Phonetic motivation in sound change

Sound change after a retiming of articulatory gestures

- *Development of contrastive vowel nasalization in VN contexts*:

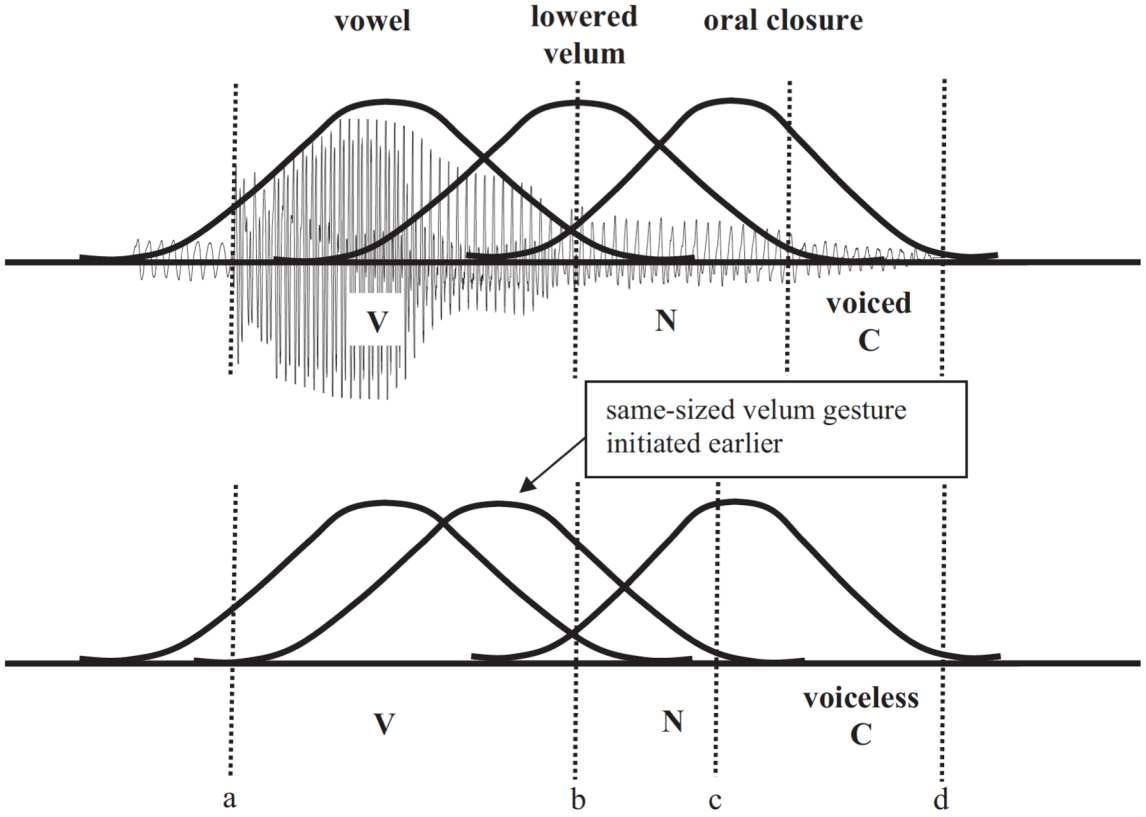


FIGURE 1. Schematic representation of the consequences for vowel nasalization, the nasal consonant, and the postnasal oral constriction if the velum gesture is initiated earlier in voiceless (bottom) than in voiced (top) contexts. Dashed lines indicate acoustic segmentation.

Sound change after a retiming of articulatory gestures

- *Assimilation of voicing in fricatives in* S[+voi] *clusters*: *desde*, *mismo*.

gestos orales	fricativa alveolar	aproximante dorsovelar
cuerdas vocales	----------^^^^^^^^^^^^^^^^ separadas vibrando	
	s	ɣ

Panel A

gestos orales	fricativa alveolar		aproximante dorsovelar
cuerdas vocales	--------^^^^^^^^^^^^^^^^^^^^^^^^ separadas vibrando		
	s	z	ɣ

Panel B

Assimilation of place by nasals in /NO/ clusters: impossible, incredible, etc.

gestos orales	oclusión ápico-alveolar	
		oclusión labial
cav. nasal (velo)	[ABIERTA]	[CERRADA]
	n	b

Panel A

gestos orales	oclusión ápico-alveolar		
			oclusión labial
cav. nasal (velo)	[ABIERTA]		[CERRADA]
	n	m	b

Panel B

gestos orales	oclusión ápico-alveolar		
		oclusión labial	
cav. nasal (velo)	[ABIERTA]		[CERRADA]
	n	n͡m	m	b

Panel C

Stop epenthesis in nasal + liquid/sibilant clusters:

- Sp. *tenre* > *tendré* 'I'll have', Sp. *hombre*, *hembra*, *nombre*.

