

# Laurentian French laxing harmony and the Activity Principle

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## 1: Overview

- A strong version of the Activity Principle (Dresher 2015, 2016) predicts that redundant features should not be phonologically active.
- Laurentian French appears to counterexemplify this: allophonic laxing of high vowels feeds a process of laxing harmony (Walker 1984; Poliquin 2006).
- However, an understanding of the French vowel system as a whole shows that the [±tense] contrast can plausibly be analyzed as including the high vowels in its scope.

## 2: The Activity Principle and the contrastive hierarchy

Dresher (2009, 2015, 2016) identifies two components of a contrast-based approach to phonological feature specifications: the Activity Principle and the contrastive hierarchy.

### 2.1 The Activity Principle

The Activity Principle is what gives contrastive specification predictive power.

- It posits that contrastive features are the ones “that are relevant to the phonological computation” (Dresher 2015: 1; Dresher 2016: 68).
- Hall (2007: 20) gives a version of this principle as the Contrastivist Hypothesis: “The phonological component of a language  $L$  operates only on those features which are necessary to distinguish the phonemes of  $L$  from one another.”
- The strongest version of this hypothesis predicts that redundant features should be entirely phonologically inactive, rather than being introduced during the course of the phonological computation (Halle 1959; Archangeli 1984) or parametrically visible or invisible to particular phonological rules (Nevins 2005).

### 2.2 The contrastive hierarchy

Organization of features into a contrastive hierarchy makes it possible to identify which features are (or may be) contrastive in a given system.

- In any inventory, there may be multiple ways of encoding the same phonemic contrast.
- In a contrastive hierarchy, features recursively subdivide the inventory until all contrasting segments have unique specifications; no feature is assigned unless it serves to mark some contrast (Dresher *et al.* 1994; Dresher 2009).

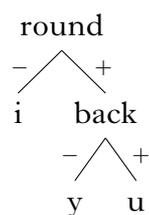
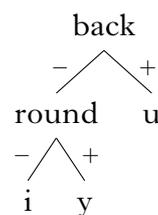
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## (1) Successive Division Algorithm (SDA; Dresher 2009: 16)

- a. Begin with *no* feature specifications: assume all sounds are allophones of a single undifferentiated phoneme.
- b. If the set is found to consist of more than one contrasting member, select a feature and divide the set into as many subsets as the feature allows for.
- c. Repeat step (b) in each subset: keep dividing up the inventory into sets, applying successive features in turn, until every set has only one member.

- Unlike pairwise comparison of segments (Archangeli 1988), the SDA reliably produces specifications sufficient to distinguish all members of the underlying inventory.
- While there may be cross-linguistic tendencies in the ordering of features (Dyck 1995; Clements 2009), the SDA itself does not stipulate the order of divisions.
- Two languages with superficially identical inventories may thus assign them different representations (with different consequences for their phonological patterning).
- E.g., there are two ways to specify the vowels /i y u/ using  $[\pm\text{round}]$  and  $[\pm\text{back}]$ :

(2) Two hierarchies for French high vowels (adapted from Burstynsky 1968: 11)<sup>1</sup>a.  $[\pm\text{round}] \gg [\pm\text{back}]$ b.  $[\pm\text{back}] \gg [\pm\text{round}]$ 

- In the case of the Laurentian French high vowels, Burstynsky (1968: 12–13) argues for (2b) on the grounds that it identifies front /i/ and /y/ as a natural class.

## (3) Assibilation of /t/ and /d/ before /i/ and /y/ (Burstynsky 1968: 13)

a. *j'ai dit* [ʒɛdzi]c. *petit* [p(ə)tsi]b. *du pain* [dʒypɛ̃]d. *têtu* [tɛtsy]

- The contrastive hierarchy restricts the number and combinations of features that can be assigned in any inventory, while still allowing for cross-linguistic variation.
- The Activity Principle predicts that non-contrastive features will be phonologically inactive, and allows us to use phonological activity to identify the relative scope of features in the hierarchy (Hall 2007: 57; Blaho 2008: 14–15; Dresher 2015).

## 3: Lax high vowels in Laurentian French

The French vowel inventory (Fig. 1) does not contrast tense and lax high vowels, but allophonic laxing can propagate from one high vowel to another.

