

MIT OpenCourseWare  
<http://ocw.mit.edu>

24.941J / 6.543J / 9.587J / HST.727J The Lexicon and Its Features  
Spring 2007

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.

# Features vs. contrasts

# The feature set:

## summary of the Jakobson-SPE view

- **The feature set** contains, universally, a limited number of features: [ $\pm$ voice], [ $\pm$ nasal], [ $\pm$ contin], [coronal], etc. + 15 or so more.
- **The cues**: each F value signaled by one or more from a set of auditory attributes.
- **Lexicon**: entries contain arrays of F-values; enough to distinguish non-homophonous items from each other.
- **Phonology**: speaker knowledge about contrasts of the language and their distribution; it refers to F values, not their cues.
- **Phonetic implementation**: selects, on a language specific basis, which cues signal an F value.

# The alternative

- **A universal set of dimensions of contrast:** VOT, duration, F1, F2, ....
- **A mechanism generating segment inventories as categories defined on these dimensions:** each segmental category available to the language is defined by specified distances from other segments on relevant dimensions.
- **Lexicon:** entries contain arrays of categories generated by the inventory.
- **Phonology:** speaker knowledge about contrasts of the language and their distribution; this refers to dimensions of contrast and optimal distances between categories.
- **More Phonology:** speaker knowledge about optimal degrees of similarity to signal relatedness between words.

# First part

- Here we focus on the Jakobson-SPE view and suggest that a key aspect of it is wrong:

The distinction between the impoverished set of features relevant to phonology vs. the larger set of phonetic features that come into play in later derivational stages, but which phonology ignores.

# Is this a cue or a feature?

- Jakobsonian test of distinctivity:  
true features are the sole basis of contrast between segments.  
we can eliminate non-features using this idea.
- Some phonetic categories never give rise to contrast
  - no contrasts of released and unreleased stops in any position:  
**no [±release]**
  - [pre-] and [postaspirate] ( $\{^h p, p\}$ ,  $\{p^h, p\}$  but no  $\{^h p, p^h, p\}$ ):  
**use [aspirate]**
  - [rounded] and [pharyngealized], or so Jakobson thought: **use [flat]**
- Many phonetic features coincide with others in known phonemes
  - [labiodental] and [+continuant] (e.g. p, f, pf but no \*tp): **no [labiodental]**
  - [linguolabial] and [-continuant]: ??
  - [laminal] and [dental] or [palatoalveolar]: **use just [±anterior]**

# Which feature to eliminate from the distinctive set?

- Mutual dependencies:
  - [ $\pm$ sonorant] [ $\pm$ consonantal], [ $\pm$ nasal], [ $\pm$ continuant].One of these is redundant, should be eliminated. **But which?**
- Dimensions that contrast for just some features:
  - timing of oral constriction to [nasal]:  $\{^mb, m, b\}$
  - timing of oral constriction to aspiration:  $\{^hp, (^h)p^h, p\}$
  - timing of closure to frication phase:  $\{p^f, ^fp, p, f\}$

Intrasegmental timing is not a phonological property.

**Then how do we characterize  $\{^mb, m, b\}$ ?**

# Explaining sound patterns with an impoverished feature set

- Release controls the realization of contrasts (McCawley 1967)
  - T<sup>h</sup> vs. T, T<sup>s</sup> vs. T, r vs. t, r vs. l contrasts in Korean are neutralized where stops are unreleased. In the right grammar, unrelease triggers neutralization rules, but this requires [ $\pm$ release] to be mentioned in phonology.
- Prenasal C's are nasal only on their left side (Anderson 1976)
  - nasality can only spread left from [mb]
  - nasality can spread left and right from [m]
- Affricates are fricatives only on their right (Steriade 1992)
  - English, Romanian disallow [sʃ, ss, sz, ʃz]
  - but allow [stʃ, ʃtʃ]



component. This fact is noteworthy since no cases have been reported of a language in which the distinction between released and unreleased stops is distinctive. I point this out in order to emphasize that the system of features which play a role within the phonological component is anything but the extremely limited class of largely “distinctive” features which it until recently was generally assumed to be, and that the phonological component, rather than affecting the “more distinctive” features in the “earlier” rules and the “less distinctive” features in the “later” rules, as is sometimes supposed, must operate in terms of highly “non-distinctive” features even in very early rules of the grammar, such as the rule making syllable-final consonants unreleased indeed is.

McCawley 1967:528



# How many distinctive features?

- Standard answer: there must be very few, because there are few phones types (McCawley: cca 2K) and many fewer phoneme types.
- McCawley (1967:526):
  - SPE's features yield, when freely combined, 29, 434, 432 phones.
  - The difference between 29, 434, 432 and 2K is made up by constraints on combinations of feature values.
- Then it doesn't matter that the actual number of features is, say, 20 and not 200. Rather what matters are the constraints on feature combinations.
- To understand what the phonological features are we need to look not at inventories but at properties referenced in phonological rules-constraints. These are frequently non-contrastive properties.