- OE *glimsian* > *glimpse* or *Thomson* > *Thompson*.

gestos orales	oclusión labial	vibr. simple ápico-alveolar
cav. nasal (velo)	[ABIERTA]	[CERRADA]
	m	ɾ

Panel A

gestos orales	oclusión labial		vibr. simple ápico-alveolar
cav. nasal (velo)	[ABIERTA]	[CERRADA]	
	m	b	ɾ

Panel B

Gestural blend: Palatalization

- When the phonetic plan for an utterance places competing demands upon a single articulator.

- The more stable gesture will tend to determine the acoustics of the output.

- /k/ in *keep* vs. *cop*.

Perceptual ambiguity after a coarticulatory effect: *Tonogenesis*

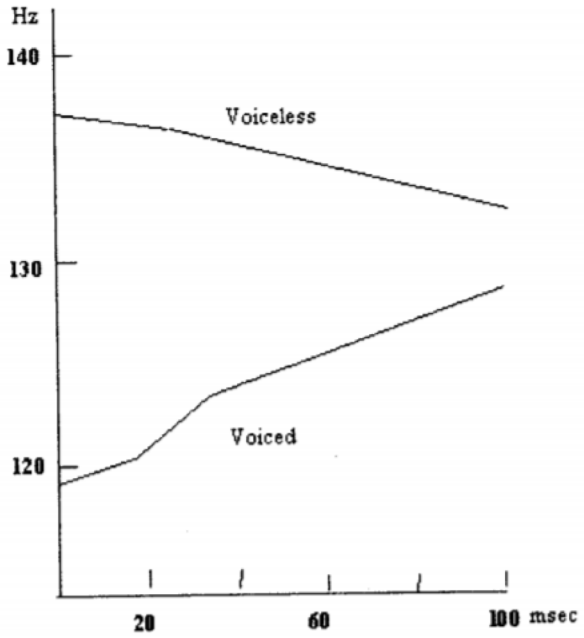


Figure 1: Average F0 contours following American English stops of five speakers. Adapted from Hombert, 1978, 80, Figure1.