1. Burstynsky uses the acoustic features  $[\pm\text{grave}]$  and  $[\pm\text{flat}]$  (*bémolisé*), following Jakobson *et al.* (1952), but also shows the same hierarchical organizations of the articulatory oppositions front–back (*antérieur–postérieur*) and rounded–spread (*arrondi–écarté*).

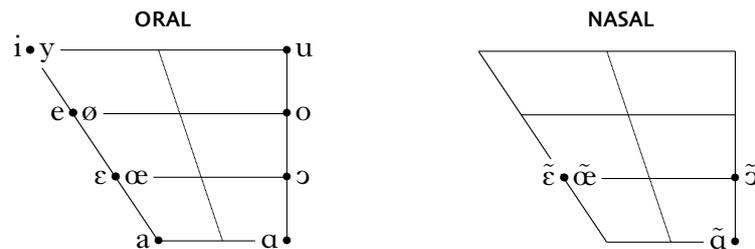


Figure 1: Vowel contrasts in French

### 3.1 Closed-syllable laxing

- High vowels are predictably lax in word-final syllables closed by consonants other than the voiced fricatives /v z ʒ ʁ/:
  - (4) No laxing in final open syllables (Poliquin 2006: 6)
 

a. <i>béni</i> [beni]	c. <i>dégoût</i> [degu]
b. <i>début</i> [deby]	d. <i>cru</i> [kʁy]
  - (5) Laxing in final syllables closed by a C other than /v z ʒ ʁ/ (Poliquin 2006: 6)
 

a. <i>élite</i> [elɛt]	c. <i>égoutte</i> [egot]
b. <i>annule</i> [anvɥ]	d. <i>arbuste</i> [aʁ.byst]
- If the coda of the final syllable contains only a voiced fricative, then a high vowel in the nucleus will be tense (and long):
  - (6) Final syllable closed by /v z ʒ ʁ/ (Walker 1984: 56; Poliquin 2006: 102)
 

a. <i>église</i> [egliz]	c. <i>écluse</i> [ekly:z]
b. <i>Vésuve</i> [vezy:v]	d. <i>sourd</i> [suʁ]
- Laxing is optional in non-final syllables closed by consonants other than /v z ʒ ʁ/:
  - (7) Optional laxing in closed non-final syllables (Poliquin 2006: 26)
 

a. <i>mystère</i> [mis.tɛʁ] ~ [mis.tɛ:ʁ]	d. <i>soûlerie</i> [sol.bi] ~ [sul.bi]
b. <i>binerie</i> [bin.bi] ~ [bin.bi]	e. <i>moucheté</i> [moʃ.te] ~ [muʃ.te]
c. <i>bustier</i> [bys.tsje] ~ [bys.tsje]	
- Laxing (apart from harmony and dissimilation, discussed below) does not apply in non-final open syllables or non-final syllables closed by /v z ʒ ʁ/:
  - (8) No laxing in open non-final syllables (Poliquin 2006: 7)
 

a. <i>mitaine</i> [mi.tɛn]	c. <i>jumelles</i> [ʒy.mɛl]	e. <i>bouton</i> [bu.tõ]
b. <i>guidons</i> [gi.dõ]	d. <i>culotte</i> [ky.lõt]	f. <i>coûter</i> [ku.te]
  - (9) No laxing in non-final syllables closed by voiced fricatives (Poliquin 2006: 177)
 

a. <i>Israël</i> [iz.ba.ɛl]	b. <i>fuselage</i> [fyz.la:ʒ]	c. <i>ouzbèque</i> [uz.bɛk]
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## 3.2 Laxing harmony

- Harmony optionally causes a high vowel in a non-final open syllable to be realized as lax when there is a lax high vowel in the final syllable:

(10) Harmonic laxing in non-final open syllables (Poliquin 2006: 7)

a. <i>minute</i>	[mi.nyɥ]	c. <i>stupid</i>	[stsy.pɪd]
b. <i>pourrite</i>	[pø.ʁit]	d. <i>choucroute</i>	[ʃø.kʁot]

- In a non-final syllable closed by a consonant other than a voiced fricative, high vowels optionally lax anyway, as in (7), so harmony is irrelevant.
- High vowels followed by a tautosyllabic voiced fricative are tense even when there is a lax high vowel in the final syllable, as in (11); cf. (10b).