# The phonological relevance of non-contrastive properties

- Some never-contrastive properties of speech sounds:
  - release, burst (Albright 2006)
  - timing of oral constriction to other F's (Steriade 1997)
  - small duration/closure degree differences (Fougeron and Steriade 1997)
- We can show two things:
  - Non-contrastive properties are cyclically transmitted from base to derivative, just like features. This has effects on morphology.
  - The distribution of contrasts depends on the distribution of non-contrastive properties: phonology can't characterize the former without referring to the latter as well.

# The cycle: review

- **[saɪkl]** vs. **[saɪklɪŋ]**, **[saɪklɪŋ]**
- Syllabic C's are generally disallowed:  $*C_{[+syll]}$
- Except to avoid impossible syllables:  
Sonority Sequencing  $\gg *C_{[+syll]}$ ,  
**[saɪkl] > [saɪkl]**; **Kar[l] > Kar[l]**
- V-initial suffixes should allow optimal syllabification:  
**[saɪklɪŋ] > [saɪklɪŋ]**
- But for the preference for Base-Derivative similarity:  
**{[saɪkl]-[saɪklɪŋ]} > {[saɪkl][saɪklɪŋ]}**
- Ident [syllabic] BD  $\gg *C'_{[+syll]}$ ,
- The right analysis of cyclic effects involves explicit and detailed identity conditions of this sort.

# How this bears on distinctive features

- Bases and derivatives prefer to be identical.
- What counts as identical?
  - a. If phonology never accesses some phonetic properties (release, timing, duration), then identity for those could never be enforced,
  - b. unless the phonetic implementation component does the same job of enforcing Base-Derivative identity, only for non-contrastive features.
- We now look at cases that disconfirm (a) - showing that phonology does access never-contrastive properties - or force us to accept the task duplication inherent in (b).

# Phonetic cyclicity: Albright 2006 on transmission of unrelease in *-ee* derivatives

If you have the contrasts below, the paper is about you:

- *beep* [bipí:] vs. *B.P.* [bip<sup>h</sup>í:]
- *nuke* [nukí:] vs. *new key* [nuk<sup>h</sup>í:]
- *marke* [markí:] vs. *marquis* [mark<sup>h</sup>í:]

# Outline of argument

- Faithfulness to quality of final releases determines
  - how the *-ee* derivative is realized
  - whether any *-ee* derivative is ok from a given form
- What kind of thing is the “quality of final releases”?
  - **[released]**, a never-contrastive feature.
  - not only **[±spread glottis]**, not the syllable position of the stop

conflict: **DEP [released] BD** vs. **\*unreleased/\_'V**

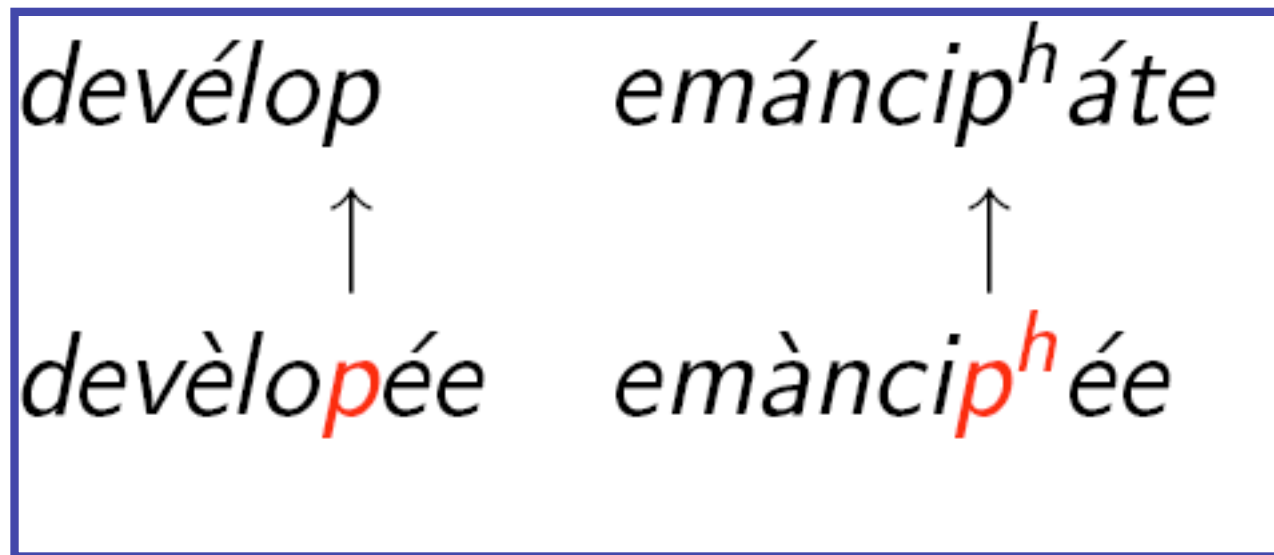
conflict causes paradigm gaps (**\*eat-ee**): no way to satisfy both.

