Christopher Spahr
University of Toronto
christopher.spahr@mail.utoronto.ca

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Confronting the European Portuguese low vowel distinction

1 Introduction

- European Portuguese shows an apparent contrast between [a] and [ɐ] in an extremely limited morphological environment
- I present an account in which /a/-raising is blocked when the vowel is associated with two skeletal V-slots, the second of which is attributed by the past tense morpheme, which is commonly assumed to be null
- This provides a succinct account of the phenomenon, which fits in cleanly with Carvalho's (2004) independently motivated templatic analysis of Portuguese verb morphology

1.1 The vowel system

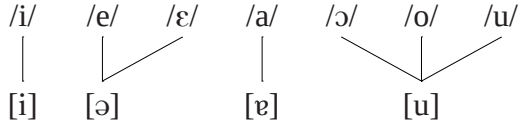
Stressed position in Portuguese contrast seven oral vowels:

(1)

	front	back
high	i	u
upper mid	e	o
lower mid	ɛ	ɔ
low	a	

Unstressed positions several-to-one phonological vowel reduction:

(2) European Portuguese unstressed vowel reduction (Carvalho 2011)



Note that phonological vowel reduction does *not* affect /a/; there is no vowel with which /a/ loses its contrast in unstressed position.

However, /a/ *does* undergo allophonic **/a/-raising** in two positions:

/a/ surfaces as a raised allophone [ɐ] in two environments:

(3) a. In unstressed position
b. In stressed position before nasals and palatals

1.2 The problem

In some dialects of European Portuguese, [a] and [ɐ] appear to be in contrast with each other in stressed position.

However, this contrast only occurs in an extremely limited morphological context, namely between the first person plural present and past perfect indicative forms of verbs:

(4) a. *falamos* [fɐlɐ́muʃ] 'we speak'
b. *falámos* [fɐlámuʃ] 'we spoke'

Redenbarger (1981) notes that some authors have posited two separate phonemes /a/ and /ɐ/ in order to account for this distinction. But given the extremely limited morphological context in which it exists, such an approach seems almost absurd.

Carvalho (2004:14, fn. 2) explicitly sets the phenomenon aside in his otherwise very insightful analysis of Portuguese verb (morpho)phonology.

> I shall leave aside the /ɐ/ ∼ /a/ opposition that exists only before heterosyllabic nasals in central [European Portuguese] for a particular morphological purpose: *matamos* 'we kill' / *matámos* 'we killed'.

The analysis that Carvalho (2004) implies, however, would require positing a non-structure preserving morphophonological rule, given that [ɐ] is merely allophonic.

2 The Portuguese verb

2.1 Morphological structure

Most descriptions of Portuguese verbal morphology (e.g., Mateus and d'Andrade 2000) assume the concatenation of a root, a theme vowel /a, e, i/, a tense–aspect–mood suffix, and a person–number suffix:

(5)
Verb Stem						
[Root	+	Theme V]	+	TAM Suffix	+	PN Suffix

Both the present indicative and the past perfect indicative are said to have null tense–aspect–mood suffixes, but are instead expressed with unique sets of person–number suffixes.

However, the first person plural suffixes for the two tenses are homophonous:

(6) Present indicative person–number suffixes (Mateus and d'Andrade 2000:74)

1st sing.	/o/	1st plur.	**/mos/**
2nd sing.	/s/	2nd plur.	(none)
3rd sing.	ø	3rd plur.	/N/ (nasal autosegment)

(7) Past perfect indicative person–number suffixes (Mateus and d'Andrade 2000:77)

1st sing.	/i/	1st plur.	**/mos/**
2nd sing.	/ste/	2nd plur.	(none)
3rd sing.	/u/	3rd plur.	/raN/ (nasal autosegment)

This leads Mateus and d'Andrade to posit identical underlying forms for the first person plural of the two tenses.