(11) No harmonic laxing before tautosyllabic /v z ʒ ʁ/ (Poliquin 2006: 177)

<i>hirsute</i>	[iʁ.syt]
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- In words with multiple possible targets for harmony, Poliquin (2006) reports an interesting range of attested patterns. Harmony may:
  - target only the penultimate syllable (closest to the trigger);
  - target only the initial syllable;
  - target the penult and spread leftward to adjacent syllables; or
  - target the initial syllable and spread rightward to adjacent syllables
- There are thus three patterns of harmony observable in trisyllabic words like the ones in (12), plus the possibility of no harmony:

(12) Words with three high vowels (Poliquin 2006: 58–59)

	NO HARMONY	PENULT ONLY	INITIAL ONLY	ITERATIVE
a. <i>juridique</i>	[ʒy.ʁi.dzɪk]	[ʒy.ʁi.dzɪk]	[ʒy.ʁi.dzɪk]	[ʒy.ʁi.dzɪk]
b. <i>limousine</i>	[li.mu.zɪn]	[li.mø.zɪn]	[li.mu.zɪn]	[li.mø.zɪn]
c. <i>illumine</i>	[i.ly.mɪn]	[i.ly.mɪn]	[i.ly.mɪn]	[i.ly.mɪn]
d. <i>dissimule</i>	[dzi.si.myl]	[dzi.si.myl]	[dzi.si.myl]	[dzi.si.myl]

- Among speakers with iterative harmony, the difference between penult–left and initial–right propagation can be seen in words like *illégitime*, where a non-high vowel blocks spreading. Table 1 shows the interaction between parameters.

	NON-ITERATIVE	ITERATIVE
PENULT	[ʒy.ʁi.dzɪk]	[ʒy.ʁi.dzɪk]
	[i.le.ʒi.tsɪm]	[i.le.ʒi.tsɪm]
INITIAL	[ʒy.ʁi.dzɪk]	[ʒy.ʁi.dzɪk]
	[i.le.ʒi.tsɪm]	[i.le.ʒi.tsɪm]

**Table 1:** Cross-classification of harmony parameters in *juridique* and *illégitime* (Poliquin 2006)

### 3.3 Dissimilatory laxing

- In addition to harmony, Poliquin (2006: 97) describes optional dissimilatory laxing in disyllabic words with two underlyingly identical high vowels in open syllables:

- (13) Optional dissimilatory laxing (Poliquin 2006: 97)
- |                |                     |                  |                   |
|----------------|---------------------|------------------|-------------------|
| a. <i>midi</i> | [mi.dzi] ~ [mi.dzi] | c. <i>chimie</i> | [ʃi.mi] ~ [ʃi.mi] |
| b. <i>fini</i> | [fi.ni] ~ [fi.ni]   | d. <i>Zoulou</i> | [zo.lu] ~ [zu.lu] |
- (14) No dissimilatory laxing of non-identical vowels (Poliquin 2006: 131)
- |                 |         |                  |         |
|-----------------|---------|------------------|---------|
| a. <i>Julie</i> | [ʒy.li] | c. <i>ciguë</i>  | [si.gy] |
| b. <i>hibou</i> | [i.bu]  | d. <i>poulie</i> | [pu.li] |

### 3.4 Tensing

- Poliquin (2006) argues that tautosyllabic voiced fricatives must actively trigger tensing of high vowels, rather than merely inhibiting or failing to trigger laxing.
  - A high vowel in a non-final open syllable is (for some speakers) realized as lax before a high vowel in a final syllable closed by a voiced fricative:
- (15) Opaque interaction of harmony and tensing (Poliquin 2006: 107–108)
- |                   |           |                    |            |
|-------------------|-----------|--------------------|------------|
| a. <i>piqûre</i>  | [pi.ky:ʁ] | c. <i>humour</i>   | [y.mu:ʁ]   |
| b. <i>russise</i> | [ʁy.si:z] | d. <i>poussive</i> | [pɔ.si:rʋ] |
- (15) can't result from dissimilation, because the vowels are not underlyingly identical.
  - Poliquin (2006) analyzes (15) as resulting from an opaque rule ordering: final-syllable laxing feeds harmony, but is then undone by tensing (Table 2).<sup>2</sup>

U.R.	/ʁysiz/
Syllabification	ʁy.siz
Closed-Syllable Laxing	ʁy.siz
Harmony	ʁY.siz
Tensing	ʁY.siz
Lengthening	ʁY.si:z
S.F.	[ʁY.si:z]

**Table 2:** Derivation of *russise* (adapted from Poliquin 2006: 109)

## 4: Reconciling the two

- Laxness on Laurentian French high vowels is clearly phonologically active.
- Attempting to analyze closed-syllable laxing as spreading a contrastive feature from the coda consonant to the vowel (and potentially thence to other high vowels) won't work—we'd still need to deal with dissimilation.
- The Activity Principle predicts that if [ $\pm$ tense] on high vowels is active, it must be contrastive.

