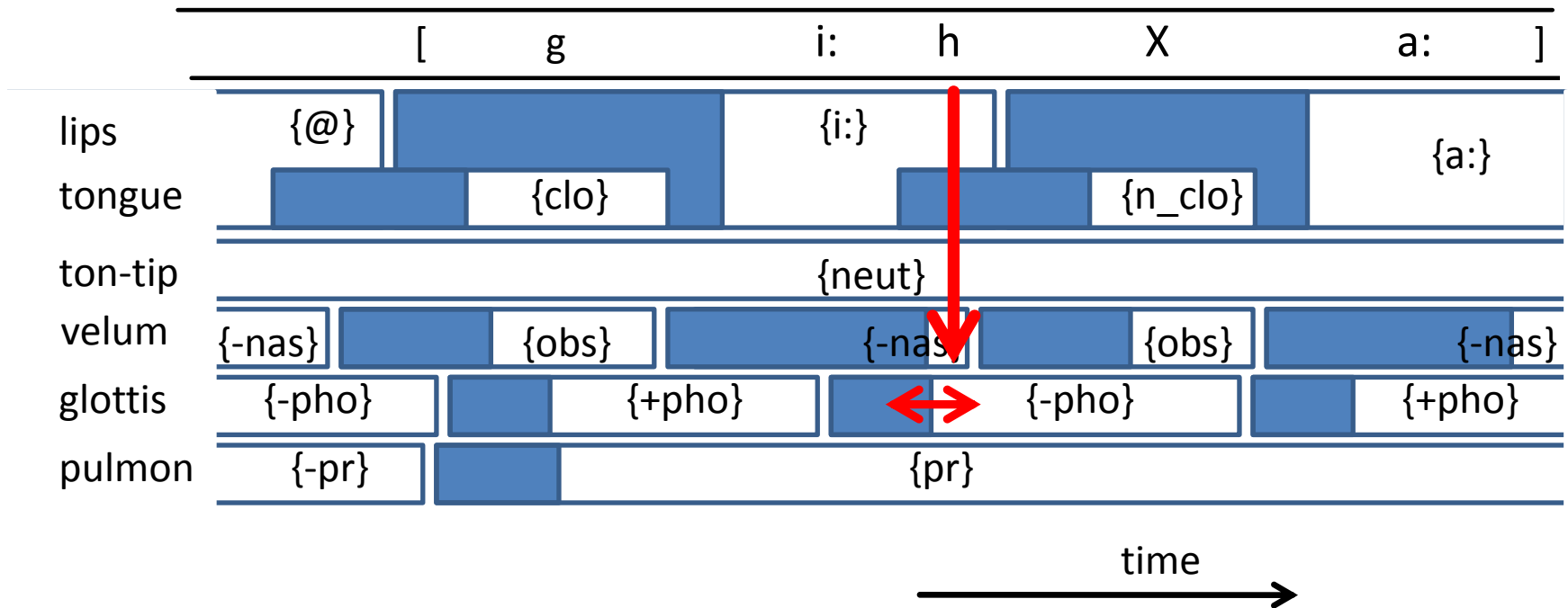
# [mo(n)ti:] epenthesis



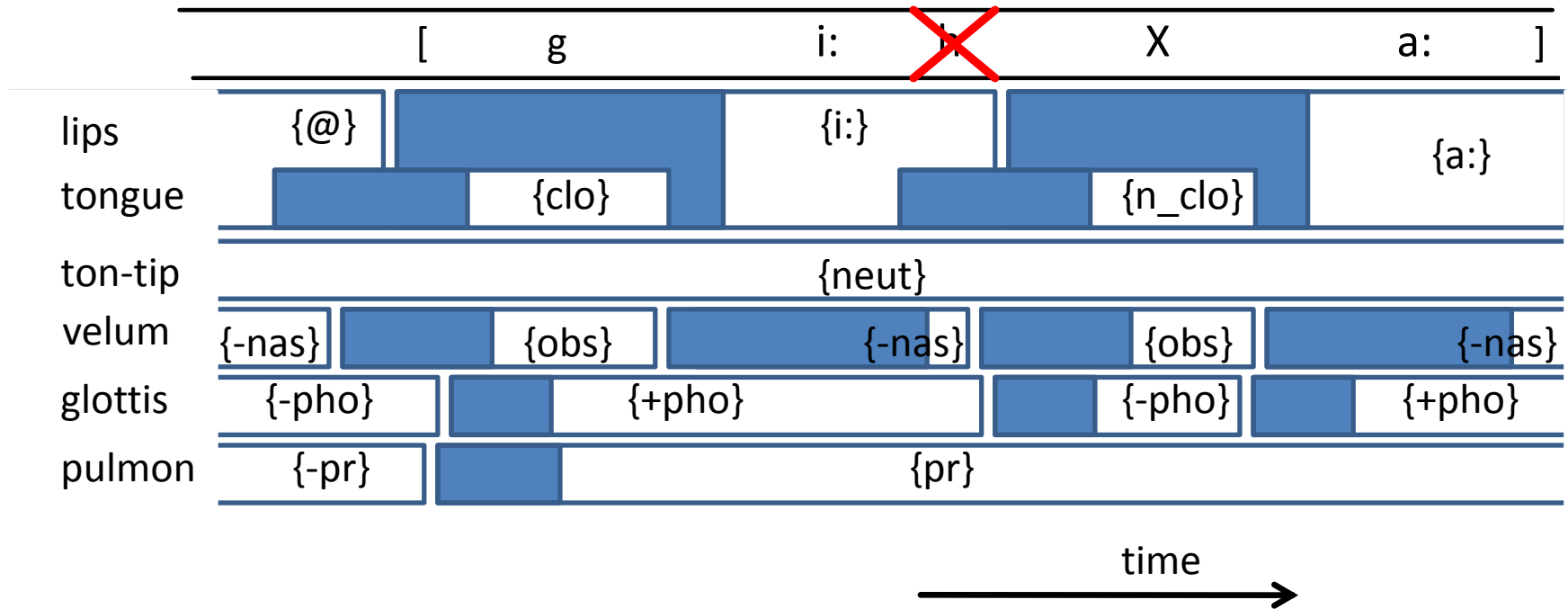
# [gi(h)Ra] epenthesis



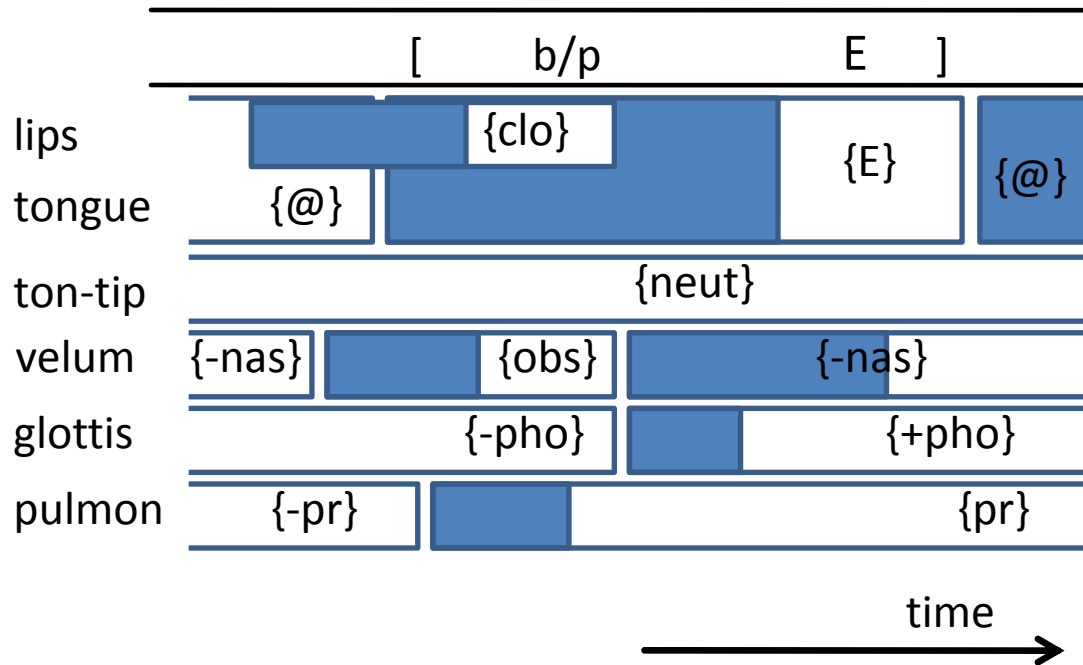
