Tone/ATR interactions in Slovenian

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Highlights:
- Slovenian contrasts High and Low tones on the unmarked \{a, e, i, o, u\}, with an epenthetic High tone on underlyingly toneless roots.
- The marked \{ɛ, ɔ, ʌ\} have a predictable Low tone, including an epenthetic Low on underlyingly toneless roots.
- Tone distinctions are allowed on \[ə\] only before \[ɾ\].
- Word-finally, tone on \{ɛ, ɔ, ʌ, ə\} is neutralized to High.
- We offer markedness constraints that penalize High tones on lax vowels and Low tones on marked vowels.
- Phonetic grounding for correlations between tone and vowel quality?

1. Unmarked vowels and their tones

1.1. The realization of tone and stress in Slovenian

Slovenian contrasts two tones, which we label Low and High. Each lexical word has exactly one tone (and one boundary tone, see below):

(1) 'pôt 'path'  'pôt 'sweat'
    'kila 'kilogram'  'kila 'hernia'
    'šaļisťa 'cup'  'šaļisťa 'joke' (dim.)

Most often, tones stay constant throughout nominal paradigms:

(2) NOM SG ko’rāk be’dāk
    GEN SG ko’rāk-a be’dāk-a
    INST PL ko’rāk-oma be’dāk-oma
    'step' 'fool'

In addition to the tone on the stressed syllable, the final syllable of the word has a boundary tone on it. The boundary tone is Low after High and vice versa (Jurgec forthcoming), contra older descriptions (Toporišič 2000, Herrity 2000, Lenček 1981).

(3) NOM SG ko’rāk be’dāk
    GEN SG ko’rāk-ā be’dāk-ā
    INST PL ko’rāk-omā be’dāk-omā
    'step' 'fool'

Stress is clearly marked by vowel reduction, both of the neutralizing and the non-neutralizing kinds (Jurgec 2005a, 2005b, 2006):

(4)

1.2. Well behaved vowels

The least marked vowels \{a, e, i, o, u\} have the widest distribution. They can appear with either tone anywhere a stressed vowel is allowed: on any syllable of the root or of the word.

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2. Tone/Stress patterns

With three numbers and six cases, Slovenian nominal paradigms have lots of highly productive morphology. These paradigms come in two flavors:

(6) Stress falls on the root throughout the paradigm  \[ \Rightarrow \text{tone is contrastive} \]

(7) Stress falls outside the root in some members of the paradigm  \[ \Rightarrow \text{tone is predictable} \]

We conclude that stress is predictable from tone. In the root has a tone in the UR, stress is attracted to it. If the root is toneless in the UR, a tone on a suffix can attract stress outside the root.

2.1. Underlyingly toneless roots

Less than 200 nouns have stress fall outside the root in some members of the nominal paradigm. In all of these roots, tone is predictable.

When the root has \{a, e, i, o, u\} in it, tone is High when the root is stressed, except for “slips” in the DAT SG and GEN PL:

A floating tone from a suffix would dock on the root:

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2.2. **Roots with underlying tone**

The vast majority of masculine nouns with a stressed \{a, e, i, o, u\} have fixed stress and tone throughout the paradigm:

(13) NOM SG  koˈɾák  beˈdàk
GEN SG  koˈɾák-a  beˈdàk-a
NOM PL  koˈɾák-i  beˈdàk-i
GEN PL  koˈɾák-ow  beˈdàk-ow or beˈdàk-ow

A tone on a suffix will end up unrealized, due to T:ΔPWd and NoFLOP:

(14) /bedàk+ á/  T:ΔPWd  NoFLOP  MAX(T)
  a.  'bedàk-a  *
  b.  beˈdàk-a  *
  c.  beˈdàk-a  *

The vast majority of neuter nouns have Low in the singular and High in the plural and dual:

(15) NOM SG  'mèst-o  kòpit-o
GEN SG  'mèst-a  kòpit-a
NOM PL  'mèst-a  kòpit-a
GEN PL  'mèst  kòpit

The feminines contrast High and Low paradigms, but the INST SG is usually High, and when stress is final, GEN PL is always High. The paradigms below represent the vast majority of feminine nouns:

(16) NOM SG  'slúʒb-á  'pàmet  maˈlín-a
GEN SG  'slúʒb-e  'pàmet-i  maˈlín-e
INST SG  'slúʒb-o  'pàmet-jo  maˈlín-o
NOM PL  'slúʒb-e  'pàmet-i  maˈlín-e
GEN PL  'slúʒp  'pàmet-i  maˈlín

Suffixes that have a floating tone trump lexical tone. The underlying Low on pàmet is replaced by the floating High of the INST SG due to MAX(float), which prefers the realization of floating tones (Wolf 2005):

