

this handout and some of the references quoted at  
[www.unice.fr/dsl/tobias.htm](http://www.unice.fr/dsl/tobias.htm)

## Havlík vs. Lower: Slavic vowel-zero alternations and a unified phase theory

- (1) purpose
  - a. provide a phase-based analysis of the Havlík-Lower parameter on vowel-zero alternations.
  - b. evaluate the consequences for phase theory: piece-driven phase.
  - c. as a consequence of the analysis, evidence a potential of autosegmental representations that was not exploited thus far: association under control, i.e. the lexical specification of melodic items for association to syllabic constituents.

### 1. Havlík vs. Lower: a parameter

#### 1.1. Lower

- (2) basic pattern of Slavic vowel-zero alternations, no variation

	zero in open syllables C__C-V	vowel in closed syllables C__C#    C__C-CV		gloss
Russian	vojøn-á	vójen	vojén-nyj	war Nsg, Gpl, adj.
Czech	lokøt-e	loket	loket-ní	elbow Gsg, Nsg, adj.
Polish	wojøn-a	wojen	wojen-ny	war Nsg, Gpl, adj.

- (3) systematic exception: vocalisation in open syllables

	open syllable		closed syllable	
	zero C__C-V	vowel C__C-yer C#	vowel C__C#	vowel C__C-CV
Russian	døn'-á	d'en'-ók	d'én'	d'en'-øk-á
Czech	dom-øk-u	dom-eč-ek	dom-ek	dom-eč-øk-u
Polish	buł-øk-a	buł-ecz-ek	buł-ek	buł-ecz-øk-a

- (4) Alternation sites are vocalized in open syllables iff the following vowel alternates with zero.

**1.2. Havlík**

(5) this was not always so: Havlík's Law  
[Havlík 1889]

- a. given a Common Slavic (CS) sequence of yers, every other yer appears in Old Czech (OCz), counting from the right edge.
- b. illustration

4 3 2 1                      4 3 2 1

CS sь pьs-ьmь > OCz se pøs-emø            se psem            "with the dog"

5 4 3 2 1                      5 4 3 2 1

CS sь šьv-ьc-ьmь > OCz sø šev-øc-emø    s ševcem            "with the shoemaker"

(6) when several alternation sites occur in a row, languages follow either the Havlík or the Lower pattern:

- a. Havlík  
counting from the rightmost alternation site, every other alternation site is vocalized (strong alternants are always preceded by weak alternants)
- b. Lower  
strong alternants are always preceded by strong alternants

(7) a parameter

- a. Havlík and Lower may not coexist within a given language: languages follow either one or the other pattern.

b. examples

Havlík	Lower
Old Polish	Modern Polish
Old Czech	Modern Czech
Moroccan Arabic	Russian
German	
French	

(8) illustration

see e.g. Rospond (1979:74) for Old Polish, Trávníček (1935:46ff) for Old Czech

		open syllable		closed syllable	
		zero	vowel/zero	vowel	vowel
		a. C _ C-V	b. C _ C-yer C#	c. C _ C#	d. C _ C-øC-V
Czech	Modern	dom-øk-u	dom-eč-ek	dom-ek	dom-eč-øk-u
	Old		dom-øč-ek		
Polish	Modern	pies-øk-a	pies-ek	pies	pies-øk-a
	Old		pøs-ek		

- (9) the Lower pattern has been extensively analyzed in the literature
- a. Russian Lightner (1965), Melvold (1989), Farina (1991), Yearley (1995)
  - Bulgarian Hristova (1994)
  - Western Slavic Rubach (1984, 1986, 1993), Gussmann (1980, 2007), Kenstowicz & Rubach (1987), Scheer (2004, 2005)
  - overview Bethin (1998), Ziková (2008)
  - b. but we are not aware of an attempt to formally express the Havlík-Lower parameter.
  - c. ==> challenge:
    1. express the parametric variation
    2. while preserving the basic skeleton of the Lower analysis

## 2. Autosegmental analysis of Lower

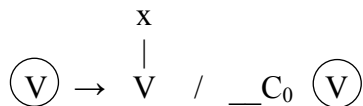
### 2.1. Regular analysis

- (10) yers are floating pieces of melody: Rubach (1986)  
Czech "elbow"

a. lokət-e Gsg      b. loket Nsg      c. loket-ní adjective

x	x	x		x	x	x	x		x	x	x		x	x					
l	o	k	e	t	e	l	o	k	e	t	e	l	o	k	e	t	e	n	í

- (11) autosegmentalised Lower (Rubach 1986, Kenstowicz & Rubach 1987)  
a floating vowel is associated to an x-slot iff it occurs before another floating vowel