Nonetheless, they transcribe the distinction in the stressed vowel, with no explanation:

(8) Identical underlying forms (Mateus and d'Andrade 2000:74, 77)

a. /fal+a]$_{\text{St}}$mos/ [fɐlémuʃ] 'we speak'
b. /fal+a]$_{\text{St}}$mos/ [fɐlámuʃ] 'we spoke'

2.2 CV templates

Carvalho (2004) presents a templatic analysis of Portuguese verb morphology using a separate CV tier. In this system, certain morphemes can lack skeletal positions:

(9) Morphemes lacking skeletal positions (Carvalho 2004:24)

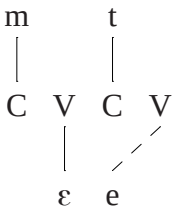
a. The thematic vowels *a, e, i.*
b. The 1st person suffix *o,* and the subjunctive affixes *e, a.*

All verb stems must contain an empty V-slot on their right edge.

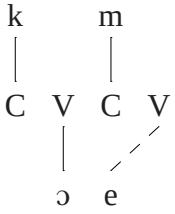
Unlinked vowels associate by convention from right to left with the CV tier:

(10) Association of theme vowel melody (Carvalho 2004:24, adapted)

a. *mete* [mét^{ə}]



b. *come* [kóm^{ə}]

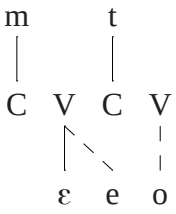


Carvalho's (2004) approach is independently motivated because it provides a superior account of stem vowel alternations to Wetzels's (1995) "deletion-cum-spreading" approach.

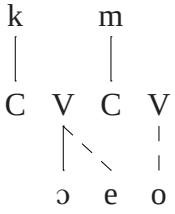
Certain stem vowels undergo tensing when CV-less person–number morphemes are used, because the tense theme vowel is forced to associate with a non-final V-slot:

(11) Stem vowel harmony (Carvalho 2004:24, adapted)

a. *meto* [mét^{u}]



b. *como* [kóm^{u}]



3 My proposal

3.1 “Crasis” as V-coalescence

There is a phenomenon in Portuguese known as “crasis” (Portuguese *crase*).

When two unstressed /a/s come together across a word boundary, they can be realized as a single [a], rather than as two [ɐ]s as they would be in isolation due to vowel raising.

In other words, unstressed /a/-raising is blocked:

(12) Crasis (Carvalho 2011:6, adapted)

a. VR: /a/ → [ɐ] in unstressed syllables

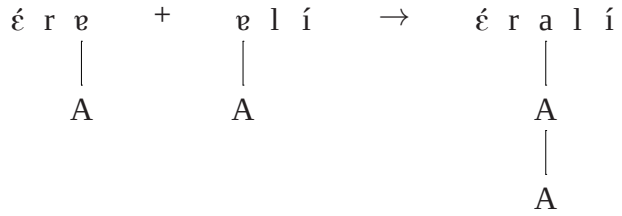
b. Crasis:

[ɐ] + [ɐˈmigɐ] → [aˈmigɐ]	*a amiga*	‘the friend’ (fem.)
[ˈkazɐ] + [ɐˈzu̯ɬ] → [ˈkazaˈzu̯ɬ]	*casa azul*	‘blue house’
[ˈpagɐ] + [ɐˈkõⁿtɐ] → [ˈpagaˈkõⁿtɐ]	*paga a conta*	‘pay the bill!’
[ˈɛrɐ] + [ɐˈli] → [ˈɛraˈli]	*era ali*	‘it was there’

Carvalho (2011) suggests that in an element-based system of representations, this can be accounted for by the coalescence of two sonority elements A.

