

BBN-ANG-243 Advanced Phonology: Phonological Analysis

2 Analyzing laryngeal contrasts

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Contrasts between consonants

			Place of articulation								
			bilab.	labio-dent.	dent.	alv.	post-alv.	pal.	vel.	glot.	
Manner of articulation	obstr.	stops/plosives	p b			t d			k g	[ʔ]	
		fricatives		f v	θ ð	s z	ʃ ʒ			h	
		affricates					tʃ dʒ				
	son.	nasals		m			n			ŋ	
		approx.	liquids				l	r			
			glides		w					j	(w)

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		approx.	liquids				l	r			
			glides		w					j	(w)

phonation types: **voiceless** and **voiced** consonants

The voicing contrast

States of the vocal folds: <https://www.youtube.com/watch?v=9T1pkdq8a8c>



The voicing contrast

In English

/b/all – /p/aul

sta/b/le – sta/p/le

cu/b/ – cu/p/

/z/oo – /s/ue

mu/z/le – mu/s/cle

bu/z/ – bu/s/

In Hungarian

/b/ál – /p/ál ‘ball’ – ‘Paul’

é/b/en – é/p/en ‘ebony’ – ‘unhurt (adv.)’

lá/b/ – lá/p/ ‘leg’ – ‘bog’

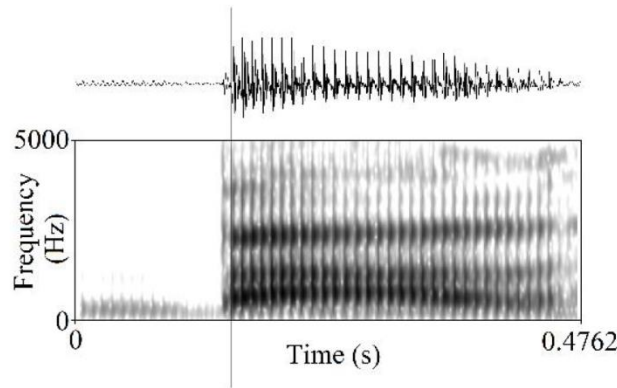
/z/ár – /s/ár ‘lock’ – ‘stem’

vi/z/em – vi/s/em ‘my water’ – ‘I take it’

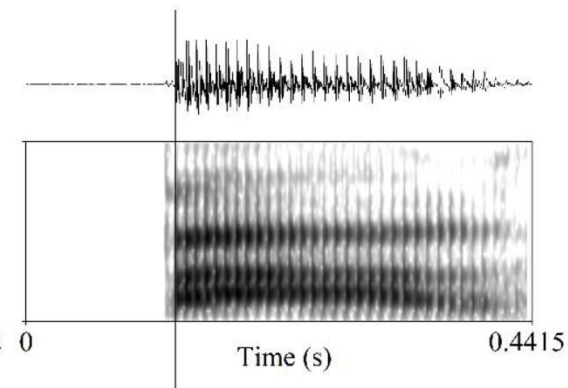
mé/z/ – mé/s/ ‘honey’ – ‘lime, whitewash’