- (12) difference between alternating and stable vowels:
- a. alternating vowels are floating (and lack any x-slot)
  - b. stable vowels are lexically associated with an x-slot
- (13) sequences of alternating vowels  
in order to make all floating vowels (but the last) appear on the surface, some special provision must be made
- a. cyclic application of Lower  
Rubach (1984:184ff), Rubach (1993:139f)  
the string is parsed from left to right, following morphological structure:  
Pol *buł-ecz-ek* "bread roll, dim Gpl" = [[[[buł] ĩk] ĩk] ĩ]
  - b. non-cyclic version of Lower  
Gussmann (1980, 2007)  
"the string is first scanned for the [alternating] segments; once these are identified, the change is implemented simultaneously" (Gussmann 1980:30). That is, all yers are vocalized in one go according to whether or not the following vowel is a yer in the underlying form.  
==> the cyclic nature of Lower has become largely consensual.



(19) Gussmann & Kaye (1993)

difference between alternating and stable vowels:

- a. alternating vowels are empty nuclei
- b. stable vowels are lexically associated with their constituent

(20) Gussmann & Kaye's (1993) analysis

- a. is based on epenthesis  
empty nuclei determine the location of alternating vowels
- b. but it cannot distinguish several alternating vowels whose quality is a lexical property of the morpheme. This situation occurs in e.g. Russian:  

e-zero	d'én'	dn'-á	"day Nsg, Gsg"
o-zero	són	sn-á	"dream Nsg, Gsg"

c. ==> melodies of alternating vowels must be present in the lexicon.

(21) underlying representation of vowels that alternate with zero:

- constituents are present in the lexicon (a)
  - the melody of alternating vowels is present in the lexicon (b)
  - both constituents and melody are present lexically (c)
- a. Rubach (1986)                      b. Gussmann & Kaye (1993)                      c. Scheer (2004, 2005),  
 Ziková (2008)

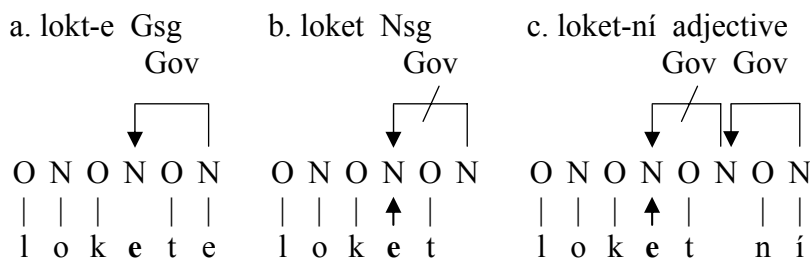


(22) Scheer (2004, 2005), Ziková (2008)

difference between alternating and stable vowels:

- a. alternating vowels are pieces of melody that **are not** associated to their constituent
- b. stable vowels are pieces of melody that **are** associated to their constituent
- c. Government acts as an association-inhibitor:  
floating melodies can associate only to ungoverned nuclei

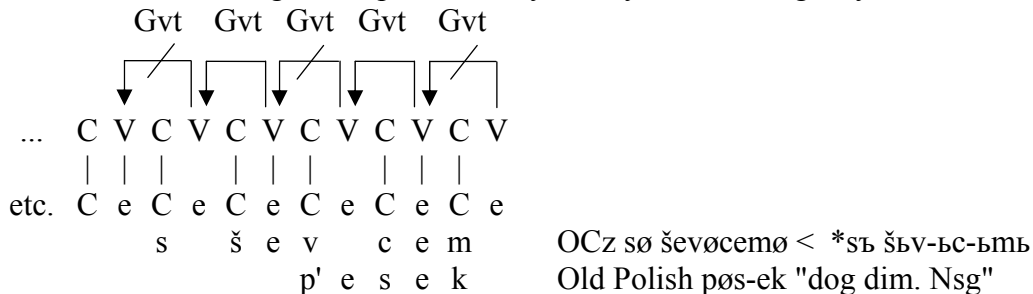
(23) Czech "elbow"



### 3. Expression of the Havlík - Lower parameter

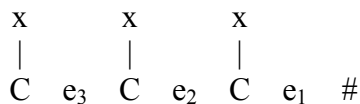
#### 3.1. Havlík pattern: non-cyclic application of Lower

- (24) Government derives Havlík  
 application of Government to a sequence of alternating vowels produces the Havlík pattern when the string is computed non-cyclically, i.e. in a single cycle.



