VOWEL-ZERO ALTERNATIONS IN SLAVIC: HAVLIK AND LOWER PATTERNS

(1) purpose
   a. to provide a survey of the workings of vowel-zero alternations
   b. to identify
      1. what's shared and
      2. what's different: loci of variation
   c. to show that Lower is a regressive lateral relation between two vowels
   d. to show that yers are not specifically Slavic
   e. to recall that insertion analyses ignore the facts today as much as in the 1980s

1. Common Slavic yers and modern alternating vowels

(2) CS yers and modern alternating vowels are entirely independent
   a. the loss of CS yers was the initial spark of vowel-zero alternations in Slavic languages, but
   b. it is neither true that they all modern vowels that alternate with zero go back to a CS yer,
   c. nor that all CS yers have produced modern alternating vowels
   d. ==> there can be no doubt that we are facing a phenomenon that is perfectly active in synchronic grammar
(3) non-etymological yers
   a. examples from Czech, where (at least) two rounds of epenthesis occurred (all dia-
      chronically epenthetic vowels alternate with zero in the modern language)
      
      | 1. epenthesis in Old Czech | 2. epenthesis in Modern Czech |
      | CS | Old Cz | gloss | CS | Old Cz | Mod. Cz | gloss |
      | ogn-ь | oheň | fire Nsg | vydr-ь | vydr | vyder | otter Gpl |
      | od- | od5(e)- | from | sestr-ь | sestr | sester | sister Gpl |
      | orz- | roz(e)- | separating, inchoative | stьbl-ь | stёbl | stёbel | blade Gpl |
      | bez- | bez(e)- | without | kриdl-ь | kриdl | kриdel | wing Gpl |

b. examples from Russian
   1. epenthesis of alternating vowels
      Kiparsky (1967:120f)
      
      | CS | Russian | gloss |
      | ogn-ь | ogón’ | ogn'-á | fire Nsg, Gsg |
      | оглъ | угол’ | ugl'-á | coal Nsg, Gsg |

   2. non-alternating > alternating vowel
      Kiparsky (1963:95)
      
      | ledъ | l’од | l’d-á | ice Nsg, Gsg |

(4) CS yer > stable vowel
   a. examples from Czech
      Trávníček (1935:48)
      
      | CS | Czech | gloss |
      | бьч-a | blech-a | flea Nsg |
      | бъзъ | bez | bez-u | elder (bot.) Nsg, Gsg |

b. examples from Russian
      Kiparsky (1963: 95f, 1967:117)
      
      | CS | Russian | gloss |
      | съть | sóт | sóт-a | honeycomb Nsg, Npl |
      | гъръть | ропот | ропот-a | murmur of discontent Nsg, Gsg |
      | търъть | topot | topot-a | tram of feet Nsg, Gsg |
alternating vowels in non-native vocabulary

a. the decision to break up a cluster by an epenthetic (and alternating) vowel or not is made upon the lexicalization of new vocabulary items, and this produces a random distribution of alternating vowels.

b. children that acquire their native tongue have no way to know whether the cluster of something that they hear as *swetr-a* "jumper Gsg" in Polish or *metr-o* "metro Nsg" in Czech will or will not break up until they have a chance to hear the word without the final vowel. Relevant mislexicalizations are indeed typical "mistakes" that are reported from children.

c. identical clusters are sometimes broken up by epenthesis, at other times remain untouched

<table>
<thead>
<tr>
<th>Czech</th>
<th>Polish</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>kart-a</em></td>
<td><em>karet</em></td>
</tr>
<tr>
<td><em>kvart-a</em></td>
<td><em>kvart</em></td>
</tr>
</tbody>
</table>

Polish

<table>
<thead>
<tr>
<th><em>tr</em></th>
<th><em>sweter</em></th>
<th><em>swetr-a</em></th>
<th><em>jumper</em> Nsg, Gsg</th>
</tr>
</thead>
<tbody>
<tr>
<td>filtr</td>
<td>filtr-a</td>
<td>filter Nsg, Gsg</td>
<td></td>
</tr>
</tbody>
</table>

d. alternating vowel borrowed?