The voicing contrast: its physical realization in Hungarian and English

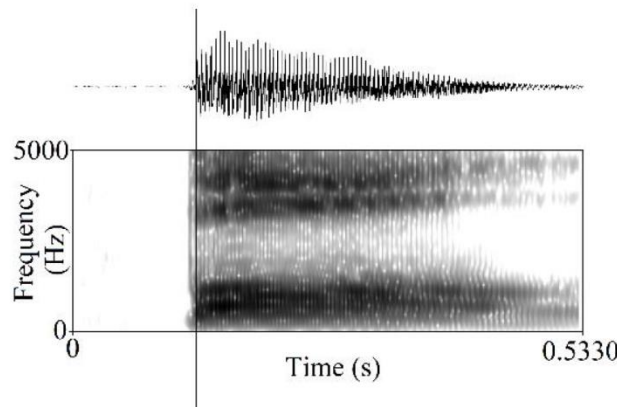
a. Hun. *bál*



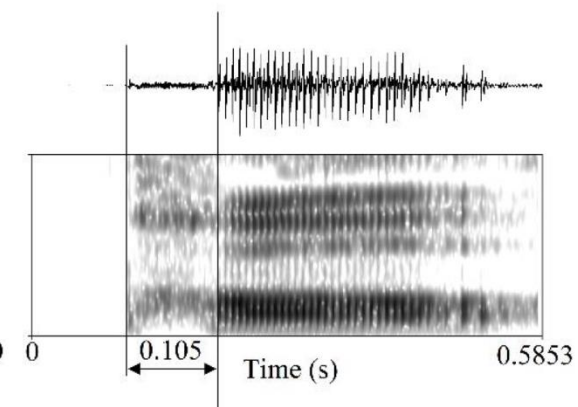
b. Hun. *Pál*



c. Eng. *ball*

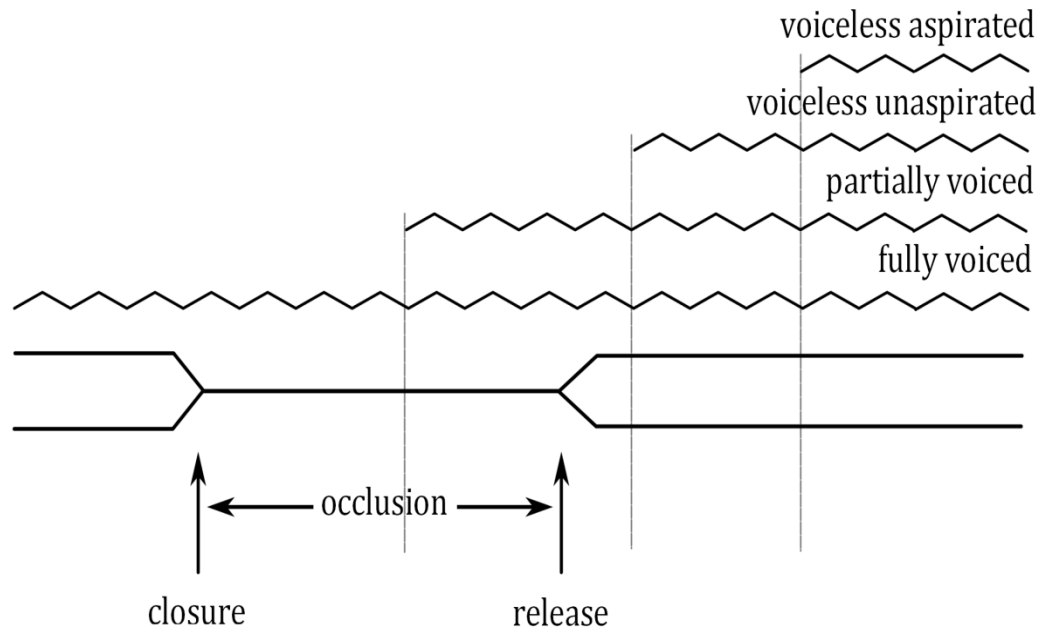


d. Eng. *Paul*



The voicing contrast: its physical realization in Hungarian and English

VOT (Voice Onset Time)



Set text:

- “Voice onset time” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/voicing.html#voice-onset-time>

The laryngeal (“voicing”) contrast in English: its physical realization

So,

[píj] – the letter P or B?

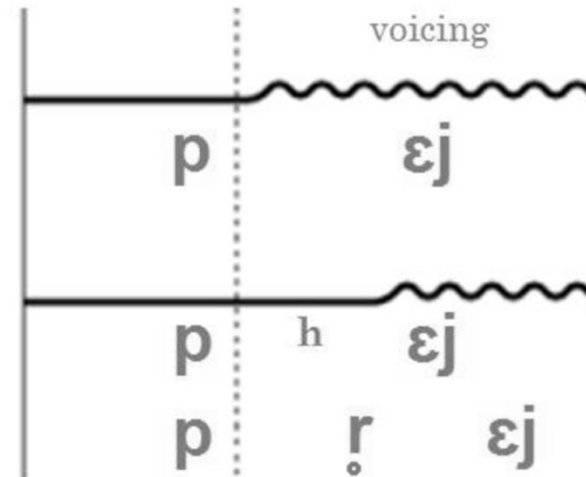
[píj súwp] – what’s that?