- (25) the government-based analysis contributes directionality
- a. Government is defined as a head-final lateral relation, and strings are therefore processed from right to left
  - b. this is a general characteristic of government that owes nothing to Slavic languages or yers.

- (26) the situation is unclear with classical Lower
- a. the generative literature does not consider the Havlík pattern. It is therefore difficult to determine what an analysis in terms of the classical Lower rule or OT-adapted versions thereof would look like.
  - b. the classical Lower rule does not provide any indication whether a given string should be processed from left to right, right to left or in any other way. It is therefore unclear how the Lower rule should be applied when a string needs to be processed - that makes a single cycle/phase - and that contains more than two alternating vowels in a row.
  - c. Rubach's (1984) additional specification that Lower is a cyclic rule ensures that strings are processed from left-to-right, cf. (14).
  - d. there is no way to enforce a right-to-left parsing, i.e. analogous to the government-based analysis.
  - e. even if there were a means to do that, the result would be wrong:  
 on the assumption that stray erasure of floating melodies occurs only at the end of the entire derivation,  
 CъCъCъ#  
 parsed right-to-left in a single cycle produces



- step 1: non-vocalisation of e<sub>1</sub> (no following floating e)  
 step 2: vocalisation of e<sub>2</sub> (presence of a following floating e)  
 step 3: vocalisation of e<sub>3</sub> (presence of a following floating e)  
 ==> result: CeCeC#

### 3.2. Lower pattern: cyclic application of Lower

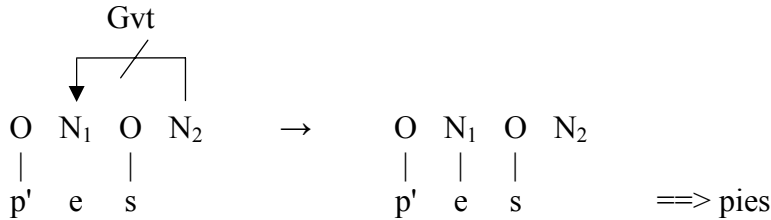
(27) interim summary

- a. government-based Lower derives the Havlík pattern if applied non-cyclically to the overall string (i.e. if the string is made of just one single cycle/phase). Right-to-left directionality is in-built.
- b. classical Lower cannot derive the Havlík pattern, even if a means were found to make its application right-to-left.
- c. what about the Lower pattern?
  1. Rubach's solution is correct  
the Lower pattern is the result of the cyclic application of Lower
  2. in Rubach's system, this just means that Lower is applied left-to-right.
  3. what does cyclic derivation mean in a phase-based environment?

(28) derivation of Pol pies-ecz-ek = [[[pies]<sub>1</sub> ek]<sub>2</sub> ek]<sub>3</sub>