2. Harmony is more transparent in such words for speakers who realize the lengthened vowels as diphthongs [ri yy ou] containing a lax component; see Poliquin (2006: ch. 3, §2.3) for discussion.

#### 4.1 A contrast within the high vowels?

- The simplest way to argue for contrastive [ $\pm$ tense] would be to find evidence of an underlying contrast between tense /i y u/ and lax /ɪ ʏ ʊ/.
- Loanwords can have tense high vowels in final closed syllables (Walker 1984: 59):<sup>3</sup>

(16) Tense high vowels in English loanwords (Walker 1984: 59)

LOANWORD		NATIVE ANALOGUE	
a.	<i>mean</i> [min]	<i>mine</i> [min]	
b.	<i>boom</i> [bum]	<i>boum</i> [bom]	
c.	<i>jeans</i> [dʒin]	<i>fine</i> [fin]	
d.	<i>suit</i> [sut]	<i>route</i> [ʁot]	

- However, Walker further observes that many such words either fluctuate between tense and lax in Laurentian French or are consistently realized with lax vowels.
- It therefore seems more plausible that the loanwords in (16) are either not treated as French words at all, or are marked as exceptions to laxing.

#### 4.2 A contrast with wider scope

- But /i y u/ need not contrast with /ɪ ʏ ʊ/ in order to be specified for [ $\pm$ tense]—if the feature takes wide enough scope, they need only contrast with *some* lax vowel(s).
- A tense–lax contrast exists in the mid vowels, though it is neutralized in some contexts and has a low functional load (Walker 1984: §2.1.3; Poliquin 2006: 4).
- Front unrounded /e/–/ɛ/ contrast in stressed (i.e., word-final) open syllables, and the rounded pairs /ø/–/œ/ and /o/–/ɔ/ contrast in stressed closed syllables:

(17) Tense–lax contrasts in the mid vowels (Walker 1984: 23)

a.	<i>fee</i> [fe]	<i>fait</i> [fɛ]	
b.	<i>jeune</i> [ʒœn]	<i>seul</i> [sœl]	
c.	<i>rôle</i> [ʁol]	<i>colle</i> [kol]	

- Elsewhere, the distribution of tense and lax mid vowels is largely governed by the “*loi de position*,” such that lax vowels occur almost exclusively in closed syllables and tense vowels almost exclusively in open ones.<sup>4</sup>
- Exceptions to the *loi de position* arise in morphologically derived words:

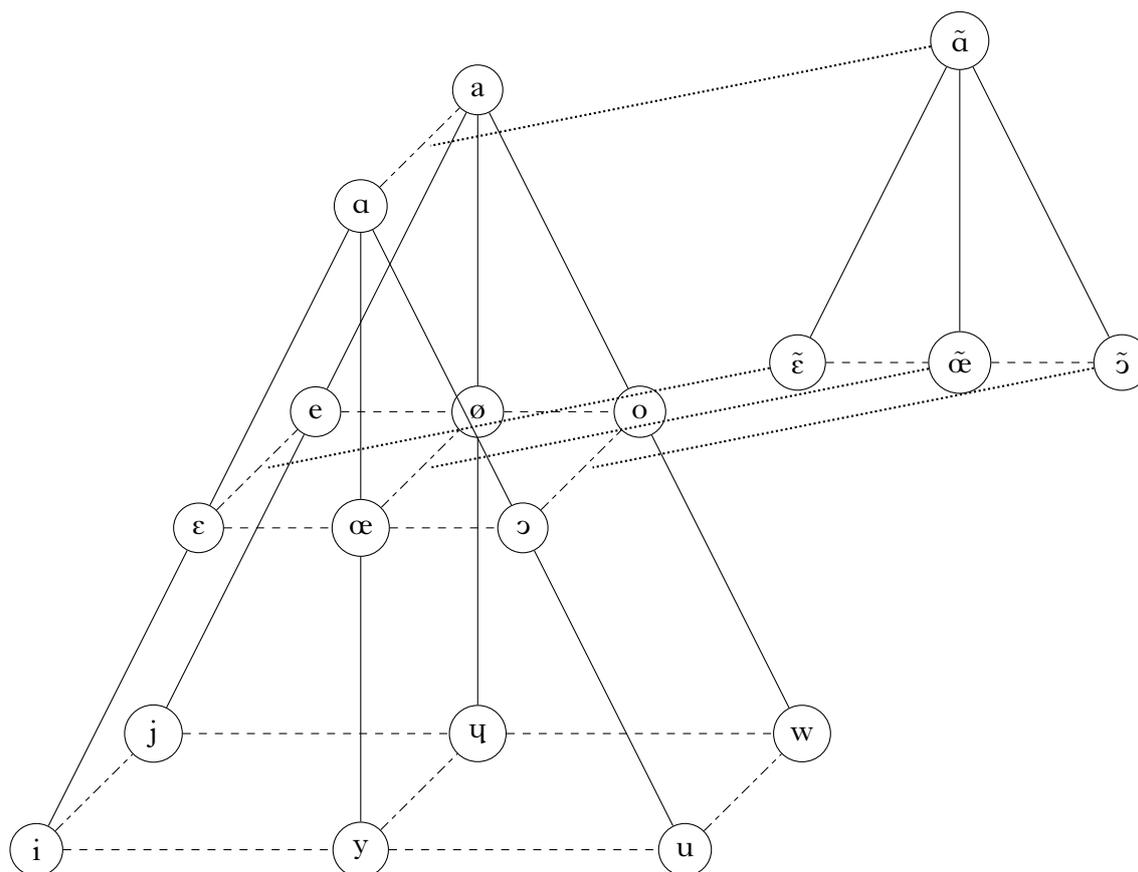
(18) Contrasting non-final tense and lax mid vowels (Walker 1984: 22–23)

a.	<i>beauté</i> [bote]	< <i>beau</i> [bo]
b.	<i>botté</i> [bɔte]	< <i>botte</i> [bɔt]

3. Walker (1984: 60) also mentions *quiz* [kwɪz] as an example of a loanword with a lax high vowel where the native pattern would tense (and lengthen) the vowel before /z/.

4. See also Lamontagne (2014) for a recent variationist study on the effects of the *loi de position* and other factors on the realization of the contrast between /e/ and /ɛ/.

- Burstynsky (1968) ignores this contrast. Laurentian French, in his analysis, differs from Standard European French in that its *loi de position* applies to high vowels as well as mid ones.
- Jakobson & Lotz (1949), on the other hand, treat the tense–lax distinction as pervasive in the phonological system of Standard French.
- They identify the contrast between /ε œ ɔ/ and /e ø o/ with the opposition between voiceless (fortis) and voiced (lenis) consonants, and, as Fig. 2 shows, with the contrast between high vowels and glides and the contrast between /ɑ/ and /a/.<sup>5</sup>



**Figure 2:** Contrasts in the French vowel system, adapted from Jakobson & Lotz (1949: 157)

- Jakobson & Lotz (1949) do not give any phonological rationale for characterizing the opposition between the low vowels /ɑ/ and /a/ as a tense–lax contrast rather than a place (or grave–acute) contrast analogous to the opposition between /o/ and /ø/.
- However, one possible motivation can be found in the fact that the /ɑ/–/a/ contrast, though more robust in Laurentian French than in Standard European French, is subject to a form of neutralization similar to the *loi de position* (Walker 1984: §3.6).