# Why just *-ee*?

- Poverty of stimulus situation (very few or no lexicalized stop-final *-ee* items)
- Allows speaker preferences to emerge without interference. Better attested affixes (*-eer*, etc) have established patterns, which speakers must follow.

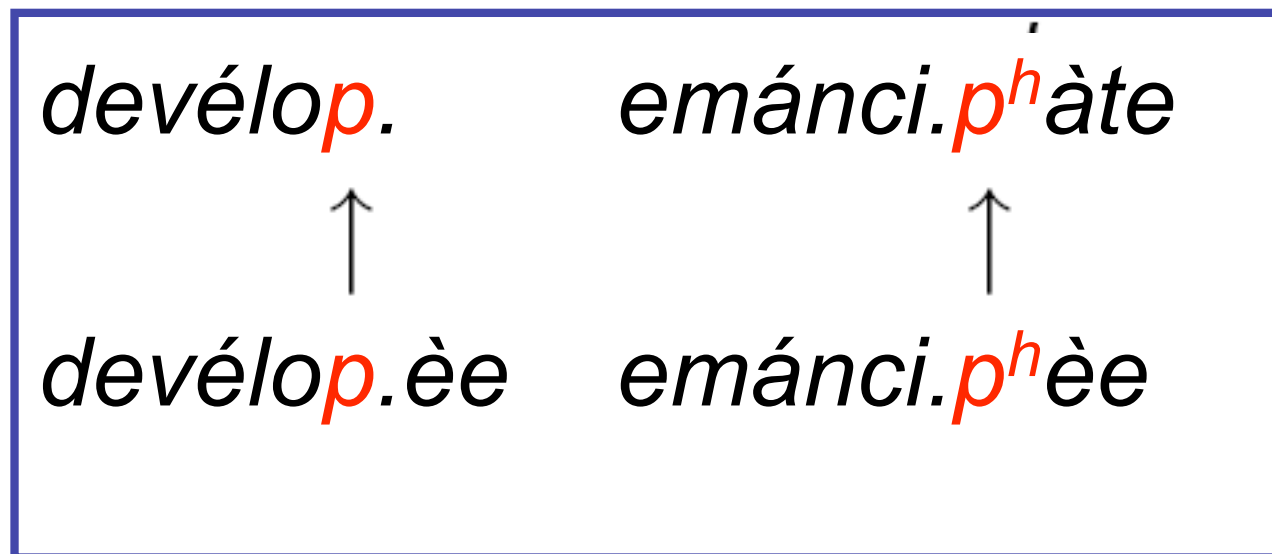


# Identity between degree of aspiration of final C in Base and Derivative



This is not failure of stem final C to resyllabify

# Identity between degree of aspiration of final C in Base and Derivative



This is not failure of stem final C to resyllabify  
But it could be preservation of base syllable position.