Perceptual ambiguity after a coarticulatory effect: *Vowel nasalization*

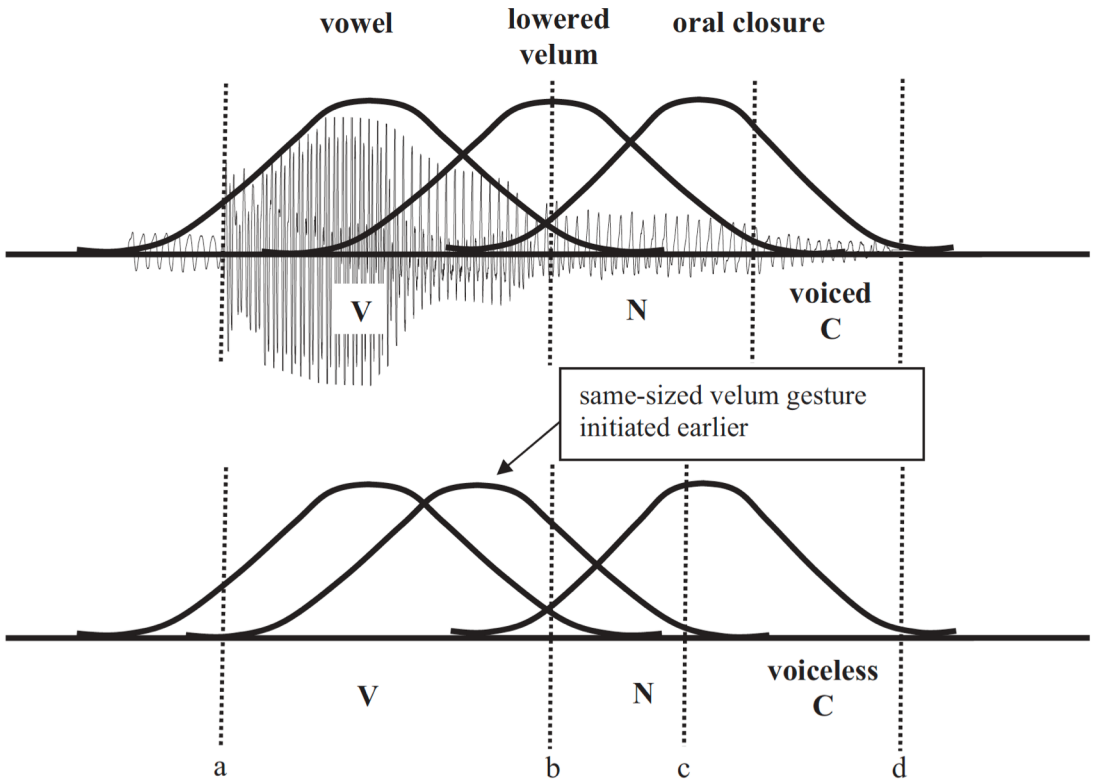


FIGURE 1. Schematic representation of the consequences for vowel nasalization, the nasal consonant, and the postnasal oral constriction if the velum gesture is initiated earlier in voiceless (bottom) than in voiced (top) contexts. Dashed lines indicate acoustic segmentation.

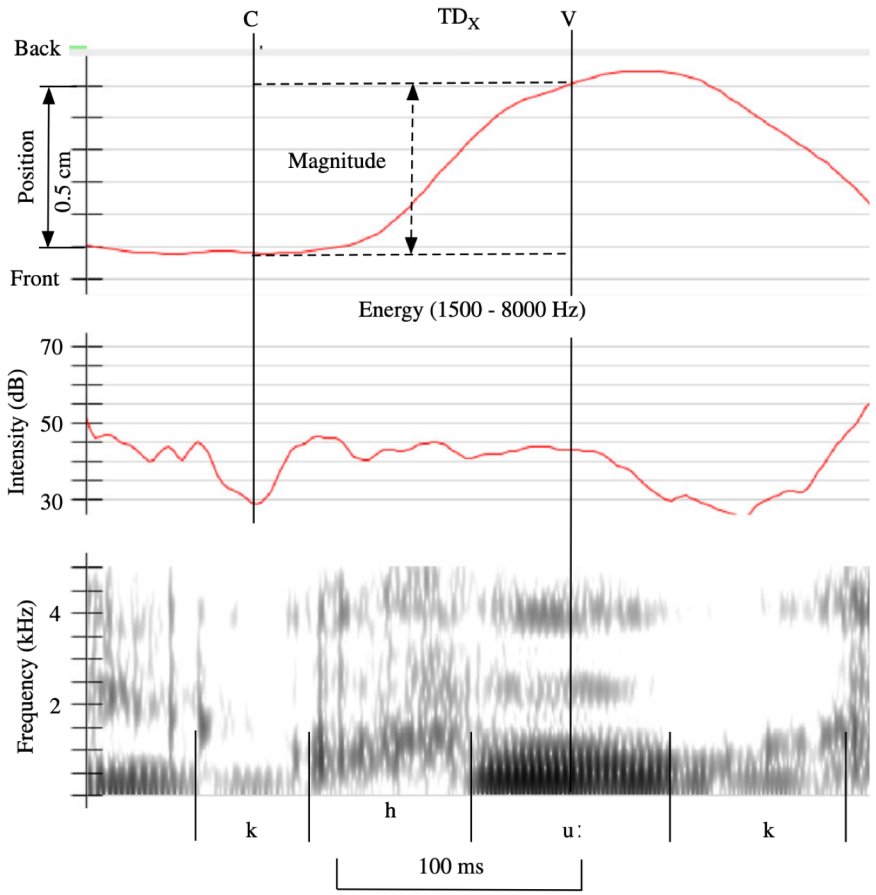
/u/-*fronting*

- In Standard Southern British English, /u/-fronting originated in contexts where /u/ is synchronically fronted due to coarticulation (Harrington 2007).

- Older speakers produced very retracted and highly coarticulated instances of /u/ and they normalized for these effects in perception.

- Younger speakers showed /u/-fronting irrespective of the context and they normalized much less than older speakers.