1. sometimes such a vowel may be suspected

<table>
<thead>
<tr>
<th>pol.</th>
<th>sweter, puder &lt; engl. sweter, germ. Puder</th>
</tr>
</thead>
</table>

2. but at other times there is no vowel in the donor language that could have been borrowed:

<table>
<thead>
<tr>
<th>Czech</th>
<th>Polish</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>kart-a</em></td>
<td><em>karet</em></td>
</tr>
<tr>
<td><em>palm-a</em></td>
<td><em>palem</em></td>
</tr>
<tr>
<td><em>farm-a</em></td>
<td><em>farem</em></td>
</tr>
<tr>
<td><em>metr-o</em></td>
<td><em>metro</em></td>
</tr>
<tr>
<td><em>bistr-o</em></td>
<td><em>bister</em></td>
</tr>
<tr>
<td><em>makr-o</em></td>
<td><em>maker</em></td>
</tr>
</tbody>
</table>

(7) consequence: alternating vowels must be lexically distinct

a. analyses must be able to somehow distinguish "true" (i.e. stable) from "false" (i.e. alternating) vowels of the same quality.

b. this is true for all morphemes: alternating vowels freely occur across prefixes, roots and suffixes.
related question
are alternating vowels underlyingly absent and inserted, or present and deleted?
a. insertion-based analyses:
epenthesis occurs in order to break up "difficult" or ill-formes consonant clusters.
c. because no context for insertion can be stated (alternating vowels are unpredict-able...)
Polish (Rubach 2013: 1141)
1. st    oset    ost-u    thistle Nsg, Gsg
       most   most-u   bridge Nsg, Gsg
2. rk    korek    kork-a    cork Nsg, Gsg
       bark    bark-u   shoulder Nsg, Gsg
3. tr    sweter    swetr-a    sweater Nsg, Gsg
       Piotr  Piotr-a  Peter Nsg, Gsg
Russian
1. sk    láskok   lásk-a    weasel Gpl, Nsg
       lásk   lásk-a    caress Gpl, Nsg
2. br    bob'ór  bobr-á    beaver fur Gpl, Nsg
       bóbr  bobr-á    beaver Nsg, Gsg
d. also in languages where more than one vowel alternates with zero (Eastern Slavic),
speakers would not know which vowel to insert.
Russian
   e    d'én'   dn'-á    day Nsg, Gsg
   o    són    sn-á    dream Nsg, Gsg
(9) Russian
yer quality is not predictable from the consonantal environment (palatal vs. non-
palatal)
\[
\begin{array}{cccccc}
\text{ó} & \text{é} \\
\hline
\text{C} & \text{són} & \text{sn-á} & \text{vengérk-a} & \text{véngr} & \text{sleep} \ Nsg, \ Gsg; \ Hungarian \\
\text{woman, Hungarian} \\
\text{C'} & \text{l'ón} & \text{l'n-á} & \text{p'en'} & \text{pn'-a} & \text{linen} \ Nsg, \ Gsg; \ stump \ Nsg, \ Gsg \\
\text{___C} & \text{l'ód} & \text{l'd-á} & \text{chrebét} & \text{chrebít-á} & \text{ice} \ Nsg, \ Gsg; \ spine \ Nsg, \ Gsg \\
\text{___C'} & \text{oğön'} & \text{ogn'-á} & \text{seméj} & \text{semj-á} & \text{fire} \ Nsg, \ Gsg; \ family \ Gpl, \ Nsg \\
\end{array}
\]
(10) insertion keeps coming back
a. although the data and arguments are known: authors like Yearley (1995) and Gouskova (2012) either ignore the facts or acknowledge them but don't mind anyway. See the eloquent refutation of Gouskova (2012) by Rubach (2013).

b. Gouskova (2012: 83)
"In some cases, however, the presence of the underlined vowel is obligatory: without it the cluster would be unpronounceable":
- pk# chlópok - chlokp-e "cotton Nsg, Lsg" *chlópk
- tk# korótok - korotk-á "short, masc., fem" *korótk

c. she does not explain what "unpronounceable" means: there is no physiological, phonetic, muscular, psychological or other obstacle that would prevent Russians (or speakers of any other language for that matter) to pronounce -pk#, -tk#.

d. the fact that Russian does not happen to have word-final -pk#, -tk# (or other clusters for that matter) is irrelevant, since the vowel-zero alternation behaves exactly in the same way when the alternative word-final clusters do exist, see (8).
Cases like under (8) are ignored: there is no way to know in which word epenthesis occurs (/lásk/ → lášok) and which word ends up with a final cluster (/lásk/ → lášk).

e. the only thing that matters is whether or not the stem-final cluster accommodates a yer: the surfacing of the vowel is predictable from the context (Lower).