# [gi(h)Ra] epenthesis



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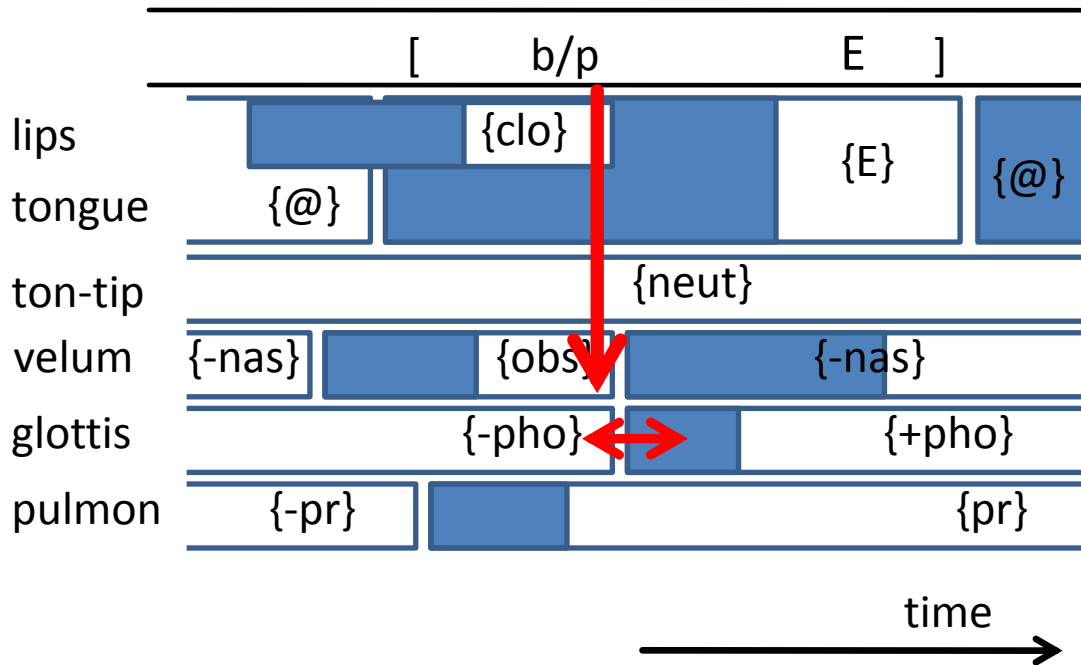


# [bE]/[pE] alteration





# [bE]/[pE] alteration



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