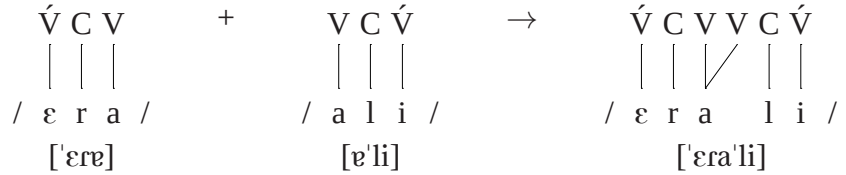
If [a] = { A, A } and [ɐ] = { A }, then:

(13) Illustration of Carvalho’s (2011) analysis of crasis



I propose instead that crasis is the coalescence of two V timing slots:

(14)



This is preferable for three reasons:

- If we think of elements as equivalent to contrastive features, then (13) involves phonological rules acting on contrastive features of non-contrastive [ɐ]. Timing units avoid this problem.
- It is widely observed that segments associated with multiple timing slots, such as geminates and long vowels, are not affected by segment-altering processes (Hayes 1986).
- It is phonetically natural. Barnes (2006) shows that allophonic vowel height of unstressed low vowels in Russian are directly correlated with their duration, and here V slots represent duration.

3.2 The past tense morpheme

Recall that Carvalho (2004), relegates the [a]—[ɐ] distinction to a (non-structure preserving) morphological rule.

Like Mateus and d'Andrade (2000), he assumes a null tense–aspect–mood morpheme for the present and past perfect indicative.

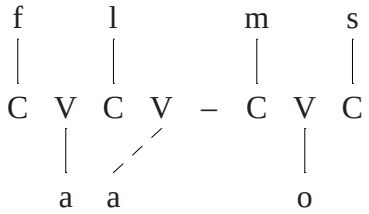
Carvalho (2004) allows for morphemes which consist only vowels on the melodic tier, but does not consider morphemes which consist only of skeletal positions.

I propose that the past tense morpheme is non-null, but consists only of a single V-slot:

(15) 'past perfect'
/ – V /

As in Carvalho's (2004) analysis, the first person singular present form contains no tense–aspect–mood suffix. The theme vowel /a/ associates to the single empty V-slot, and is raised allophonically to [ɐ]:

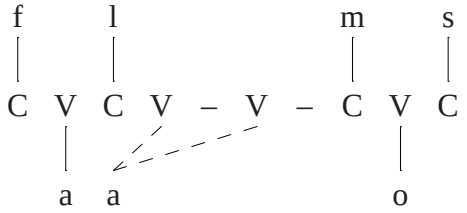
(16) [fɐlɐ́muʃ] 'we speak'



In the past tense, there are now two empty V-slots. The theme vowel /a/ associates with both of these, creating a phonologically long vowel.

Because of the double linking of this vowel, it is exempt from prenasal /a/-raising, just as phonologically long crasis /a/ is exempt from unstressed /a/-raising:

(17) [fɐlámuʃ] ‘we spoke’



3.3 Phonetic predictions

V-slots in this analysis are abstract and phonological, but they are still representations of **length**.

The association between raised low vowels and shorter duration seems to be natural and somewhat cross-linguistic (Barnes 2006).

We would thus predict that two-V /a/s which do not undergo raising are longer in duration than those that do.

Gendrot and Adda-Decker’s (2007) study seems to corroborate this assumption (see Figure 1).