f. this simple statement covers all situations.
Not invoking it is missing an obvious generalization, and creates the illusion of multi-causality where a single mechanism is at work.

g. Gouskova (2012) believes that there are three different reasons why alternating vowels appear on the surface in Russian:
1. they stand in closed syllables /lask/ → lášok "weasel Gpl"
2. avoid an "unpronounceable" coda cluster /chlóp/ → chlópk "cotton Nsg"
3. every syllable must be headed by a vowel /sn/ → són "dream"

(11) property #2
distribution of vocalized and unvocalized alternation sites
a. first approximation:
<table>
<thead>
<tr>
<th>open syllable</th>
<th>closed syllable</th>
<th>gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>C__C-V</td>
<td>C__C-Ø</td>
<td></td>
</tr>
<tr>
<td>Russian</td>
<td>vojén-á</td>
<td>vojén-nij</td>
</tr>
<tr>
<td>Czech</td>
<td>lokot-é</td>
<td>loket-ní</td>
</tr>
<tr>
<td>Polish</td>
<td>wojén-a</td>
<td>wojen-ny</td>
</tr>
</tbody>
</table>

b. BUT: vowels also occur in open syllables (grey-shaded column)
Empirical generalization

Alternation sites are vocalized in open syllables iff the following vowel alternates with zero.

The yer context

Alternation sites show

\[
\begin{align*}
V & / \_ \{C.CV, C\#\} & & \text{in closed syllables} & \text{bul-ecz-k-a} \\
\_ & / \_ C\_ \_ & & \text{before yers} & \text{bul-ek} \\
\_ & / \_ CV & & \text{iff } V \neq \_ & \text{bul-ok-a}
\end{align*}
\]

Challenge

Disjunction

What do closed syllables and alternating vowels have in common?

3. Lower

Reducing the disjunction

a. is not possible by making reference to closed and open syllables
b. is possible by generalizing the other side of the disjunction:
   Alternation sites are vocalized iff they are followed by an alternating vowel
c. \(\Rightarrow\) this is the insight of Lower
   Lightner's (1965)
d. Lower
   \[1,\hat{i} \rightarrow e, o / \_ C_0 \{1,\hat{i}\}\]
   Where the two input symbols are two distinct vowels, called yers, which never appear
   on the surface as such (they are absolutely neutralized)

Consequence: abstract vowels

a. all consonant-final words are assumed to end in a yer. \(\text{/píšl/} \rightarrow \text{pes}\)
   These final yers are interpreted as case markers.
b. all consonant-initial suffixes are assumed to begin with \(\text{/lokít-íní/} \rightarrow \text{loket-ní}\)
   a yer
c. distribution of abstract vowels:
   1. after word-final consonants
   2. in places where vowels alternate with zero
(17) **cyclic application**
   a. Lower must apply following the morphological structure, i.e. inside-out
      [[[bul] ñk ñk- Conditional]
   b. /bul-ñk-ñk-ı/
      1. computation of bul nothing happens
      2. computation of bul-ñk nothing happens
      3. computation of bul-ñk-ñk Lower applies → bul-Ek-ñk
      4. computation of bul-ñk-ñk-ı Lower applies → bul-Ek-Ek-ı
      5. final yers are deleted
   d. non-cyclic version of Lower
      "the string is first scanned for the [alternating] segments; once these are identified, the change is implemented simultaneously" (Gussmann 1980:30)

4. **Autosegmental version of Lower**

(18) **underlying identity**
   a. recall that alternating vowels must be lexically distinct from non-alternating vowels of the same quality.
   b. linear solution: two vowels added to the inventory
      \( ñ ñ \)
      properties: high vowels
      [-tense] in order to distinguish them from other high vowels
      [+banana] would have had the same motivation.
       Except the reminiscence to Common Slavic yers, which were high vowels.