(17) /pàmet+ jo H/  MAX(float)  IDENT(T)
  a.  'pàmet-jo  *
  b.  'pàmet-jo  *

Interestingly, floating tones dock onto the vowel that has the underlying tone. If we accept the NOM SG as the base f or assessing OO- faithfulness, then OO-IDENT(stress) can do the work:

(18) NOM SG  'pàmet  NOM SG  beˈdàk
INST SG  'pàmet-jo  GEN PL  beˈdàk-ow

(19) /pàmet+ jo H/  NoFLOP  OO-IDENT(stress)
  a.  'pàmet-jo  *
  b.  paˈmét-jo  *
There are other nouns that have tonally non-uniform paradigms. Most often, these nouns have a Low on most members of the paradigm, with the occasional “slip”. Many of them “slip” in the Ø-marked NOM SG when stress is final:

(20) NOM SG  'mif'  lúf
GEN SG  'mif'-i  lúf-i
INST SG  'mif'-jo  lúf-jo
NOM PL  'mif'-i  lúf-i
GEN PL  'mif'-i or 'mif'-i  lúf-i or lúf-i

'mouse'  'light'

So we see that most “slips” are with roots that have final stress, in the Ø-marked NOM SG (masculine) and the Ø-marked GEN PL (feminine). There are also “slips”, however, with overtly marked cases.

3. The misbehaving vowels

Tone is predictable on the more marked vowels of Slovenian: {e, a, u} and [ə] except before [r]. We now discuss them in turn.

3.1. The lax mid vowels

With underlyingly toneless roots, the epenthetic tone on [e] and [ə] is Low:

(21) NOM SG  gôr-a  zên-a
DAT SG  gôr-i  zên-i
GEN SG  gor-ê or gor-ê  zên-ê or zên-ê
NOM PL  gor-ê  zên-ê
GEN PL  gor-á or gor-á  zên-á or zên-á

'mountain'  'wife'

Recall that the epenthetic tone on [a, e, i, o, u] is High:

(22) NOM SG  'móf'
DAT SG  'môy-u

'husband'

Clearly, some markedness constraint prefers an epenthetic Low on [e] and [ə]. The phonetic grounding for the required markedness constraint is reasonable: Higher vowels correlate with higher perceived pitch, and –ATR correlates with lower vowels, so the combination is dispreferred. More formally: *H/[–ATR–low].

Correlations between high vowels and high pitch are not common, but a few cases include Fuzhou (Donohue, later today), Kotoko (Odden, afterwards).

We should note, however, that there might be a phonetic grounding for the opposite correlation between tone and ATR: Since higher $F_0$ causes higher $F_1$, High tones should correlate with lower vowels, as reported for Rengao (Yip 2002:32). Phonetically, it may be the case that Slovenian vowels are slightly lower with High tones, but this trend has only barely reached significance in Jurgec (2005a):

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In paradigms with fixed stress, which normally contrast High and Low tones, [e] and [ɔ] show up with predictable tone: Low tone on all members of the paradigm, except the NOM SG and GEN PL:

(25) NOM SG promět rép
GEN SG promět-a rép-a
NOM PL promět-i rép-i
GEN PL promět-ōw rép-ōw

('traffic' 'tail')

In a few nouns, [e] and [ɔ] can appear as the root's penult vowel, but the penult gets stressed only in the NOM SG. Again, [e] and [ɔ] show up with a Low tone:

(26) NOM SG uzkřík brčn
GEN SG uzkřík-a brčn-a
NOM PL uzkřík-i brčn-i
GEN PL uzkřík-ōw brčn-ōw

('cause' 'bronze')

Missing from the language are fixed stress paradigms with [e] or [ɔ] and a High tone throughout. We assume that such hypothetical inputs map onto the Low tone paradigms:

(27) NOM SG tělé měče
GEN SG tělé-t-a oťět-a
NOM PL tělé-t-a oťět-e
GEN PL tělé oťět-ōw

('calf' 'father')

A floating tone, however, causes [e] or [ɔ] to surface with a High tone:

(28) /promět-ōw H/ *H/[–ATR–lo] IDENT(T)
-- a. pro‘mět-ōw * *
 b. pro‘mět-ōw *!

