To foot or not to foot: a prosodic analysis of high vowel distribution in Québécois French (QF)

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High vowel distribution data I: stressed syllable, before stop or voiceless fricative (Walker 1984)

• pipe [pIp]	butte [bYt]	croupe [crUp]
• vite [vIt]	tube [tYb]	bouc [bUk]
• vide [vId]	plume [plYm]	pousse [pUs]
• vif [vIf]	lune [lYn]	boum [bUm]
*[vif]	*[lyn]	*[pus]

High vowel distribution II: stressed open syllable

lit [li]	vu [vy]	boue [bu]
*ll	*vY	*bU

High vowel distribution III: stressed syllable, before voiced continuant + cluster -vr

pire [pi:r]

muse [mY:z]

louve [lu:v]

(Voiced Continuant Lengthening)

High vowel distribution with respect to tenseness and length as function of syllable cut and position

Walker (1984), Déchaine (1991) and Poliquin (2006)

	Word-initial		**Word-medial**		**Word-final**	
	open	closed	open	closed	**open**	**closed**
Walker	T,L	T,L	T,L	T,L	**T**	**L,T:**
Déchaine	T,L	L	T,L	L	**T**	**L,T:**
Poliquin	T,L	n/a	T,L	n/a	**T**	**L,T:**

Derivational solutions

- **Final Closed Syllable Laxing, Voiced Continuant Lengthening**

(1) i, y, u => i:, y:, u: /_____ [+cont,+voice]
(2) i, y, u => I, Y, U /_____ all other consonants #

High vowels, underlyingly tense, undergo lengthening before voiced fricatives and laxing before all other consonants in word-final syllables. (Tense in final open syllables)

- **Laxing Harmony**
- **Optional Open Syllable Laxing**
- **Optional Closed Syllable Laxing**

(Dumas 1974b, 1976, 1981, Legaré 1978b, Reighard 1979, Walker 1984)

- Rule-based approach misses the following generalization:

  *+hi,-tense] ___ : insufficient rime

  +hi,+tense] ___ : sufficient rime

  +hi, -tense] ___C : sufficient rime

  * +hi, +tense] ___C : ?

		Front		Back	
		-round	+round	-round	+round
high	+tense	li	ly		tu
		*lit	*lyt		*tut
	-tense	*lI	*lY		*tU
		lit	lYt		tUt

This generalization is captured in Déchaine (1991) and Montreuil (2005):

- branching root node
- quantifying rime minimum via sonority number

Metrical solutions I: Déchaine (1991)

- "Metrical template"

  1) Primary & secondary stress: peripheral rimes are strong, medial are weak

  2) High vowels are underlyingly lax

  3) High vowels may be lengthened in word-initial and word-final positions (i.e. lengthening = tensing), or be devoiced and deleted in word-medial positions

  4) Weight Gain: obligatory for the final rime, exhaustively dominated by a (s)trong root node, and optional in initial rimes, non-exhaustively dominated by a (s)trong root node

  ```
    w          s
  |   \        |
  s    ( w)    s
  |     |      |\
  lY~y  na     tI  k
  ```

  5) Role of morphological boundary: stem-final lengthening via cyclical stress assignment

  amItié~ami|tié

  salYter~saly|ter

  dégUter~dégu|ter

Metrical solutions II: Montreuil (2005)

Sonority-to-Weight Principle: SWP

- Vowels: Son 3 Son 2 || Son 1

  low vowels mid-vowels high vowels

  \ / |

  Degree 2 Degree 1

High vowels in word-final open syllables increase their weight to that of Degree 2 vowels to meet the requirement of exceeding 1 as the total weight of the rime, and thus surface as tense

- Consonants: Son 4 || Son 3 Son 2 Son 1

  +vce, +cont -vce, +cont +vce, -cont -vce, -cont

  | \ | /

  Degree 1 Degree 0

Weight-by-Position: inherently weightless consonants in coda position increase their weight from Degree 0 to Degree 1

Current proposal for phonological weight distinctions in QF I: vowels

- Sonority scale for QF vowels

  Height non-high> i, I, y, Y, u, U: high vowels are set apart from mid and low

  Peripherality i, y, u > I, Y, U: a distinction is made between high tense and high lax

- Sonority-to-Weight encoding

low vowels mid-vowels || high vowels

\ / |

μ < μ

< μ = “a hypomora”; a relational notion, not a discreet number used for “adding” and “subtracting” moras; encodes weight “less than one mora”