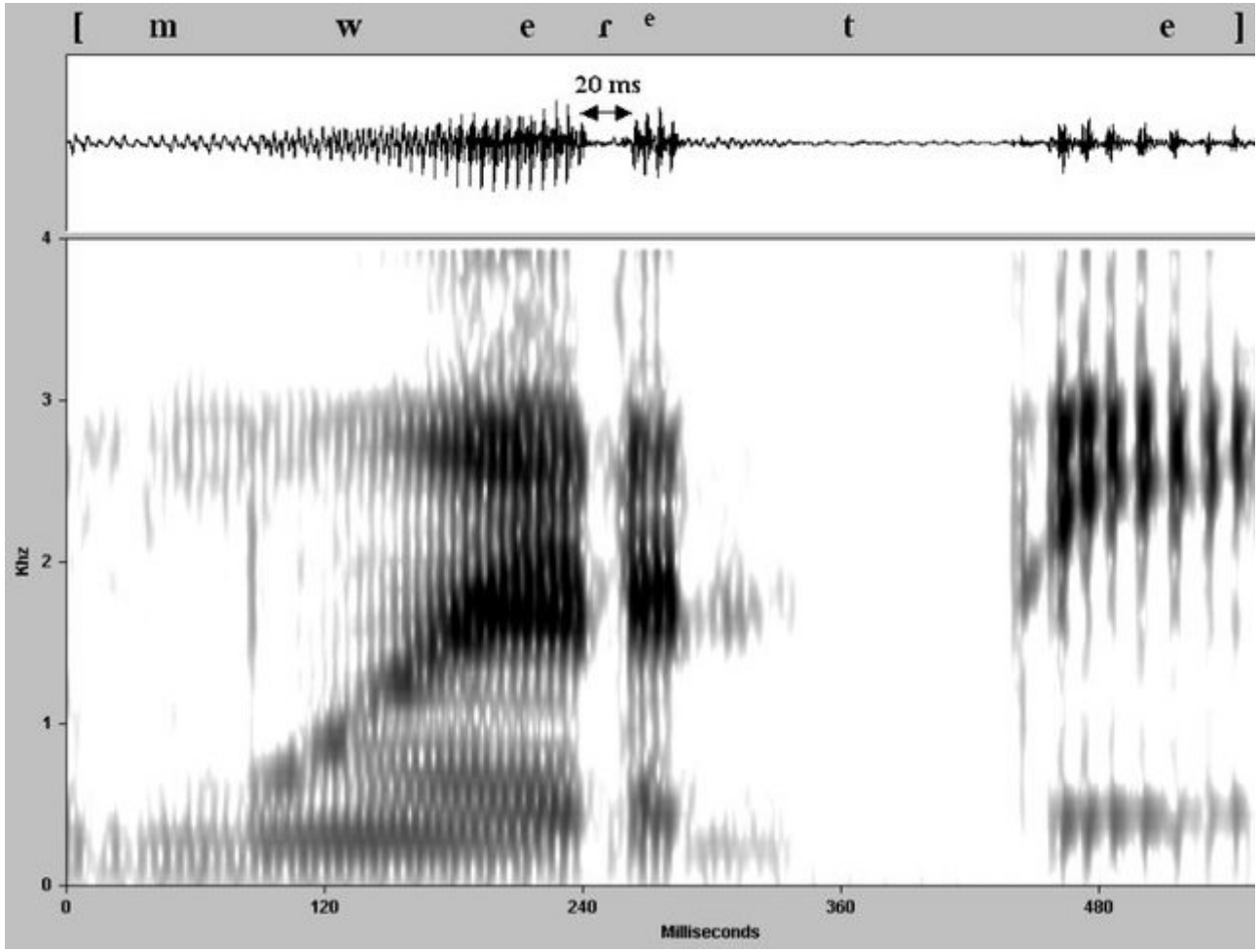
/u/-*fronting*


C
TDX
V
Back
Position
0.5 cm
Front
Magnitude
Energy (1500 - 8000 Hz)
70
50
30
Intensity (dB)
4
2
Frequency (kHz)
k
h
u:
k
100 ms

Vowel epenthesis in OR/RO *clusters*

- The transition from the stop to the liquid in obstruent-sonorant clusters resembles a short vowel.
- It usually shares its formant structure with the syllabic vowel following the cluster.
- This vowel can be reinterpreted as a full vowel, yielding epenthesis.

Vowel epenthesis in OR/RO *clusters*



Perceptual ambiguity due to cue loss:

- Listeners are more likely to confuse [k] with [t] before [e, i] than the other way around.
- If the mid-frequency peak that acoustically characterizes fronted velars is obscured, its acoustic signal is similar to that of an alveolar.
- Uni-directionality: greater likelihood of a mid-frequency peak being obscured rather than being inserted.

Domain-final voicing neutralization

- Acoustic cues to a phonological contrast can be perceptually masked on certain phonetic or prosodic contexts.

- Phrase-final laryngeal gestures, phrase-final lengthening, final consonant non-release, along with perception and phonologization of these articulatory routines, can all give rise to voicelessness (or perception of voicelessness) in final obstruents.