(19) autosegmental solution
    a. the distinction is structural, rather than melodic
    b. alternating vowels are floating pieces of melody
       Czech "elbow"
      a. lokøt-e Gsg    b. loket Nsg    c. loket-ı adjective
      \[
      \begin{array}{cccccccccc}
      x & x & x & x & x & x & x & x & x & x \\
      \end{array}
      \]
      \[
      \begin{array}{cccccccc}
      l & o & k & e & t & e & l & o & k & e & t & e & l & o & k & e & t & e & n & i \\
      \end{array}
      \]

(20) autosegmentalised Lower
    an x-slot is associated to a floating vowel if that vowel is followed by another floating vowel.

\[
\begin{array}{c}
\begin{array}{c}
\text{V} \\
\text{V} \quad / \quad \text{C}_0 \quad \text{V}
\end{array}
\end{array}
\]
advantages
   a. no need for extra vowels
   b. that are absolutely neutralized
   c. no need for invented properties such as [-tense]
   d. no need for a yer deletion rule: non-associated pieces of melody remain unpronounced
   e. no limitation of the number of alternating vowels
      Lightner's yers could produce only two distinct vowels that alternate with zero.
      But there are languages with three or more alternating vowels, e.g. Slovak (Rubach 1993: 139ff).

5. Lower, empty nuclei and government

Lower describes a lateral relation
   a. the only information which is needed in order to compute the phonetic value of alternation sites concerns the following vowel,
      1. which is either a yer (i.e. a floating piece of melody)  ==> vocalization
      2. or a non-yer (an associated piece of melody).  ==> non-vocalization
   b. basic insight of Lower:
      vowel-zero alternations are the result of a regressive (right-to-left) intervocalic relationship: the patient is the leftmost vowel, whose phonetic value is determined by its neighbor to the right.

Lower describes a lateral and regressive relationship between vowels

```
/\ p i s i Czech pes 'dog' Nsg
  ↓ vocalization
   ε
```

empty nuclei
   b. Spencer (1986) on Polish vowel-zero alternations
   c. Government Phonology
      Kaye et al. (1990), Kaye (1990a)
      1. empty nuclei were not invented by GP, but they are a trademark of that theory because it gave them a theoretical status with stable cross-linguistic properties.
      2. distribution of empty nuclei:
         - after the last consonant of consonant-final words
         - in places where vowels alternate with zero
      3. e.g. French la semaine "the week" may be pronounced [la səmən] or [la smən]

```
/\ Gov
  O N O N O N
  | | | |
  s m e n French la semaine [la smən]
```
d. **Government**  
Schwa is deleted under the influence of government, a lateral force which originates in the following vowel and is always regressive (right-to-left).

e. The distribution of empty nuclei in GP is exactly the one of abstract vowels (yers), cf. (16)c.

f. **Multigenesis**  
GP didn't know about Slavic, and Lighter, Rubach etc. wrote before GP was born.

(25) Alternating vowels are empty nuclei: Gussmann & Kaye (1993)  
Czech "elbow"

<table>
<thead>
<tr>
<th>a. lokt-e Gsg Gov</th>
<th>b. loket Nsg Gov</th>
<th>c. loket-ní adjective Gov Gov</th>
</tr>
</thead>
<tbody>
<tr>
<td>O N O N O N</td>
<td>O N O N O N</td>
<td>O N O N O N O N</td>
</tr>
<tr>
<td>l o k t e</td>
<td>l o k t</td>
<td>l o k t n i</td>
</tr>
<tr>
<td>e</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(26) Kaye & Gussmann (1993):  
Insertion and deletion at the same time

a. Deletion  
Empty nuclei are present lexically, but may be silenced (by government)

b. Insertion  
Empty nuclei acquire melody through epenthesis (in case they escape government)

c. Insertion of melody is impossible in languages where two distinct vowels alternate with zero (East Slavic): one would not know which vowel to insert.

(27) **Nuclei cum melody**

a. Lexical identity of alternating vowels  
Both nuclei and melody are present, but they are not associated.

b. **Government acts as an association-inhibitor**: floating melodies associate by default except when their nucleus is governed.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>x x</td>
<td>O N O N</td>
<td>O N O N</td>
</tr>
<tr>
<td>p e s e</td>
<td>p s</td>
<td>p e s</td>
</tr>
</tbody>
</table>
6. Lower vs. Havlík

(28) Lower vs. Havlík
in a sequence of alternating vowels,
   a. all alternating vowels in a row are vocalized $\implies$ Lower
      MoCz /domEčEk/ appears as domeček
      recall the grey-shaded column under (11)b
   b. every other alternating vowel vocalizes $\implies$ Havlík
      (counting from the right edge)

(29) Havlík's Law
   sound law discovered by Antonín Havlík (1889) for Old Czech
   a. in a sequence of consecutive yers in CS, every other yer appears in OCz, counting
      from the right edge.
   b. se psem ‘with the dog’
      \begin{align*}
      4 & 3 & 2 & 1 & 4 & 3 & 2 & 1 \\
      CS & sě pěš-ěmě & > & OCz & se pøs-emø
      \end{align*}