Aspiration in English

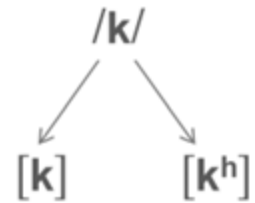
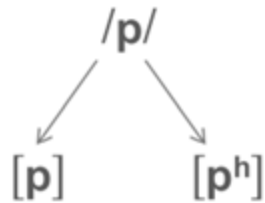
(1) pay /pɛj/ → [p^hɛj]

(2) pray /pɹɛj/ → [pɹɛj]



Aspiration in English

Aspirated and unaspirated allophones of /p, t, k/:



Set text:

- “The phonetics of aspiration” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/aspiration.html#the-phonetics-of-aspiration>

Aspiration in English: its distribution

		#_	_(C)V*
strongly asp'ed	#_(C)V*	[p ^h]íg	com[p ^h]áre
		[p ^h]áralyze	occu[p ^h]átion
		[p ^h]óison	a[p ^h]éar
		[p _ɾ]óud	com[p _ɾ]úter
		[p _l]áy	a[p _ɾ]óve
<hr/>			
weekly asp'ed	#_(C)V*	[p ^h]aráde	
		[p ^h]olíte	
		[p _ɾ]epáre	

* C = /l, r, j, w/, i.e., approximants/non-nasal sonorants

Aspiration in English: its distribution

__(C)V*	__C ≠ /l, r, j, w/	__#	s__
ó[p]era	o[p]timism	ti[p]	s[p]eak
léo[p]ard	Se[p]tember	loo[p]	whis[p]er
há[p]y	hy[p]nosis	stam[p]	was[p]
Á[pr]il			s[pr]ay

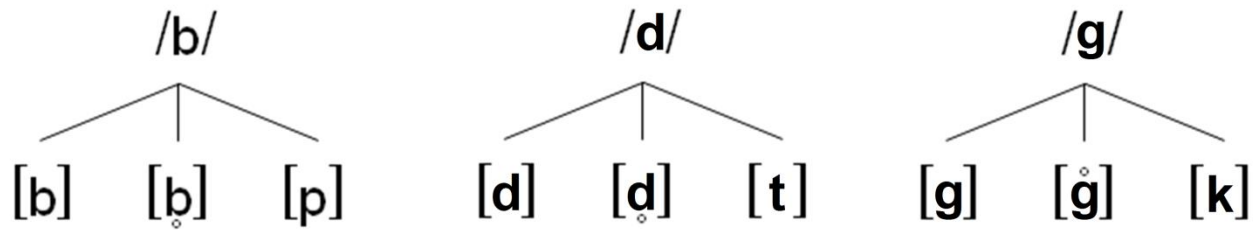
* C = /l, r, j, w/, i.e., approximants/non-nasal sonorants

Set text:

- “The distribution of aspiration” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/aspiration.html#the-distribution-of-aspiration>

Voicing in English

Voiced and voiceless allophones of /b, d, g/:



Voicing in English: its distribution

/b/ all – [b̥~p] all

la/b/ – la[b̥~p]