Shifts in vowel height due to nasalization

- Coarticulatory nasalization of vowels in nasal contexts results in the introduction of a nasal pole-zero pair that produces dramatic misperceptions.

- These can misperceptions result in sound change involving changes in vowel height.

- Low vowels may rise, high vowels may be lowered, and mid vowels can be raised or lowered.

Hypoarticulation/Undershoot: *Debuccalization of* /s/ > [h]

- A relaxation of the tongue constriction can prevent friction in the alveolar region, thus leaving the vocal folds as the only active articulator and yielding [h].

- Post-vocalic productions of [s] have a transitory period in which only glottal friction is produced (at least in Spanish, cf. Widdison 1993).

- This makes it likely that preconsonantal reduction of /s/ could result in [h] in perception.

Fricative voicing constraint:
Fricative devoicing, rhotacism

- Fricative voicing can only be achieved when air pressure behind the fricative constriction is sufficient.

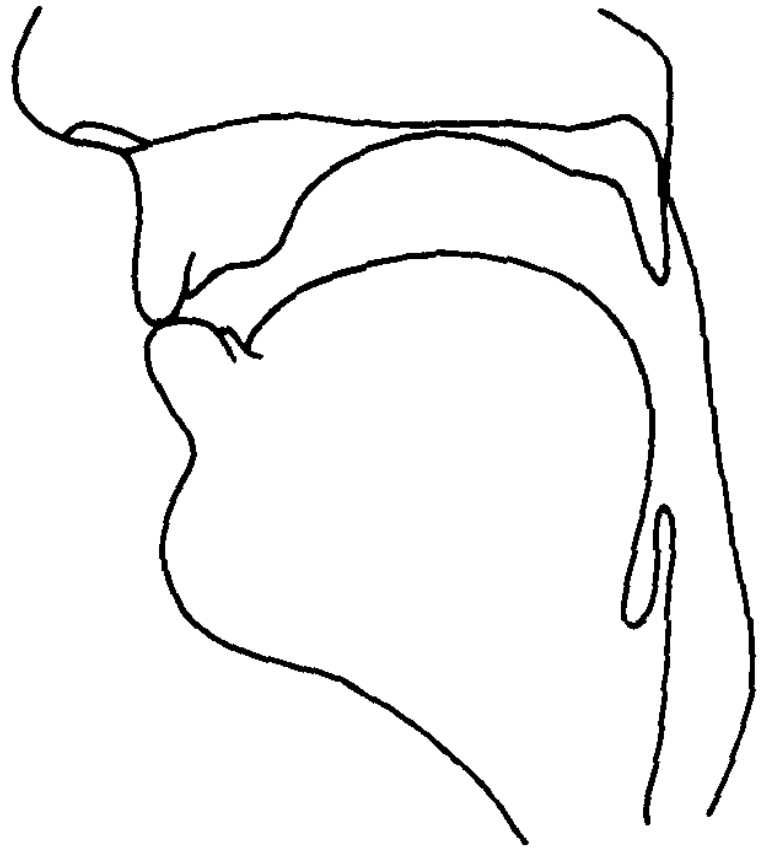
- This introduces a bias against voiced fricatives because airflow is impounded by the vocal folds, reducing oral pressure.

- Without any articulatory adjustments, voiced fricatives will tend to become glides.

Aerodynamic voicing constraint

- The production of voicing requires a certain degree of tension and adduction of the vocal folds, as well as air flowing through them.
- In order to attain the appropriate tension, the subglottal air pressure has to be higher than the oral air pressure.
- During stops, a full closure occurs in a certain point of the oral cavity.
- As a consequence, the air that flows through the vocal folds accumulates in the oral cavity, which eventually results in the oral air pressure reaching the same level as the subglottal pressure.
- Voicing ceases when the airflow falls to a certain level.

Aerodynamic voicing constraint



Aerodynamic voicing constraint: Prenasalization

- The intraoral air pressure can be decreased by opening the velopharyngeal port and letting some air flow through the nasal cavity.

- This articulation will result in a prenasalized stop.

Aerodynamic voicing constraint: Devoicing

- Devoicing can also be avoided by producing short voiced stops.

- This is reflected in the fact that voiced stops are typically shorter than their corresponding voiceless stop.

Aerodynamic voicing constraint: Spirantization

- However, excessive shortening could result in undershoot, with stops being produced as approximants.

- Thus, intervocalic spirantization is more likely to affect voiced stops than voiceless stops.