5. For Jakobson & Lotz (1949), the more open vowels /ε œ ɔ/ are ‘tense’ and /e ø o/ are ‘lax’.

- /ɑ/ and /a/ contrast in closed or non-final syllables, but neutralize to [ɑ] in open final syllables:

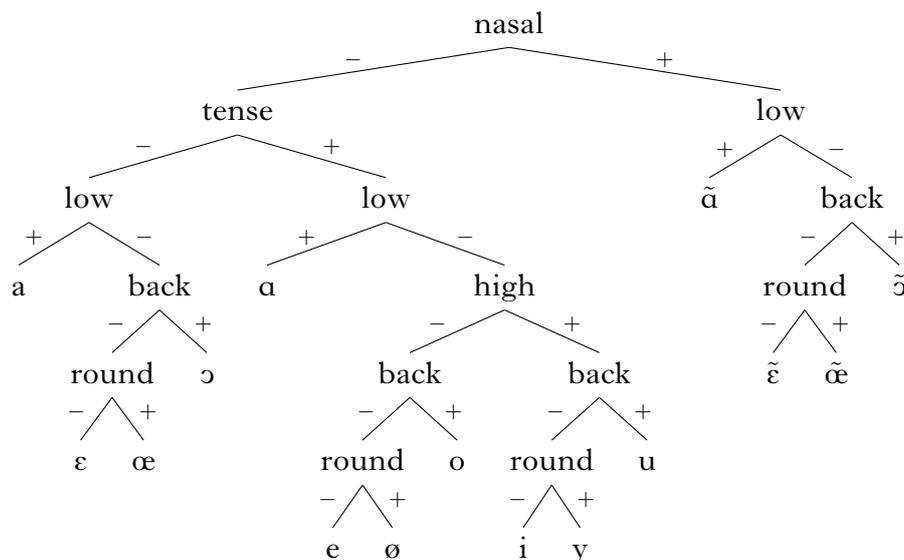
(19) Neutralization of the /ɑ/-/a/ contrast in open final syllables (Walker 1984: 78)

CLOSED FINAL		OPEN FINAL	
a. <i>chatte</i>	[ʃat]	<i>chat</i>	[ʃɑ]
b. <i>basse</i>	[bas]	<i>bas</i>	[bɑ]
c. <i>plate</i>	[plat]	<i>plat</i>	[plɑ]
OPEN NON-FINAL		OPEN FINAL	
d. <i>entasser</i>	[ɑ̃.ta.se]	<i>tas</i>	[ta]
e. <i>sénateur</i>	[se.na.tœʁ]	<i>sénat</i>	[se.nɑ]
f. <i>tabagie</i>	[ta.ba.ʒi]	<i>tabac</i>	[ta.ba]

- If the /ɑ/-/a/ contrast is marked by [ $\pm$ tense], then the alternations in (19), the *loi de position*, and high vowel laxing are all broadly similar if not fully unifiable.

### 4.3 A contrastive hierarchy for Laurentian French vowels

- Given that [ $\pm$ tense] is contrastive among the oral vowels, it will be contrastively specified on /i y u/ if it is given scope over [ $\pm$ high]. I propose the hierarchy in Fig. 3.<sup>6</sup>



**Figure 3:** Proposed contrastive feature hierarchy for French vowels

[ $\pm$ tense]  $\gg$  [ $\pm$ high]: high vowels are specified for [+tense]

[ $\pm$ back]  $\gg$  [ $\pm$ round]: front vowels are a class (as argued by Burstynsky 1968; see (3))

[ $\pm$ nasal]  $\gg$  [ $\pm$ tense]: nasalization neutralizes tense–lax contrasts (Jakobson & Lotz)

- Other orderings in Fig. 3 are more speculative, but are included for concreteness.

6. I omit the length contrast between / $\epsilon$ / and / $\epsilon$ :/ here (on which see Walker 1984: §3.1), on the assumption that length is represented suprasegmentally rather than featurally. Also set aside here is the question of whether schwa should be regarded as a separate phoneme, rather than identified with / $\text{œ}$ / or represented as a melodically empty vowel slot.

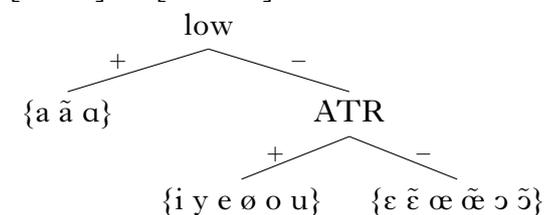
- The specification of [+tense] on the high vowels means that the laxing patterns in §3 can be generated without abandoning the Activity Principle:
  - A rule of closed-syllable laxing can change [+high] vowels from [+tense] to [–tense].
  - A rule of dissimilatory laxing can change a [+high] vowel from [+tense] to [–tense] if it is followed by an identical vowel in the next syllable.
  - Laxing harmony can copy [–tense] from one [+high] vowel to another.
  - Making a [+high] vowel [–tense] does not cause it to become featurally identical to any of the [–tense] vowels in the underlying inventory, none of which are [+high].