a. cycle 1

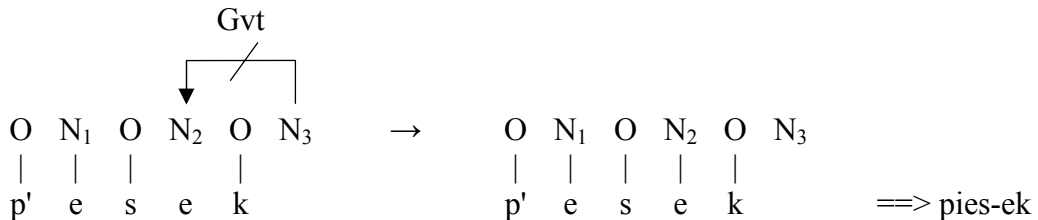
computation of N<sub>1</sub>



b. cycle 2

1. N<sub>1</sub> already computed and protected by Phase Impenetrability: cannot be governed by N<sub>2</sub>

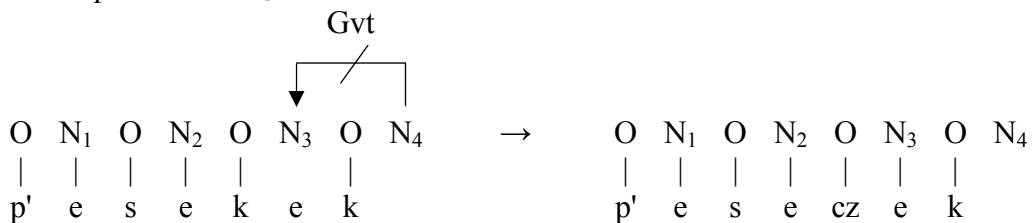
2. computation of N<sub>2</sub>



b. cycle 3

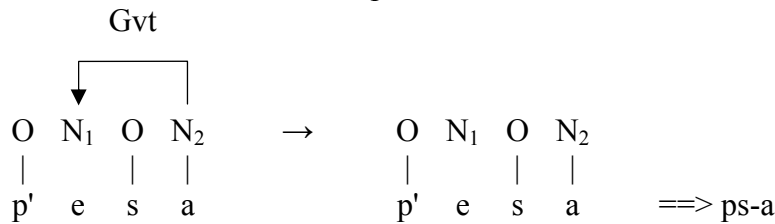
1. N<sub>2</sub> already computed and protected by Phase Impenetrability: cannot be governed by N<sub>3</sub>

2. computation of N<sub>3</sub>



- (29) phase-based analysis of cyclic derivation
- Phase Theory and Phase Impenetrability lie at the heart of current minimalist syntax (Chomsky 2000, 2001 et passim).
  - sentences are processed piecemeal so that workbench memory is unburdened: at given points in the syntactic derivation (phase heads), interpretation is triggered and the current string is sent to PF/LF.
  - Phase Impenetrability Condition (PIC)  
the instrument of memory-unburdening is the PIC: previously interpreted chunks are "frozen"/ "forgotten" by further computation.

- (30) piece-driven vs. node-driven phase
- the above analysis supposes a distinction between two types of affixes:
    - those that trigger interpretation, i.e. create a phase boundary
    - those that are interpretation-neutral, i.e. sit in the same phase as the rest of the string
  - interpretation-triggering: -ek  
pies + ek → [[pies] ek]  
==> PIC effect on the root e: \*ps-ek
  - interpretation-neutral: case markers  
pies + -a → [pies-a]  
no PIC effect on the root e: \*pies-a



- node-driven phase  
a phase/ interpretation is triggered when the derivation encounters a specific node in the tree: vP, CP on Chomsky's initial (and conservative) count
- piece-driven phase  
phasehood is a lexical property of affix classes:  
-ek does, case markers do not trigger interpretation

(31) cyclicity in phonology

a. Lexical Phonology

- cyclicity is *process-specific*

- rules may or may not be cyclic [even within the Lexicon: Rubach & Booij 1984]

- Lower is a cyclic rule

b. Halle & Vergnaud (1987)

cyclicity is a lexical property of affixes

English:

class 1 affixes are cyclic: [[parént]-al<sub>1</sub>] – outer cycle created by -al<sub>1</sub>

class 2 affixes are not: [párent]-hood<sub>2</sub> – no outer cycle created by -hood<sub>2</sub>

==> but the PIC plays no role

c. Kaye (1995)

- follows Halle & Vergnaud: interpretation-triggering is a lexical property of affixes

BUT

- introduces the PIC

d. spell out your sister!

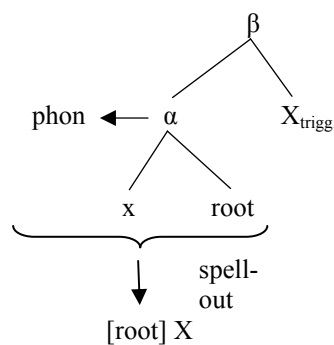
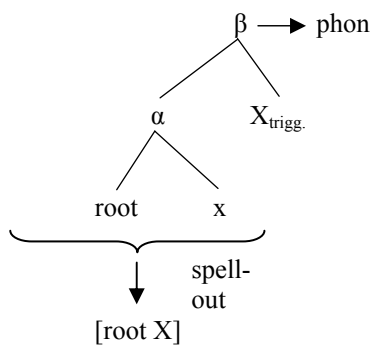
what is actually spelled out when interpretation is triggered?

- Halle & Vergnaud: the constituent projected by the interpretation-triggering affix

- Kaye: the sister of the interpretation-triggering affix

(32) interpretation-triggering affixes: what exactly is spelled out

- a. Halle & Vergnaud (1987): cyclic affixes trigger the spell-out of their own constituent  $\beta$
- b. Kaye (1995): cyclic affixes trigger the spell-out of their sister  $\alpha$



- (33) summary cyclic spell-out  
syntax and phonology must come to grips with spell-out: theories on either side must not be different.  
Phonology can learn from syntax  
[intermodular argumentation, Scheer 2008, 2009, forth a,b]
- a. spell-out is governed by the PIC  
==> only Kaye's system implements the PIC
  - b. the phase edge  
in syntax, when an XP is spelled out, only its complement is actually sent to interpretation: the head and the Spec, i.e. the phase edge, are only spelled out at the next higher phase.  
==> in syntax the sister of  $X^0$  is spelled out  
==> only Kaye's system spells out the sister of the phase head  
[see Scheer 2008]
  - c. definition of phasehood  
syntax: node-driven phase  
phonology: piece-driven phase  
maybe syntax is evolving towards piece-driven phase: den Dikken's (2007) Phase Extension is a step into this direction. See Scheer (2009, forth a) on this issue.
- (34) summary Havlík vs. Lower
- a. we follow
    - Halle & Vergnaud's idea of interpretation-triggering affixes
    - Kaye's PIC-based approach to cyclicity
  - b. simple parameter
    - Havlík pattern: non-cyclic application of Government, i.e. to a single phase
    - Lower pattern: cyclic application of Government, i.e. to nested phases
  - c. since cyclicity is a lexical property of affixes, the diachronic evolution from Old Polish/Czech to Modern Polish/Czech reduces to the modification of a lexical property of affixes:  
Old Polish/Czech: -ek is non-cyclic  
Modern Polish/Czech: -ek is cyclic  
[Ziková 2008]

#### 4. Stable vs. alternating suffix-initial vowels

- (35) there are two types of vowel-initial suffixes
- a. suffixes whose vowel does not alternate with zero (= suffixes with stable Vs)
  - b. suffixes whose vowel does alternate with zero
  - c. like everywhere else in Slavic languages, the contrast between alternating and stable vowels is a lexical property of each morpheme and therefore needs to be recorded in the lexicon.

(36) diagnostics

- a. influence of a following vowel:
  - suffix initial vowels are absent: they are alternating
  - suffix-initial vowels are present: they are stable
- b. influence of suffix-initial vowels on preceding alternation sites in a Lower-system:
  - preceding alternating vowels are present: the suffix-initial vowel is alternating
  - preceding alternating vowels are absent: the suffix-initial vowel is stable

(37) examples

- a. diminutive *-ek* is alternating:
  - Po pies-ek, pies-øk-a
  - Cz dom-ek, dom-øk-u
- b. adj. *-ov* is stable:
  - it triggers the absence of a preceding alternating vowel
  - it does not alternate itself

	CøC-V	CeC	CøC-ov-V	gloss
Czech	skøl-o	skel	skøl-ov-it-ý	glass Ng, Gpl, glassy
Polish	kotøł-a	kocioł	kotøł-ow-y	boiler Gsg, Nsg, adj.

(38) classical distinction: in terms of association

e.g. Rubach (1986)

stable: associated		alternating: floating	
-a Gsg	-ov adj.	-ek dim.	
x	x x	x	
a	o v	e k	

x	x	-	x	→	x	x	x
p'	e	s	a		p	e	s a

vs.

x	x	-	x	→	x	x	x	x	x
p'	e	s	e k e		p'	e	s e	k	e

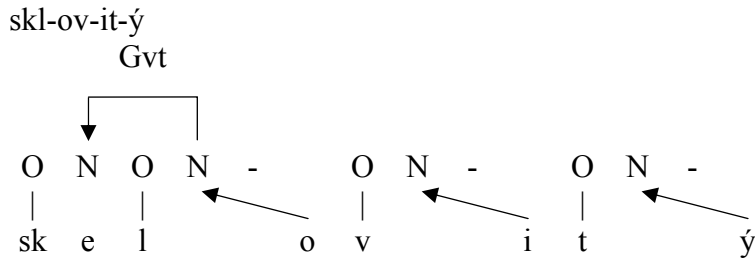
(39) government-based analysis

the distinction cannot be encoded in terms of association:

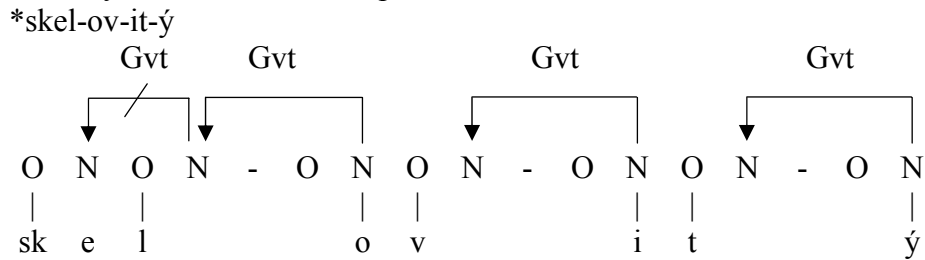
- a. the regular distinction between stable and alternating vowels is indeed in terms of association, cf. (21)c

Cz pes - ps-a	vs.	Cz les - les-a
O N O N		O N O N
p   e   s		l   e   s

- b. but stable suffix-initial vowels must also float because they necessarily end up in the final empty nucleus of the stem: they trigger the absence of the preceding root vowel. Government relations, however, are strictly local.



lexically associated *o* would produce a vocalised root:



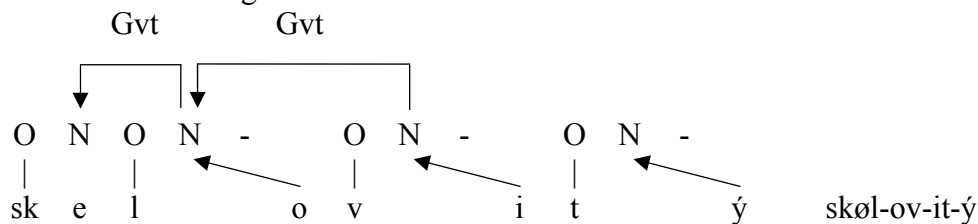
(40) solution proposed

- a. the stable/alternating distinction is a lexical property of  
 ==> the melody  
 of the vowel
- b. floating vowels fall into two groups
  - those that can associate to any nucleus ==> *-ov*
  - those that can associate only to ungoverned nuclei ==> *-ek*
 [Ziková 2008]

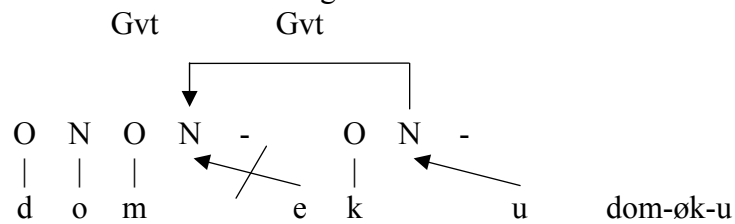


c. illustration

*-ov* associates to a governed nucleus



*-ek* cannot associate to a governed nucleus



(41) association is only a secondary effect of this basic distinction

- a. the contrast is visible in suffixes, cf. de effect shown
- b. it is invisible in roots:
  1. if the root-e is lexically specified for associating to governed nuclei  
 ==> it will behave like a stable vowel, i.e. as if it were lexically associated to its nucleus
  2. if the root-e is lexically specified for being unable to associate to governed nuclei  
 ==> it will behave like an alternating vowel



c. ==> the distinction proposed does not add anything to the grammar

1. it just expresses the difference between stable and alternating vowels in a different way.
2. this expression is just as general as the one that is based on lexical association:

(42) Association under Control

isn't the lexical specification of pieces of melody for their behaviour during computation outlandish?

==> no

- a. this is a logical possibility offered by autosegmental representations, which however was (almost) not exploited so far:  
all items of a representation including association lines (i.e. not just constituents and pieces of melody)
  - may have lexical properties
  - may be manipulated by phonological computation
- b. association of a piece of melody and a constituent may be under three kinds of control:  
[Ben Si Saïd et al. 2009]
  1. lexical - our example
  2. grammatical  
in Semitic languages, the gemination of the middle consonant of a triconsonantal root may be a morpheme:  
 $C_1VC_2VC_3$  - unmarked meaning  
 $C_1VC_2C_2VC_3$  - intensive/iterative meaning  
==>  $C_2$  receives an "order" to associate
  3. sociological  
French: liaison with and without enchaînement  
[Encrevé 1988, Encrevé & Scheer 2005]  
with enchaînement: j'avais [z] un rêve  
without enchaînement: j'avais [z | ?] un rêve

## 5. Conclusion

(43) conclusion

- a. a perspective on the Havlík-Lower parameter:
  - Havlík: non-cyclic application of Government
  - Lower: cyclic application of Government
- b. a perspective on cyclicity and a unified phase theory:
  - both syntactic and phonological phases are PIC-based
  - phase edge: both syntactic and phonological phases spell out their sister
  - following Halle & Vergnaud, affixes may or may not be interpretation-triggering
- c. consequence:  
association under (lexical) control

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