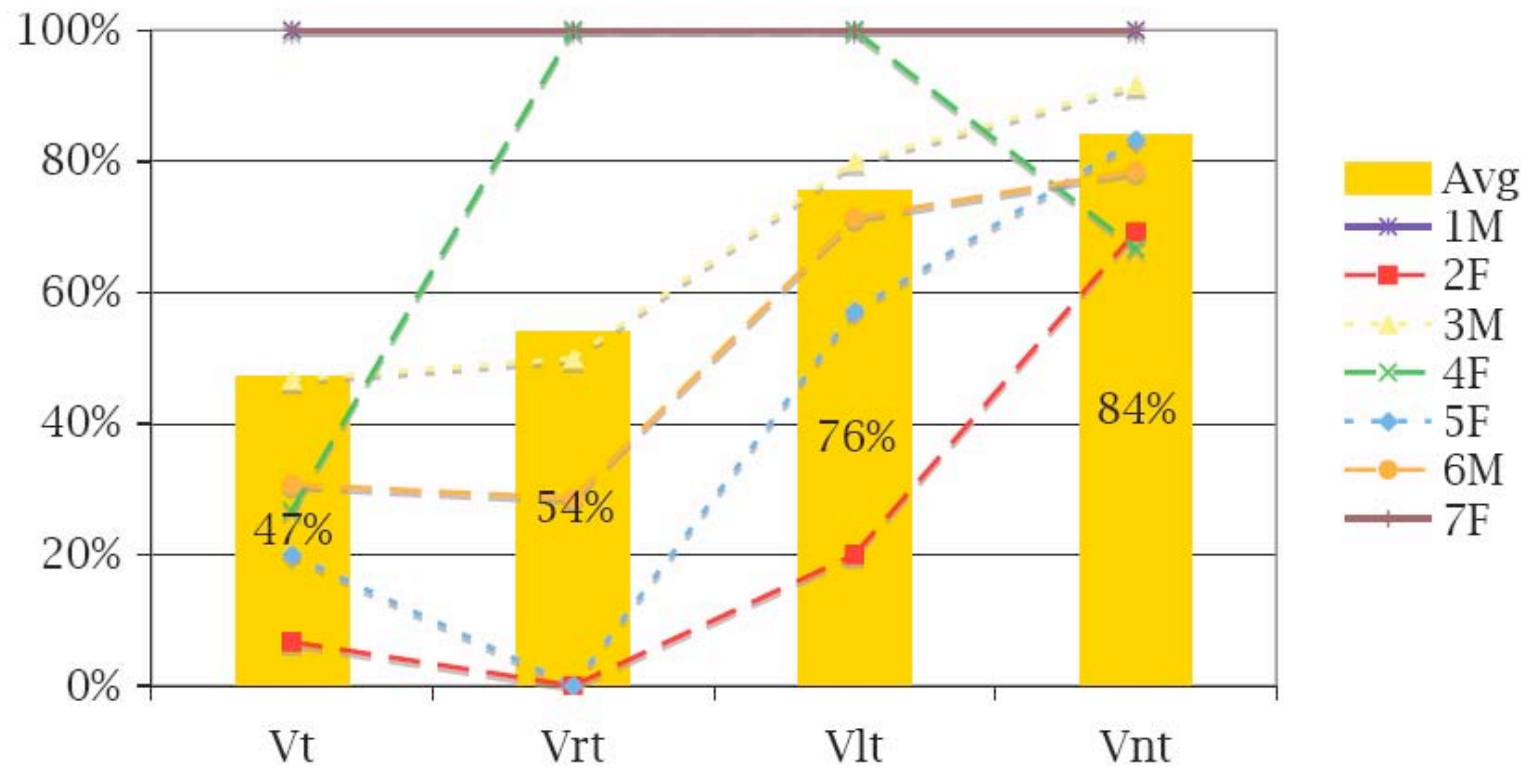
# It's not syllable position

- The same coda C in the base, for the same subject, results in different realizations in the *-ee* derivative.
- The differences are based on different