#### 4.4 Feature valency and coalescence

- St-Amand (2012) independently argues for giving the tense–lax contrast wide scope, as part of her account of coalescence in hiatus resolution.
- However, St-Amand (2012) also argues that the features involved must be privative.
- The laxing facts imply binary [ $\pm$ tense]:
  - If the relevant feature were privative TENSE, then closed-syllable laxing would delete it, and harmony would need to copy the *absence* of a feature.<sup>7</sup>
  - If the feature were privative LAX, it would be underlyingly absent on high vowels, which would make it hard to motivate dissimilatory laxing (§3.3) as an OCP effect (and would require harmony to spread an inserted feature).
- Can St-Amand’s (2012) analysis of coalescence be made to work with binary features?
- Her argument for privative features hinges on the coalescence of /a/ and /e/ to [ε].
- The generalization to be maintained is that coalescence produces a single segment whose features are a subset of the union of the features of the two source segments.
- Under St-Amand’s (2012) assumptions about features, either ordering of binary [ $\pm$ ATR] and [ $\pm$ low] assigns /ε/ some feature that is not found on either /a/ or /e/:

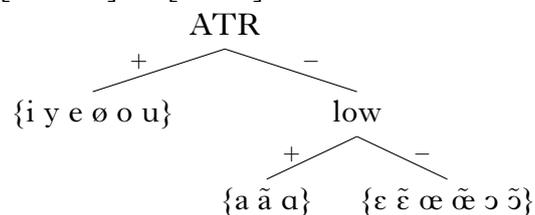
(20) Ordering binary [ $\pm$ low] and [ $\pm$ ATR] (St-Amand 2012: 69)

a. [ $\pm$ low]  $\gg$  [ $\pm$ ATR]



	low	ATR
/a/	+	–
/e/	–	+
/ε/	–	–

b. [ $\pm$ ATR]  $\gg$  [ $\pm$ low]



	low	ATR
/a/	+	–
/e/	–	+
/ε/	–	–

7. Gauthier’s (2013) Government Phonology analysis does something like this, treating laxing as deletion of an element  $\mathbb{F}^+$ , but Gauthier does not deal with all the non-local harmony effects discussed by Poliquin.

- In (20a), /a/ is unspecified for  $[\pm\text{ATR}]$ , so there is no source for  $[-\text{ATR}]$  on  $[\varepsilon]$ .
- In (20b), /e/ is unspecified for  $[\pm\text{low}]$ , so there is no source for  $[-\text{low}]$  on  $[\varepsilon]$ .
- The hierarchy in Fig. 3 avoids this problem by following Jakobson & Lotz (1949) in treating the contrast between /a/ and /a/ as a tense–lax contrast rather than a place contrast.
- This makes it possible to say that coalescence of /a/ and /e/ produces  $[\varepsilon]$  through deletion of conflicting feature specifications and retention of non-conflicting ones:<sup>8</sup>

(21) Coalescence of /a/ and /e/ with specifications as in Fig. 3

/a/	+	/e/	→	[ε]
–nasal		–nasal		–nasal
–tense		<del>+tense</del>		–tense
<del>+low</del>		–low		–low
		–high		(–high)
		–back		–back
		–round		–round

## 5: Conclusions

- The contrastive hierarchy in Fig. 3 makes it possible to say that  $[\pm\text{tense}]$  is phonologically active on high vowels without abandoning the Activity Principle: Poliquin’s (2006) account of harmony does not require a non-contrastive feature to be phonologically active.
- The hierarchy is also consistent with attested patterns of assibilation (Burstynsky 1968) and coalescence (St-Amand 2012).
- Incorporating Jakobson & Lotz’s (1949) proposal that the /a/–/a/ opposition is a tense–lax contrast removes St-Amand’s (2012) objection to binary features.

8. Retaining  $[-\text{high}]$  from /e/ would give  $[\varepsilon]$  arising from coalescence a feature not present on underlying /ε/, but consistent with its normal realization. It therefore makes no difference whether  $[-\text{high}]$  is kept or deleted in (21).

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