(30)
\begin{tabular}{|c|c|c|}
\hline
                      & open syllable & closed syllable \\
\hline
Czech Mod. Old      & a. zero C C V  & b. vowel/zero C C-yr C \\
                      & dom-ök-u      & dom-č-ek                 \\
                      & dom-čő-ek     & dom-ek                   \\
Polish Mod. Old     & pies-ök-a      & pies-ek                  \\
                      & pies-ek       & pies                   \\
                      & pos-ek        & pies-ök-a               \\
\hline
\end{tabular}

(31) Havlík outside of Slavic
   a. Moroccan Arabic (Kaye 1990b)
   b. German (e.g. Hall 1992, Noske 1993)
   c. French
      Scheer (2004:§469) and Schenker (1995:97) are explicit on the Slavic-French parallel.

(32) Lower must be directional
    Scheer & Ziková (2010)
   a. recall from (17) that Lower needs to be applied cyclically
   b. Havlík is simply the non-cyclic application of Lower (government)
   c. the Lower rule by itself is non-directional: it does not provide any indication
      whether a string should be computed from right to left, from left to right or in
      some other way.
      Rubach (1984:190)
   d. government is intrinsically directional: it applies from right to left.
   e. government also has the following restriction:
      only phonetically expressed nuclei are good governors.
(33) Havlík vs. Lower

a. Havlík
   computation of the string in one go
   
   \[
   \begin{array}{c}
   \text{Gvt} \quad \text{Gvt} \\
   O \quad O \quad O \quad O \quad O \quad O \quad O \quad O \\
   d \quad o \quad m \quad e \quad \varepsilon \quad e \quad k \\
   \downarrow \quad \downarrow \\
   \emptyset \quad e
   \end{array}
   \]

b. Lower
   cyclic computation
   1. inner cycle
   \[
   \begin{array}{c}
   \text{Gvt} \\
   O \quad O \quad O \quad O \quad O \\
   d \quad o \quad m \quad e \quad k \\
   \downarrow \\
   e
   \end{array}
   \]

2. outer cycle
   \[
   \begin{array}{c}
   \text{Gvt} \\
   O \quad O \quad O \quad O \quad O \\
   d \quad o \quad m \quad e \quad k \\
   \downarrow \\
   e
   \end{array}
   \]

(34) Havlík: more illustration

\[
\begin{array}{c}
\text{Gvt} \quad \text{Gvt} \quad \text{Gvt} \quad \text{Gvt} \quad \text{Gvt} \\
\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\
C \quad V \quad C \quad V \quad C \quad V \quad C \quad V \quad C \quad V \\
\end{array}
\]

\[
\begin{array}{c}
\text{etc.} \quad C \quad e \quad C \quad e \quad C \quad e \quad C \quad e \quad C \quad e \quad C \quad e \\
\downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\
\text{s} \quad \text{š} \quad \text{e} \quad \text{v} \quad \text{c} \quad \text{e} \quad \text{m} \quad \text{OCz} \quad \text{söšvocemö} \quad *\text{söšv-šće-ęmę} \\
p' \quad e \quad s \quad e \quad k \quad \text{Old Polish pøs-ek} \quad \text{"dog dim. Nsg"}
\end{array}
\]

7. Yers and Lower are not specifically Slavic

(35) classical view

a. yers are Common Slavic vowels and hence only exist in Slavic.

b. therefore vowel-zero alternations in Slavic have got nothing to do with vowel-zero
   alternations in other languages.

c. in linear approaches, alternating vowels were represented as idiosyncratic melodic
   items in the underlying vocalic inventory - a specific fact about Slavic.
(36) analysis has made yers unspectacular and common
   a. only Slavic languages have [–tense] yers, but all languages can have floating
      pieces of melody.
   b. Government-based analyses have gone one step further: the lateral relation
      embodied by Lower identifies as government, and word-final consonants are fol-
      lowed by an empty nucleus, rather than by a yer with morphological value.
   c. vowels that alternate with zero in modern Slavic languages are perfectly inde-
      pendent from the Common Slavic vowels that are known as yers (see section 1).
   d. the phenomena at hand are not specifically Slavic, but phonological in nature.