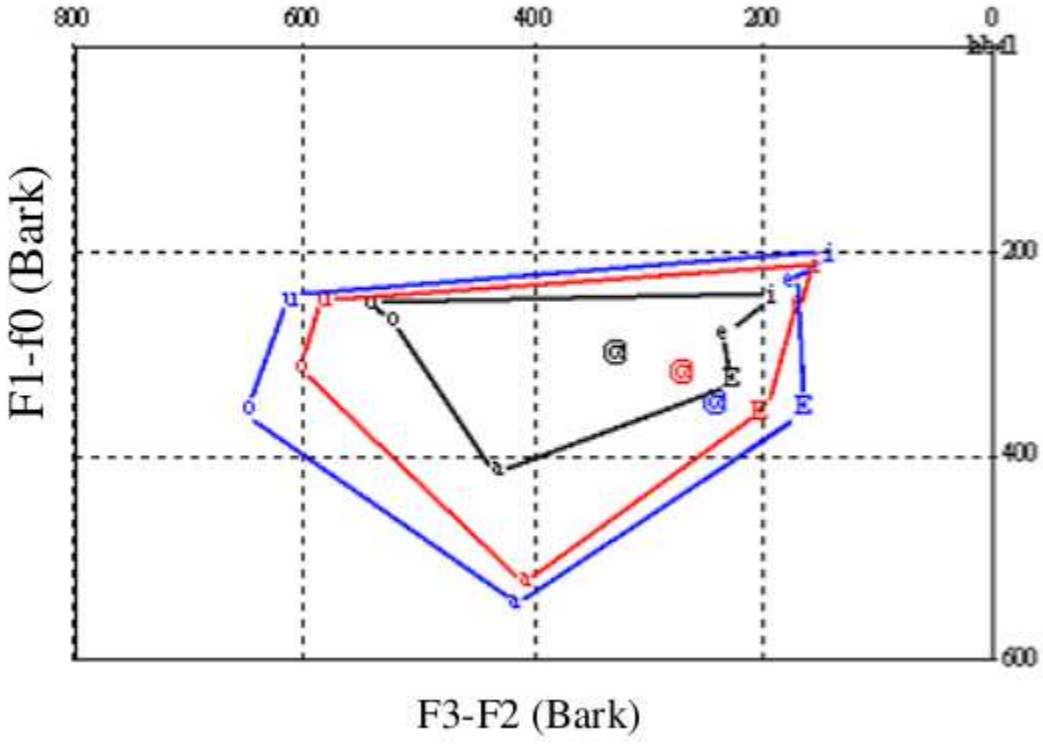
But we need more data, looking specifically at the appropriate morphological contexts!

4 Discussion

4.1 The historical perspective

How might the past perfect morpheme have arisen as merely a V-slot?

Three past perfect person–number suffixes, including the first person plural, lost a syllable on the transition from Latin to modern Portuguese. The V-slot could thus be a preservation of resulting compensatory lengthening:



"From inside to outside (black [30–50ms], red [60–80], blue [90–110]). Male and female results are merged."

Figure 1: Portuguese vowel formants based on duration (Gendrot and Adda-Decker 2007)

(18) Diachrony of Portuguese past perfect suffixes (Williams 1962:193)

Classical Latin	Vulgar Latin	Portuguese
-āvī	*-ái*	*-ei*
-āstī	*-ásti*	*-aste*
-āvit	*-áut*	*-ou*
-āvĭmŭs	*-ámus*	*-amos* [amuʃ]
-āstĭs	*-ástes*	*-astes*
-ārunt	*-árunt*	*-arom* > *-aram*

Williams (1962) suggests that the non-raised /a/ in the past perfect form developed on analogy from other suffixes in the paradigm, which did not involve raising.

Under my proposal, the paradigm levelling could instead result in the V-slot acquired from lengthening being applied to all past perfect suffixes, and then analyzed as a separate morpheme.

4.2 Further issues

There are some additional considerations to my proposal (noted by Joaquim de Carvalho, p.c.):

- Unstressed /a/ and stressed raised presnasal /a/ may not be the same allophone, despite both being transcribed as [ɐ]
  - But this depends on how you conceive of categoricalness and allophony…
- Crasis does *not* occur when one of the vowels is a stressed raised vowel, viz.
  a ama [ɐ] + [ɐ́mɐ] → [ɐ́ːmɐ], not *[ámɐ]
  - Faithfulness to stressed positions across word boundaries?

4.3 Conclusions

- It *is* possible to account for the European Portuguese low vowel distinction
- I have proposed a unified analysis for two different processes, which fit neatly into an independently motivated templatic analysis of Portuguese verbal morphology
- This analysis makes testable predictions about duration

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