- Incorporating length in the moraic representation of high vowels:

I=	<μ	“hypomoraic”
I:=	*<μμ	(largely unattested, is posited as structurally marked here)
i =	μ	“moraic”
i:=	μμ	“bimoraic”

- Underlying specification of QF high vowels: not specified for tenseness at the input (following Montreuil 2005)
- High vowels are hypomoraic per markedness, metrical requirements may override markedness and “promote” high vowels on the weight scale
- Weight Scale

  >μ >> μ >> *(>μμ) >> μμ,

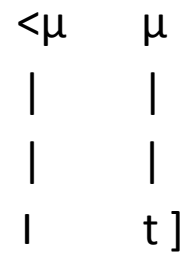
  (hypomora >> mora >> *hypermora >> bimora)
- On the surface:

  I >> i >> I: >> i:

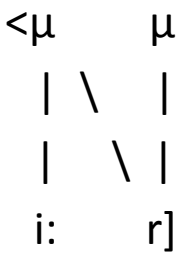
Current proposal for phonological weight distinctions in QF II: consonants

- Consonants are *amoraic*; WbP= coda licenses exactly one mora
- All consonants in coda position contribute weight to the total weight of the rime
- Voiced continuants participate in mora-sharing (cf Montreuil 1995), which manifests itself on the quality and length of the vowel, i.e. tense and lengthened

a.



b.



(where [i:] is bimoraic, as are all long vowels under this analysis)

Status of foot as prosodic constituent in French

A well-formed foot ≥ μ; the unmarked foot in French: **F=σ**

(Bullock 1998: the monosyllable functions as the MPW in French);

metrification = syllabification

‘pas’	‘charmant’	‘comparé’	‘comparaison’
F	F F	F F F	F F F F
|	| |	| | |	| | | |
bo	ʃar mã	kõ pa : re	kõ pa rɛ zõ

Summary of foot proposals for French

	FOOT TYPE	QS/QI	FOOT INVENTORY	ANALYSIS OF --
Selkirk 1978	(unbalanced) syllabic trochee	QI	σ, σ + schwa	Surface realizations of schwa
Scullen 1993	iamb	QS	H, LL, LH	Truncation, reduplication
Montreuil 2003	expanded syllabic trochee	QI	σ, σ + schwa, schwa+schwa	Surface realizations of schwa
Current proposal	**expanded moraic trochee**	**QS**	**σ, σ + hv, hv+hv** **(σ: here, any syllable headed by a non-high nucleus)**	**Distribution of high vowels (hv) in QF**

- Quantitative minima: syllable – >μ, foot – μ
- Final foot is the most prominent phonological position in the word: it must be optimal, which for French means that it does not branch (cf Bullock 1995)

a.
```
   *F
    |
   <μ
    |
*(C)i] => (C)I]
```
syllable: OK, (i.e. could be found word-internally in an unfooted syllable)
foot: too light (i.e. is disallowed in a word-final syllable, which is always dominated by a foot)

b.
```
   F       F
   |       |
  <μ       μ
   |       |
(C)i ] => (C)i]
```
licit foot: ≥ μ;
This rime is minimally monomoraic,
which makes it sufficient to support a foot

c.
```
   F          F
   |  \       |  \
  <μ  μ      <μ  μ
   |  |       |  |
(C)i  C ] => (C)I  C]
```
Once grammar assigns the hypomora to the high vowel and the mora to the coda via WbP, the rime has sufficient phonological material to support a foot, therefore the high vowel remains hypomoraic and surfaces as lax

Foot parameters and metrification algorithm

- +QS
- Left-headed

- Build monomoraic trochees iteratively right-to-left. The final foot is non-branching. A foot is constructed when sufficient prosodic material becomes available (i.e. one mora.)
- A hypomoraic (+hi head, no coda) rime is combined with the syllable to its left, the former constituting the weak branch of such moraic trochee
- If no syllable to the left is available, the insufficient rime may be left unfooted

(degenerate foot analysis is also possible, accomplishes the same objective)

Non-final syllables

Disyllabic words

- Speaker A: F(mi).F(tEn) initial syllable is footed, weight requirement is imposed => high vowel surfaces as monomoraic
- Speaker B: mI.(tEn) initial syllable is unfooted, no weight requirement to counter the inherent weight of high vowels, the hypomoraic vowel surfaces as lax
- p*i*.s*in* > p*i*.F(sIn) > F(psIn)/ p^{l}.F(sIn) : unfooted syllable can lose^ or devoice its nucleus if the phonotactics permit it; in some cases, moraic material is preserved: si.ta.sjõ > s~~i~~.ta.sjõ > s:ta.sjõ (Deletion is largely a medial syllable phenomenon)