degrees of release in the isolation coda
- Degrees of release are systematic:  
determined by context and idiolect.

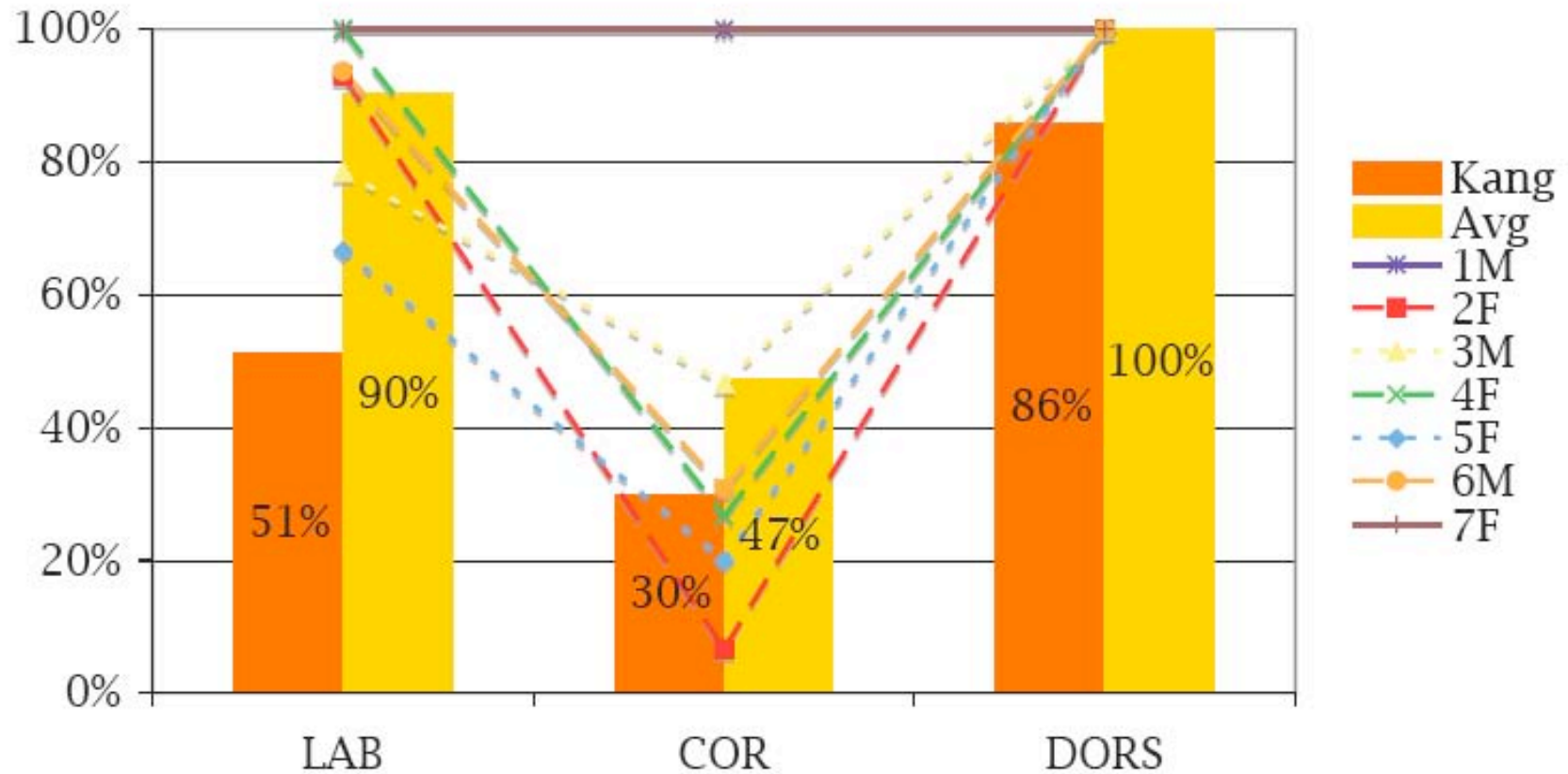
Base	unreleased	released	noisy release
Derivative		unaspirated	aspirated