a/b/out – a[b]out

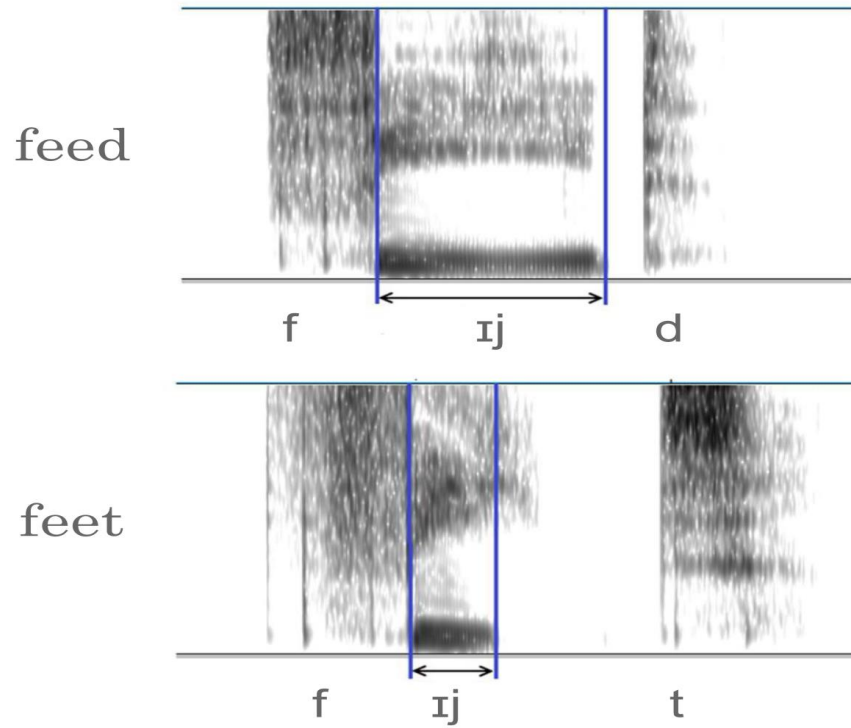
Types of voicing (= phonation)

- spontaneous
- passive
- active

Set texts:

- “The phonetics of voicing” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/voicing.html#the-phonetics-of-voicing>
- “Types of phonetic voicing” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/voicing.html#types-of-phonetic-voicing>

The realization of the laryngeal contrast in English in final position



The realization of the laryngeal contrast in English in final position

- prefortis clipping

/bad/ vs. /bat/: [bāḁ~bāt] vs. [băt]

- glottalization (preglottalization, glottal reinforcement)



/bad/ vs. /bat/: [bāḁ~bāt] vs. [băʔt]

Set text(s):

- “Pre-fortis clipping” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/voicing.html#pre-fortis-clipping>
- (“Glottalization” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/glottalization-and-glottalling.html#glottalization>)

The laryngeal contrast in English

- **lenis** (underlyingly voiced): **b, d, g, dʒ, v, ð, z, ʒ**
- **fortis** (underlyingly voiceless): **p, t, k, tʃ, f, θ, s, ʃ**

lenis obstruents  voiced
fortis obstruents  voiceless

Set text:

- “Fortis vs. lenis” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/voicing.html#fortis-vs.-lenis>

Voicing vs. aspirating languages

Hungarian: voicing language

- negative VOT vs. zero/short-lag VOT

Further voicing languages: Romance languages (e.g., Italian, Spanish and French), Slavic languages (e.g., Ukrainian, Czech and Serbo-Croatian)

English: aspirating language

- zero/short-lag VOT vs. positive/long-lag VOT

Further aspirating language: most Germanic languages (e.g., German, Icelandic and Norwegian), Mandarin Chinese

The analysis of /s/+C clusters in English

No aspiration after [s] – and after fortis fricatives in general:

peak [p^híjk],

speak [spíjk] → /spíjk/? or /sbíjk/?

1. Syllable-based analysis:

- Fortis plosives can be aspirated in syllable-initial position, e.g., in peak [p^híjk], a.ppea.rance [əp^hí:rəns], but speak [spíjk] and di.sco.ve.ry [dɪskóvəri].
- Potential problem: No aspiration in words like fifteen [fɪfti:n] either. Syllabified as fi.fteen, where /ft/ is a syllable-initial cluster?

2. An alternative analysis:

- These are not fortis fricative + fortis plosive but fortis fricative + lenis plosive clusters: speak /sbíjk/, discovery /dɪsgóvəri/ and fifteen /ffɪtɪn/.

The analysis of /s/+C clusters in English

Set texts:

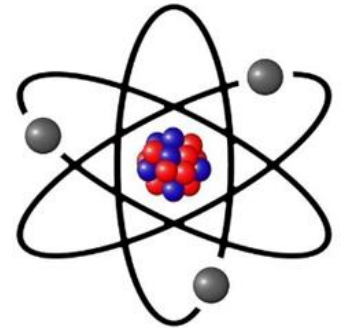
- “Fortis fricatives” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/aspiration.html#fortis-fricatives>
- “The effect of syllables” at <http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/aspiration.html#the-effect-of-syllables>