With the Ø-marked NOM SG, the High tone can be attributed to two possible sources:

(29) A floating H on the NOM SG suffix
(30) A ban on Low tones word-finally, possibly due to contrast preservation

There are two reasons to believe that the second hypothesis is more satisfying:

(A) Diachronically, schwa is turning into [e], and then it acquires a Low tone. When this schwa is non-final in the NOM SG, it keeps its Low tone:

(31) NOM SG stěbár 'step'
GEN SG stěbr-á 'step-
NOM PL stěbr-i 'step-
GEN PL stěbr-ōw or stěbr-ōw 'pillar'

(B) Additionally, there are several dialects of Slovenian that ban Low tones from the final syllable, regardless of the vowel:

(32) NOM SG ko‘rak beďák (Kostanjevica dialect)
GEN SG ko‘rak-a beďák-a
INST PL ko‘rak-oma beďák-oma

('step' 'fool')

We conclude that the High tone in promět is most probably due to markedness, overriding the underlying tone, and not due to a floating High on the NOM SG.
Pitch is lowered and compressed word-finally, so tonal distinctions word-finally are bad. Formally, we propose the constraint *FINALLOW.

*FINALLOW is undominated in the Kostanjevica dialect. In the standard dialect, it’s only active with the marked vowels of the language:

\[
\begin{array}{|c|c|c|c|}
\hline
\text{NOM SG} & \text{br\'\=t} & \text{modr\'\=s} \\
\text{GEN SG} & \text{br\'\=t-a} & \text{modr\'\=s-a} \\
\text{NOM PL} & \text{br\'\=t-je} & \text{modr\'\=s-je} \\
\text{GEN PL} & \text{br\'\=t-ow or br\'\=t-ow} & \text{modr\'\=s-ow or modr\'\=s-ow} \\
\text{‘brother’} & \text{‘viper’} \\
\hline
\end{array}
\]

We assume that the High tone on [br\'\=t] is another case of a constraint against a Low tone on a final marked vowel (but it could also come from a floating High on the NOM SG). We conjoin *FINALLOW with *[+ATR +low]:

\[
\begin{array}{|c|c|c|c|}
\hline
\text{/br\'\=t/} & \text{*FINALLOW & *[+ATR +low]} & \text{*[+ATR +low]} & \text{IDENT(T)} \\
\hline
\text{a. br\'\=t} & * & * & * \\
\text{b. br\'\=t} & * & * & * \\
\hline
\end{array}
\]

3.2. The low tense vowel

The vowel we transcribe as [\=a] has an F1 that is higher that [e] and [o]'s, and lower than [a]'s. Its F2 is the same as [a]'s, and is intermediate between [e]'s and [o]'s. We conclude that it is a central low tense vowel.

The tone on [\=a] is predictable: it is always High. However, [\=a] is only allowed word finally, and non-finally, its correspondent [a] is always Low (with “slips”).

\[
\begin{array}{|c|c|c|}
\hline
\text{NOM SG} & \text{br\=t} & \text{modr\=s} \\
\text{GEN SG} & \text{br\=t-a} & \text{modr\=s-a} \\
\text{NOM PL} & \text{br\=t-je} & \text{modr\=s-je} \\
\text{GEN PL} & \text{br\=t-ow or br\=t-ow} & \text{modr\=s-ow or modr\=s-ow} \\
\text{‘brother’} & \text{‘viper’} \\
\hline
\end{array}
\]

We assume that the High tone on [br\=t] is another case of a constraint against a Low tone on a final marked vowel (but it could also come from a floating High on the NOM SG). We conjoin *FINALLOW with *[+ATR +low]:

\[
\begin{array}{|c|c|c|c|}
\hline
\text{/br\=t/} & \text{*FINALLOW & *[+ATR +low]} & \text{*[+ATR +low]} & \text{IDENT(T)} \\
\hline
\text{a. br\=t} & * & * & * \\
\text{b. br\=t} & * & * & * \\
\hline
\end{array}
\]

The tougher problem is getting an [a] to surface with a Low tone only if its UR correspondent is [\=a]. The problem is independent of one’s choice of serial or parallel derivations. First, we need a principle that bans [\=a] non-word-finally:

\[
\text{(37) LICENSE(\(\=a\)) must be word final or}
\]

\[
\lambda \rightarrow \text{[\-ATR] / \_ o} #
\]

Now, neutralizing the tone on a non-final [\=a] can be done opaquely, referring to [\=a], or transparently, referring to [\=a]. Neither option is fully satisfying:

Opaquely, we’ll need a constraint against a High tone on [\=a], but since [\=a] is [+ATR], it’s hard to see what the phonetic grounding would be.

\[
\text{(38) \quad *H/ [+ATR+low] (\?) or}
\]

\[
\lambda \rightarrow \hat{\=a} (\?)
\]

Transparently, we’ll need a constraint against a High tone on [a]. This is plausibly phonetically grounded, in the same way that *H/[\-ATR-low] is.

\[
\text{(39) \quad *H/[\-ATR] or}
\]

\[
a \rightarrow \hat{a} \text{ (but only if the } \lambda \rightarrow \text{ a rule applied on the same vowel)}
\]

The only problem with *H/[\-ATR] is that it’s not active anywhere else in the language: The epenthetic tone on [a] is High (as in /št\=var/ \(\rightarrow\) ['štv\=ar]), and tones contrast freely on [a].