Base	released	released	noisy release
Derivative	unaspirated	unaspirated	aspirated

# The two dialects: isolation [t] data

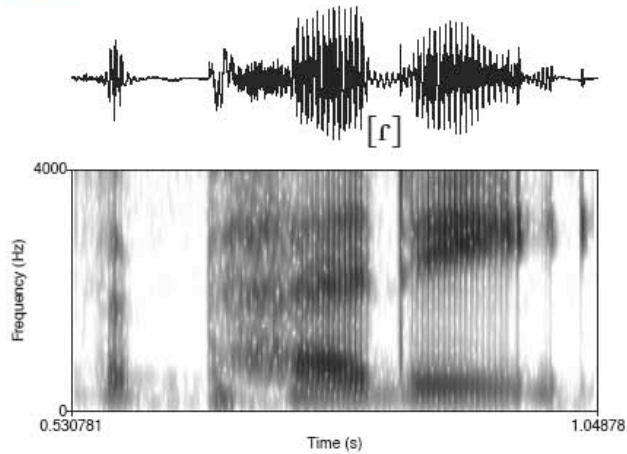


# The two dialects: isolation non-t data

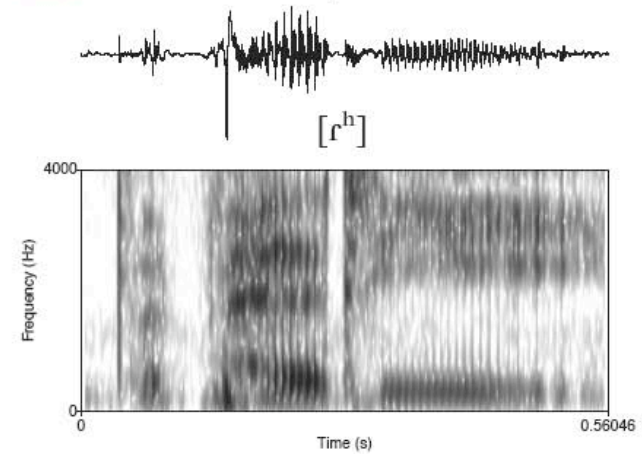


# If forced, how dialect A realizes t<sup>1</sup> before '-ee

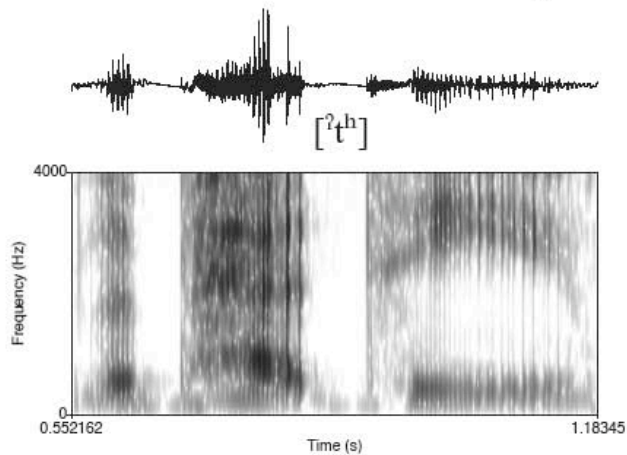
▶ Voiced flap



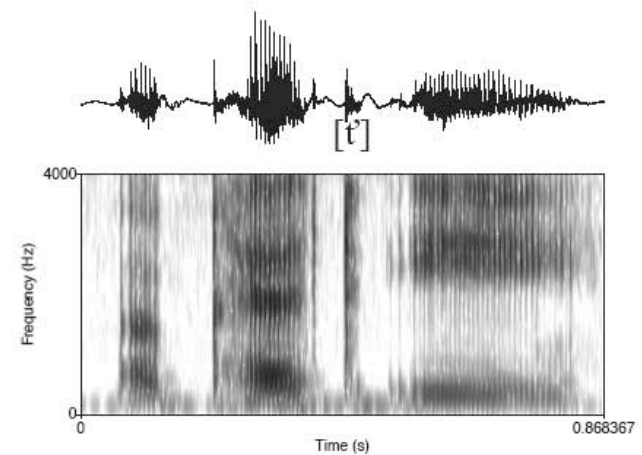
▶ Voiceless/aspirated tap



▶ Glottalized and aspirated



▶ Ejective



# Post-production wug *-ee* test

- 👉 Without exception, speakers who glottalize Vt show gaps for *eat* (etc.), while speakers who generally release Vt do not
- Only 2 “always releasing” speakers recorded so far, but anecdotally confirmed with several others by casual observation of final releases, then asking for *-ee* intuitions

# Non-coronal stops

Definitely unaspirated

Generally unaspirated

Aspiration uncertain

Aspiration somewhat possible?

beep-ee, trip-ee

warp-ee, usurp-ee

help-ee, scalp-ee

stamp-ee, jump-ee

soak-ee, lick-ee

mark-ee, cork-ee

milk-ee, sulk-ee

sink-ee, rank-ee



# Dialect A: Release types in coda C

<b>isolation</b>	p (or k)	t
V_	unaspirated, freq. unreleased	unreleased, glottalized
Vl_	variably released ?	variably released ?
Vn_	variably released ?	variably released ?

# Dialect A: degrees of aspiration in coda C

-ee	p (or k)	t
V_	develop(*h)-ee	<del>eat-ee</del>
Vl_	gulp <sup>(h)</sup> -ee	halt <sup>(h)</sup> -ee
VN_	dump <sup>(h)</sup> -ee	haunt <sup>(h)</sup> -ee

# Summary of correspondences

Base form	Before -ée	
Glottalized/unreleased	Gap	( <i>ea</i> [ʔt̚])
Released	Released, unaspirated	( <i>bee</i> [pʳ])
Noisily released	Variably asp./unasp.	( <i>haun</i> [t <sup>(h)</sup> ])
Aspirated	Aspirated	( <i>ampu</i> [t <sup>h</sup> ] <i>ate</i> )

# Adam's proposal

- Overall claim: realization before -ee preserves release properties of stop in base form, spoken in isolation
- Small acoustic differences are allowed (noisy release mapped variably to plain burst, or aspiration)
- Larger differences prohibited (weak release  $\leftrightarrow$  aspiration)
- For speakers with characteristically glottalized/unreleased final /t/, OO-Ident to base form prevents change to any realization that is possible to produce intervocalically