The phonological representation of laryngeal contrasts

The phonological makeup of segments

- **distinctive features**: the phonemes of a language can be analyzed as units decomposable into features that distinguish one phoneme from another.
- For example, the features relevant for distinguishing /t/, /d/ and /n/ are the following:

	t	d	n
consonantal	+	+	+
alveolar	+	+	+
voiced	-	+	+
nasal	-	-	+



The phonological representation of laryngeal contrasts

The phonological makeup of segments

- The distinctive features necessary for defining the consonants of English (for illustration only):

Features of Some American English Consonants

Features	p	b	m	t	d	n	k	g	ŋ	f	v	θ	ð	s	z	ʃ	ʒ	tʃ	dʒ	l	r	j	w	h
Consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-
Sonorant	-	-	+	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+
Syllabic	-	-	-/+	-	-	-/+	-	-	-/+	-	-	-	-	-	-	-	-	-	-	-/+	-/+	-	-	-
Nasal	-	-	+	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Voiced	-	+	+	-	+	+	-	+	+	-	+	-	+	-	+	-	+	-	+	+	+	+	+	-
Continuant	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+
Labial	+	+	+	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	+	-
Alveolar	-	-	-	+	+	+	-	-	-	-	-	-	-	+	+	-	-	-	-	+	+	-	-	-
Palatal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	+	-	-
Anterior	+	+	+	+	+	+	-	-	-	+	+	+	+	+	+	-	-	-	-	+	+	-	-	-
Velar	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
Coronal	-	-	-	+	+	+	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	-	-
Sibilant	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-	-

Note: The phonemes /r/ and /l/ are distinguished by the feature [lateral], not shown here. /l/ is the only phoneme that would be [+lateral].

The phonological representation of laryngeal contrasts

The phonological makeup of segments

- The features marked with a plus sign can be thought of as being present in the segment while the minus sign signifies the absence of a feature, e.g., /m/ is specified for the feature [nasal] while /b/ is unspecified for this feature:

m	b
[nasal]	

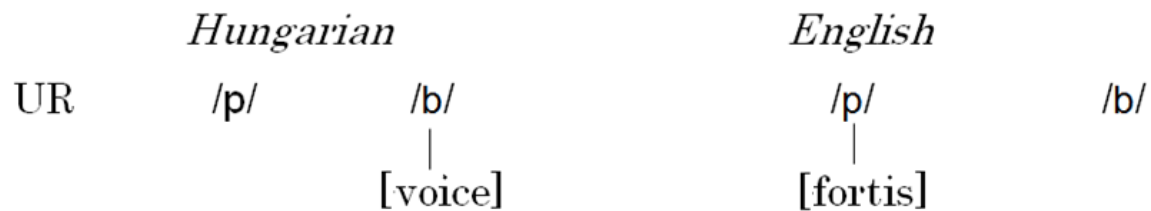
The phonological representation of laryngeal contrasts

Traditional analysis



The phonological representation of laryngeal contrasts

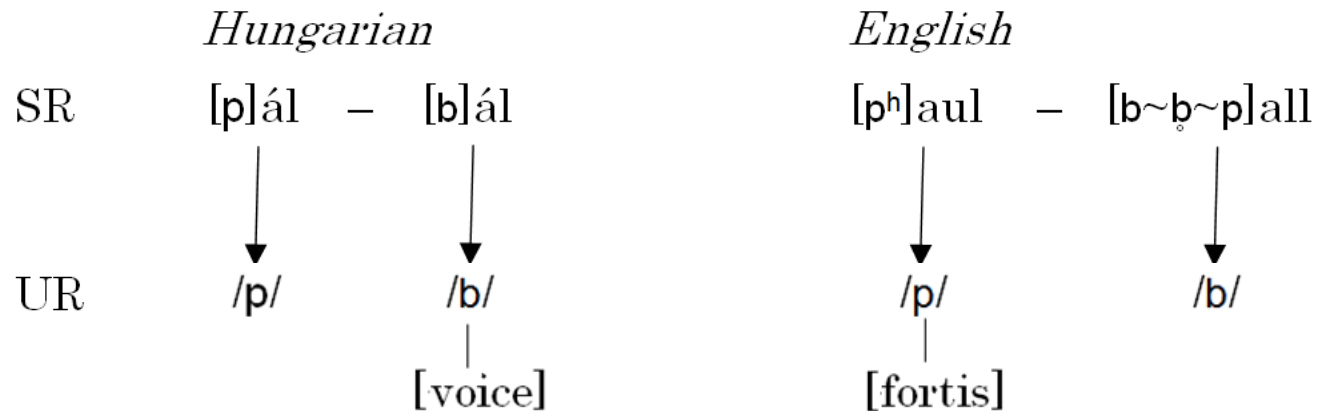
Nontraditional analysis



The phonological representation of laryngeal contrasts

True voicing vs. aspirating languages

(i) The phonetic basis of the separation



- In Hungarian, it's the production of voiced obstruents that requires greater articulatory effort while in English, it's fortis obstruents that are phonetically more marked (more difficult to produce). These phonetic facts can be reflected in the phonological representation too.

The phonological representation of laryngeal contrasts

True voicing vs. aspirating languages

- (i) The phonetic basis of the separation
- (ii) The phonological basis of the separation

Hungarian

diszgráfia /disgra:fiɔ/ → /dizgra:fiɔ/

d i s g r a : f i ɔ → d i z g r a : f i ɔ
 | |
 [voice] [voice]

English

dysgraphia /dɪsɡrɑfɪjə/

d i s g r a f ɪ j ə
 |
 [fortis]

play /pleɪ/ > [p̚leɪ]

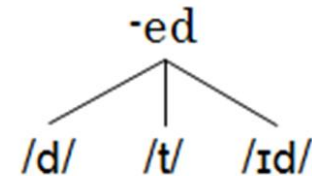
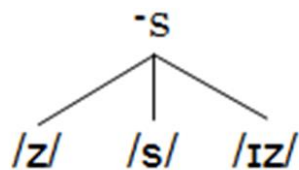
p | eɪ
 |
 [fortis]

The phonological representation of laryngeal contrasts

True voicing vs. aspirating languages

- (i) The phonetic basis of the separation
- (ii) The phonological basis of the separation

English



a. played /pleɪ#d/

p l eɪ d

b. stabbed /stab#d/

s t a b d

c. stopped /stɒp#t/

s t ɒ p d → s t ɒ p t

|
[fortis]

|
[fortis]

The phonological representation of laryngeal contrasts

True voicing vs. aspirating languages

(i) The phonetic basis of the separation

(ii) **The phonological basis of the separation**

- In Hungarian, voiced obstruents trigger regressive voice assimilation, so voicing is a phonologically active property. This can be easily represented if we assume the feature [voice] in this language type.
- In English, lenis obstruents don't cause laryngeal assimilation. Fortisness, on the other hand, seems to be a phonologically active property: sonorant devoicing after fortis obstruents and the allomorphic alternations of the morphemes *-s* and *-ed* can be accounted for if we assume the feature [fortis] in this type of laryngeal system and analyze these phenomena as the forward spreading of [fortis], i.e., as progressive laryngeal assimilation.

Set text:

“Voicing assimilation” at

<http://www.budling.hu/~cash/courses/phonolec/phonolec-notes/voicing.html#voicing-assimilation>

The phonological representation of laryngeal contrasts

Problematic cases: e.g., Swedish:

a.	[p ^h]acka		‘pack’	
	[b]ad		‘bath’	
	[t ^h]ak		‘roof’	
	[d]äck		‘deck’	
b.	vä/g/a	→	vä[g]a	‘weigh-INF’
	vä/g-t/	→	vä[kt]	‘weigh-SUP’
	kö/p/a	→	kö[p]a	‘buy-INF’
	kö/p-d/e	→	kö[pt]e	‘buy-PAST’

- Phonetic facts: word-initially, fortis plosives are aspirated, and lenis plosives are actively voiced. → On a phonetic basis, we could assume both [fortis] and [voice] in this laryngeal system.
- Phonological facts: fortis obstruents trigger regressive and progressive laryngeal assimilation while lenis obstruents are phonologically inactive → On a phonological basis, we could assume only [fortis] in this system.
- Question: Which considerations should play a more important role in determining the phonological representation?