Trisyllabic words I: V2 is +hi

- Speaker A: ka.p*i*.tEn > F(ka)F(pi)F(tEn)
- Speaker B: ka.p*i*.tEn > F($_{s}$ka.$_{w}$pI)F(tEn) medial syllable attaches itself to the syllable material to its left, thus meeting the minimum weight requirement: high vowel surfaces as hypomoraic per markedness. In addition, it is in a weak branch of the moraic trochee, it may become a target of deletion: F(ka.p~~*i*~~)F(tEn) > F(kap)F(tEn)^, or devoicing, given the necessary phonotactics: F($_{s}$ka.$_{w}$pI)F(tEn) > F($_{s}$ka.$_{w}$p^{l})F(tEn)

^ Unfooted material/Weak Branch Elimination to optimize foot structure? (Bullock 1998)

Trisyllabic words II: V1 is +hi

- Speaker A: tr*i*.ko.te > F(tri)F(ko)F(te)
- Speaker B: tr*i*.ko.te > tri F(ko)F(te) initial syllable is unfooted, the high vowel is specified as hypomoraic and lax, per markedness
- *F(tri.ko); metrification proceeds from right-to-left, a foot is constructed as soon as enough prosodic material is available, i.e. F(ko)

Trisyllabic words III: V1 and V2 are +hi

- Speaker A: tr*i*.b*y*.nal > F(tri)F(by)F(nal)
- Speaker B: tr*i*.b*y*.nal > F($_{s}$trI.$_{w}$bY)F(nal)

Tetra+ syllabic words :

- Speaker A: sa.ly.ta.tion > (sa)(ly)(ta)(sjõ)
- Speaker B: sa.ly.ta.tion > ($_{s}$sa.$_{w}$ly)(ta)(sjõ)

Problematic cases: “cas /d*i*f*ici*l/” all nuclei are high
/d*i*f*ici*l/ (Dumas 1981)
a. dIfIsIl b. difIsIl c. dIfisIl d. difisIl

/s*i*.m*i*.l*i*.t*y*d/ (Poliquin 2006)
a. [si.mi.li.tYd] (si)(mi)(li)(tYd)
b. [sI.mI.lI.tYd] sI(mI.lI)(tYd)
c. [sI.mi.li.tYd] sI(mi)(li)(tYd)
d. [si.mi.lI.tYd] sI*(mi.lI)(tYd) => e. is predicted under this analysis
e. *[sI.mI.li.tYd]

A possible solution: d. is a. that has undergone a late harmony rule?

Big picture: "High vowel processor"

Phonetics HEIGHT => SONORITY

||

Phonology WEIGHT (inherent)

||

POSITION (type of foot, position within foot)

||

WEIGHT (as function of position)

||

Phonetics SURFACE REALIZATION (lax/tense, devoiced, deleted)

- QF syllable rimes display sensitivity to weight
- Final syllable is phonologically prominent; the strongest prosodic position in the word
- Syllable weight is computed from the weight of all the components of the rime
- Phonological weight of segments is based on degrees of sonority, parametrized for QF, and length
- Vowels: non-high vowels are inherently more sonorous, and thus contribute a full mora (μ) to the total weight of the rime; high vowels are less sonorous, and are associated to reduced weight (<μ), per markedness. In the current analysis they are referred to as *hypomoraic*. Lengthened vowels, regardless of height, are bimoraic (μμ).
- Consonants, inherently amoraic, acquire weight via Weight-by-Position. Coda position licenses exactly one mora, consonants in this position contribute a mora to the total weight of the rime. QF voiced continuants, inherently more sonorous than the other consonants, are able to share their mora: mora-sharing by voiced continuants directly affects the quantitative status of the nucleus, thus determining both its quality in relation to tenseness on the one hand, and length on the other.
- High vowels associated to a full mora are phonetically realized as tense; hypomoraic high vowels, i.e. associated to reduced weight, are phonetically realized as lax; hypomoraic vowels participating in mora-sharing with a voiced continuant are realized as tense and lengthened (can also be viewed as tense and diphthongized, in a number of idiolects as lax and diphthongized, but never lax and lengthened).

To foot or not to foot?

To foot…