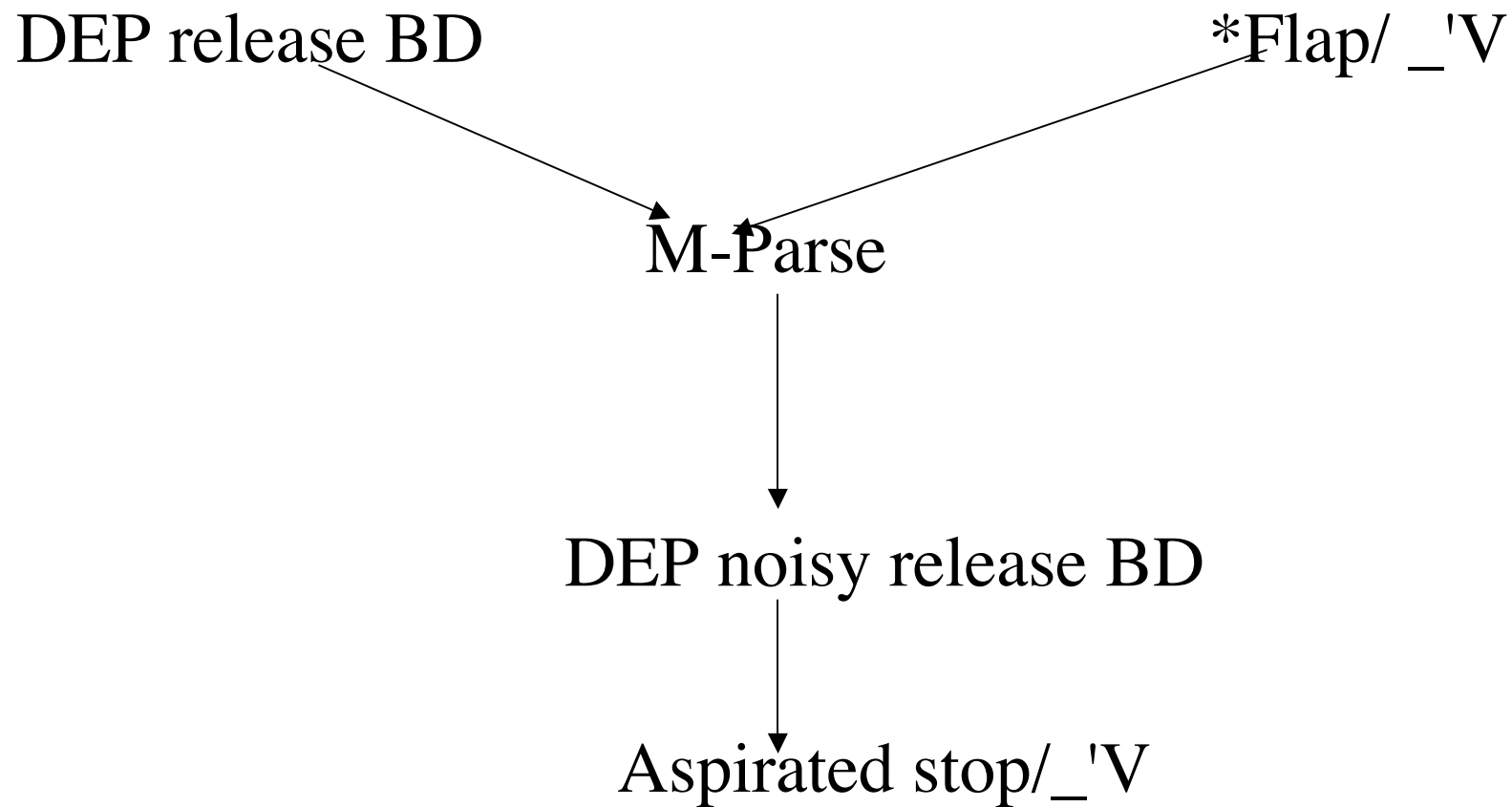


# Possible formalization: categories

Realization in final position	Realization in pre-V position	Shared category
unreleased stop, glottalized	flap, preglottalized flap	no release (assuming only plosives have it)
non-noisy release	unaspirated stop	[-noisy] release
noisy release	aspirated stop	[+noisy] release

3/23/07 28

# Rankings, dialect A



# \*eat-ee dialect A

iʔt <sup>1</sup>	DEP release	*Flap/_'V	MParse
iʔti	*!		
iʔri		*!	
⊖			*

# develop-ee, dialect A

di'vɛlɚp <sup>1</sup> di'vɛlɚp	MParse	DEP noisy release	Aspirated/_'V
divɛlɚ'pɪ			*
divɛlɚ'p <sup>hi</sup>		*!	
⊖	*!		



# dump-ee, dialect A

dump <sup>l</sup>	MParse	DEP noisy release	Aspirated/_'V
dum'p <sup>l</sup> i			*!
dum'p <sup>h</sup> i			
⊖	*!		

# Relevant here

- The intuition that this is correspondence for release and noisy release.
- Not for glottalization or aspiration, both distinctive features, albeit in other languages.
- How do we show it's not DEP asp, MAX glott?
- Hypothetically: speakers who flap finally, without glottalizing, yet still cannot use -ee after post-vocalic final flap.

# Hupa C's

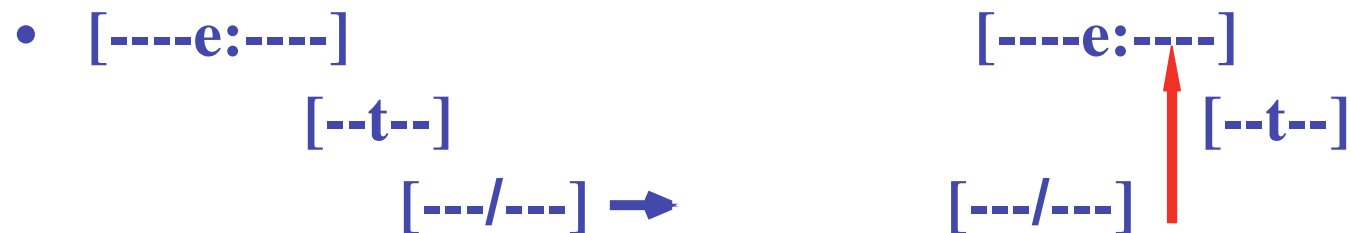
		bila- bial	denti- alveo- lar	palato- alveo- lar	velar	uvular	labial- velar	glott
Stop	unasp asp eject	<b>(p)</b>	t t <sup>h</sup> t'		k <sup>j</sup> k <sup>jh</sup> k <sup>j'</sup>	q q'		ʔ
Affr	unasp asp eject		ts ts <sup>h</sup> ts' tʃ'	tʃ tʃ <sup>wh</sup> tʃ' <sup>l</sup>				
Fric	vcl glott		s ɬ (s)	(ʃ)			x x <sup>w</sup> ɬ <sup>2</sup>	h
Nasal	vcd glott	<b>m</b>	[n] [ɲ]	<b>ɲ</b>	[ŋ] [ŋ̥]			
Lateral	vcd glott		l ɭ					
Glide	vcd glott			j j̥			w w̥	