(37) the yer context
    "in closed syllables and before a vowel that alternates with zero"
   a. controls phenomena in Slavic beyond vwoel-zero alternations.
   b. controls alternations beyond Slavic.

(38) Western Slavic
    Scheer (2004:§428)

<table>
<thead>
<tr>
<th></th>
<th>open syllable</th>
<th>closed syllable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C__C-V</td>
<td>C__C-yer</td>
</tr>
<tr>
<td>a. Czech VV-V</td>
<td>žáb-a</td>
<td>žab</td>
</tr>
<tr>
<td></td>
<td>jmén-o</td>
<td>jmen</td>
</tr>
<tr>
<td>b. Czech o-ů</td>
<td>nož-e</td>
<td>nůž</td>
</tr>
<tr>
<td>c. Polish o-ó</td>
<td>krov-a</td>
<td>krov</td>
</tr>
<tr>
<td>d. Polish e-q</td>
<td>zeb-a</td>
<td>zeb</td>
</tr>
</tbody>
</table>

(39) French
    ATR alternations of mid vowels
    Scheer (2004:§437)

<table>
<thead>
<tr>
<th></th>
<th>open syllable</th>
<th>closed syllable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>_C#</td>
<td>_C.CV</td>
</tr>
<tr>
<td>c</td>
<td>fet</td>
<td>alεhtε</td>
</tr>
<tr>
<td>méτε</td>
<td>pεrdy</td>
<td>bεtεraav</td>
</tr>
<tr>
<td>sεAKε</td>
<td></td>
<td>sεAKεsεnεtε</td>
</tr>
<tr>
<td>o</td>
<td>kod</td>
<td>mokεri</td>
</tr>
<tr>
<td>rεz</td>
<td>nεmal</td>
<td>rεζεje</td>
</tr>
<tr>
<td>sοbε</td>
<td></td>
<td>sοbεsεnεtε</td>
</tr>
<tr>
<td>o</td>
<td>oβKεz</td>
<td>oβKεzεmε</td>
</tr>
<tr>
<td>οεvε</td>
<td>sοεfε</td>
<td>bεεvεri</td>
</tr>
<tr>
<td>sοεn</td>
<td>bεεvεri</td>
<td>sονεsε</td>
</tr>
</tbody>
</table>
(40) French
schwa - [ε] alternation
Scheer (2004:§439)
closed syllable | open syllable
εC# | εCœ | εCV | spelling
\begin{tabular}{llll}
moçxel & moçxelamâ & moçxelo̕ & je morcèле, morcèlement, nous morcelons, morceler \\
apel & apelâra & apâle & j'appelle, appellera, appellation \\
âsçxel & âsçxelamâ & âsçxelo̕ & j'ensorcèле, ensorcèlement, ensorceler \\
apel & apelâra & apâle & je harcèłe, harcèlement, harceler \\
añev & añevamâ & añâve & j'âchève, âchèvement, achever \\
señev & señevamâ & señâve & je sèvre, sèvrera, sevrer, sevrage
\end{tabular}

(41) German
distribution of [ŋ] and [ŋg] in monomorphemic environments
Scheer (2004:§482)
See also Dutch (Kager & Zonneveld 1986)
a. occurrence of [ŋ]

\begin{tabular}{llllll}
_# & [ ] & spelling & _C & [ ] & spelling & _œ & [ ] & spelling \\
laŋ & lang & ?aŋst & Angst & ?iŋœ & Inge \\
draŋ & Drang & pŋŋŋŋ & Pingpong & ?aŋœl & Angel \\
diŋ & Ding & heŋst & Hengst & ŋŋ & Finger \\
?eŋ & eng & ?aŋʃtʃœm & Angström & maŋœl & Mangel \\
kŋ & Ring & beŋt & Bengt & ŋŋœ & Hunger \\
\end{tabular}

b. occurrence of [ŋg]

\begin{tabular}{ll}
_V & [ ] & spelling \\
?ŋgoo & Ingo \\
tango & Tango \\
?aŋgiinaa & Angina \\
zïŋgulaa & Singular \\
?ŋŋgaaŋ & Ungarn \\
?eŋgeelj & evangelisch \\
?aŋgeelika & Angelika
\end{tabular}
References

Anderson, Stephen 1982. The analysis of French shwa: or, how to get something for nothing. Language 58: 534-573. WEB.
Kaye, Jonathan 1990a. 'Coda' licensing. Phonology 7: 301-330. WEB.