In OT terms, *H/[\-ATR] must be conjoined with IDENT(ATR), so that only an [\=a] that has [\=a] as its input correspondent will be penalized (Łubowicz 2002).
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Recent innovations in the standard dialect include normally when no full vowel is available in the word: The tone on [ə] is predictable when not followed by [r].

When stressed and not followed by [r], the tone on [ə] is High. Note that [ə] is normally stressed only when no full vowel is available in the word:

Recent innovations in the standard dialect include a move to fixed stress paradigms, with speakers choosing either High or Low for the non-word-final schwas:

For the speakers who prefer the innovative (b) pattern, there is a constraint against High tones on [ə] (*H/ə ?). The phonetic grounding for such a preference is unclear…

When a schwa is needed next to an [r], it’s epenthesized before it, never after it, e.g.: /tu/ → [t’un], *[t’un] ’cape’.

Before [r], the tone on [ə] is contrastive, except word-finally:

What makes a Low tone bad on a final [ə]? Since [ə] probably lacks an ATR value, maybe it’s just that [ə] is a bad vowel:

How come tone is contrastive on [ə] only when followed by [r]?

If [ə] is realized lower before [r], then it’s more sonorous, and less liable to lose its tone. We haven’t done the necessary measurements, but we know that [r] makes preceding front vowels lax (Jurgec 2007).

Schwa is always epenthetic in actual lexical items (when underlying, it chain-shifts to e). Opaque, tonal contrasts are removed from obstructions, but kept on /tl/. When a schwa is epenthesized to break a cluster, the [r]’s tone is realized on the schwa.
4. Marked vowels in loanwords

Evidence for the markedness of High tones on {ɛ, ǝ} comes from loanword phonology, where these vowels are raised to fit the High tone:

(47) Native [+ATR] Native [-ATR] Foreign [+ATR]
    'ršk ˈ'hand' GEN.PL 'ršk 'deadline' 'ršk 'rock'
    'šs ˈ'wasp' GEN.PL 'šs ˈ'axis' 'šs ˈ'Oz'
    'métʃ ˈ'sword' 'métʃ ˈ'calF' GEN.PL 'métʃ ˈ'match'

Recall that in the native vocabulary, {ɛ, ǝ} surface with a Low tone (except finally), so a hypothetical /paˈtɛk-ǝ/ would come out Low:

(48) /paˈtɛk-ǝ/ IDENT(ATR) *H/−[ATR=lo] IDENT(T)
    a. paˈtɛk-ǝ ----------------- *!
    b. paˈtɛk-ǝ ----------------- *!
    c. paˈtɛk-ǝ ----------------- *!

In the loanword phonology, where only High tones are allowed (with a few exceptions), the vowel must change to fit the tone:

(49) /métʃ/ ΔPWd:H *H/−[ATR=lo] IDENT(ATR)
    a. 'métʃ' ----------------- *!
    b. 'métʃ' ----------------- *!
    c. 'métʃ' ----------------- *!
    d. 'métʃ' ----------------- *!

5. Conclusions

- Slovenian tones contrast on {a, e, i, o, u}, but not on {ɛ, ǝ, ʌ}. Tones contrast on ǝ only before [r].
- The markedness constraint *H/−[ATR=lo] causes unfaithfulness to tones in the native phonology and unfaithfulness to ATR in the loanword phonology.
- Word-finally, tone on {ɛ, ǝ, ʌ, ɔ} is neutralized to High.
- Constraints that cause neutralization medially: *H/−[ATR], *H/−[ATR]\& IDENT(ATR), and maybe *H/ɔ.
- High tones on medial {ɛ, ǝ, ʌ, ɔ} with certain overtly marked cases are attributed to floating tones, with a high ranking M\&AX(float).
- Constraints that cause neutralization word-finally:
  - *FINALLOW & [−ATR=lo]
  - *FINALLOW & [+ATR=lo]
  - *FINALLOW & ɔ
  - And in some non-standard dialects: *FINALLOW
- Puzzling conflicting evidence about the phonetic grounding for correlations between vowel quality and tone.

References


Tone/ATR interactions in Slovenian - 8 - Becker (michael@linguist.umass.edu) & Jurgec (peter.jurgec@hum.uit.no)