# Glottalization

- Creak or creak+/- in sonorants: **n<sup>0</sup>, a<sup>0</sup>**
  - folds tightly adducted at one end;
  - loosely adducted at the other
- Ejection in stops, affricates: **t'**
  - folds tightly adducted across their length
  - at release, larynx pushed up

# The Hupa effect outlined

- Unreleased post-V ejective shifts glottal timing:  
**/e:t' / → [e:0t}**
- But only if some V-part remains modal
- And no ad-hoc lengthening is permitted: only in **V:t'**



# Hupa: morphology of definites

- Each verbal root comes in definite and indefinite forms

- Definite roots followed by a definite enclitic [l].

**tÓlkj’-l-tÓe:** ‘extend+ def + suffix

- Opacity: all short final V’s deleted, including definite

enclitic: / **tÓlkj’-l** / = [**tÓlkj}**] unreleased,

deglottalized

# Indefinites

- Lack the underlying /l/ enclitic: root final C is potentially word final or followed directly by C-initial suffix.

**tÓlkj'-tÓe:** 'extend+suffix' realized as [tÓlkj}-tÓe:]

vs.

**tÓlkj'-l-tÓe:** 'extend+ def + suffix' realized as [tÓlkj'-l-tÓe:]

- Shift in glottal timing happens in final C's of a subset of such indefinite roots.

# Indefinites for long V: roots

Root-final consonant = ejective		
	Long vowel root 'be peppery'	
	Definite	Indefinite
word-final, preconsonantal	1 tʃ'e:kj̃	5 tʃ'e:kj̃
phrase-final	2 tʃ'e:kj'	6 tʃ'e:kj'
before consonant initial suffix	3 tʃ'e:kj' -tʰe:	7 tʃ'e:kj̃ -tʰe:
before vowel initial suffix	4 tʃ'e:kj' -ɪɬ	8 tʃ'e:kj̃ -ɪɬ

Figure by MIT OpenCourseWare.



# Short V roots

	Short vowel root 'extend'	
	Definite	Indefinite
word-final, preconsonantal	9 t <sup>h</sup> <sub>I</sub> k <sup>j̥</sup>	
phrase-final	10 t <sup>h</sup> <sub>I</sub> k <sup>j̥</sup>	
before consonant initial suffix	11 t <sup>h</sup> <sub>I</sub> k <sup>j̥</sup> - t <sup>h</sup> e:	13 t <sup>h</sup> <sub>I</sub> k <sup>j̥</sup> - t <sup>h</sup> e:
before vowel initial suffix	12 t <sup>h</sup> <sub>I</sub> k <sup>j̥</sup> - i̥	

Figure by MIT OpenCourseWare.

No throw-back of glottalization upon the preceding V:  
 Extrapolating from other measurements, pre-glottalizing a  
 short V will create a fully creaky V: \*Creaky V

# Back to morphology

- “Laryngeal features associated with obstruents which are **underlyingly preconsonantal** [i.e. directly followed by C-initial suffix, without the definite enclitic] overlap with a preceding long V, while laryngeal features associated with obstruents which are **underlyingly not preconsonantal** [i.e. directly followed by the definite enclitic] do not overlap with a preceding long V.” (Gordon p.11)

# What Gordon means

Root-final consonant = ejective		
	Long vowel root 'be peppery'	
	Definite	Indefinite
word-final, preconsonantal	1 tʃ'e:kj̃	5 tʃ'e:kj̃
phrase-final	2 tʃ'e:kj'	6 tʃ'e:kj'
before consonant initial suffix	3 tʃ'e:kj' -tʰe:	7 tʃ'e:kj̃ -tʰe:
before vowel initial suffix	4 tʃ'e:kj' -iɬ	8 tʃ'e:kj̃ -iɬ

Figure by MIT OpenCourseWare.

Think of these as being **CV:C'-l** in UR or at some later relevant stage

Think of this being **CV:C'** in UR

# Two paradigm uniformity effects

- Two ways of generalizing certain timing options
- 1. Pre-V indefinite root same as phrase-final root form:  
**Ce:0C-il** like **Ce:0C** and not the expected **\*Ce:C'-il**  
(Like English cyclic effect in **cyc[l̥]** (2 syls) and **cyc[l̥]-ing** (3 syls))
- 2. Definite form has glottal timing realized as if enclitic vowel is always present

**Ce:C'** as if **Ce:C'i** and not **\*Ce:0C**

Gordon's analysis: a single paradigmatic uniformity effect

- All forms of the root have the glottal timing of the allomorph preceding a C-initial suffix.

(word-medial allomorph, syllabically aligned form)

# Moral

- Critical ranking:

