

The “negative preterite” in Kabyle Berber*

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Abstract

The verbal system of Kabyle Berber is based on vocalic alternations between Imperfective and Perfective stems. These alternations are reputed to be random and therefore lexicalized. In this article, I propose an analysis that accounts for them.

I show that the Berber verbal stems are related by an apophonic derivation, as attested in German and Classical Arabic. This mechanism makes it possible to predict the vocalization of Berber Perfective stems on the basis of the vocalization of Imperfective stems. In the light of this analysis, the NEGATIVE PRETERITE stem, a stem that has always been considered to be lexicalized by the traditional grammars, proves to be derivable from its positive counterpart, the PRETERITE stem.

My analysis relies on: a) the apophonic path, which has been evidenced in typologically unrelated languages and b) a detailed analysis of the Berber vocalic system.

1. Introduction

The verbal system of Kabyle, a dialect of Berber spoken in northern Algeria, is based on an aspectual opposition (Imperfective vs. Perfective) and it is traditionally assumed to be organized as in (1).

- (1) Within each aspectual category, every verb has two stems: the imperfective stems are the AORIST and the INTENSIVE AORIST, the perfective stems are the PRETERITE and the NEGATIVE PRETERITE. All in all there are four lexical forms for each verb.

Some examples of the verb forms are given in (2).

(2) The four stems of Berber verbs.¹

	<i>Imperfective stems</i>		<i>Perfective stems</i>		
	<i>aorist</i>	<i>intensive aorist</i>	<i>preterite</i>	<i>negative preterite</i>	<i>gloss</i>
a.	xǝm bbək	xəddəm θəbbək	xǝm bbək	xǝim bbik	‘to work’ ‘to dive’
b.	naði mil kətti	tsnaði tsmil tskətti	nuða mal kətta	nuða mal kətta	‘to look for’ ‘to lean’ ‘to muffle up’
c.	aðər	ttsaðər	uðər	uðir	‘to go down’

The provisional set of data in (2) shows that the NEGATIVE PRETERITE conjugation does not concern all verbs, but only a subset of them. More precisely, if in (2a) and (2c) the NEGATIVE PRETERITE stem is different from the PRETERITE stem, for the verbs in (2b), both perfective stems are identical. This identity of two stems within the same aspectual class cannot be due to chance; on the contrary, it is an indication that there is a close link between the two perfective stems and that they do not constitute two different lexicalized items. The assumption of a specific NEGATIVE PRETERITE stem then becomes rather suspicious. My purpose in this article is to provide an analysis that dispenses with a separate stem for the NEGATIVE PRETERITE stem within the verbal system of Berber.

I start by introducing the theoretical background of my analysis in section 2 and then go on to give some basic facts about the verbal system of Berber (section 3). Section 4 focusses on some vocalic alternations that have always been considered as random and therefore lexicalized. I will show that they are fully predictable. This analysis of the vocalic alternations constitutes the basis of the wider analysis of the morphology of the aspectual opposition that I propose in this article. In section 5 I show how this analysis sheds light on the NEGATIVE PRETERITE stem. Sections 6 and 7 extend the analysis to the other verb types. Finally, the results are briefly summarised in section 8.

2. Theoretical background

2.1 Government Phonology and the “CVCV Hypothesis”

The present article places itself within the framework of Government Phonology (GP) as outlined in Kaye, Lowenstamm & Vergnaud (1985, 1990). Crucial for my analysis will be the representation of the skeletal level. I will adopt the “CVCV Model”, whose basic assumptions are summarised in (3).

- (3) The CVCV Model. (Lowenstamm, 1996)²
- a. The only syllabic constituents are: onset and nucleus.
 - b. Syllabic constituents cannot branch.
 - c. Onset positions (or C positions) and nucleus positions (or V positions) are strictly alternating.
 - d. The identity of the segmental material associated with the syllabic constituents is constrained as follows: only consonantal segments are linked to onset positions, only vowels appear in nucleus positions. Consonants cannot be syllabic.³

The principles given in (3) propose a simple organization of the phonological representations: only one syllabic type is recognized, namely the simplest one, a non-branching onset followed by a non-branching nucleus (or *CV*).

The adoption of this hypothesis immediately raises the following question: various syllabic types are observed on the surface. How are they represented in such a framework? Consider in (4) the representations in the CVCV framework of *bra*, a *CCV* syllable, and of *bar*, a *CVC* syllable.

- (4) 1. *CCV* syllable: *bra* 2. *CVC* syllable: *bar*
- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| C | V | C | V | C | V | C | V |
| | | | | | | | |
| b | r | a | | b | a | r | |

Within a CVCV analysis both syllabic types, *CCV* and *CVC*, rely on the same skeletal material: two CV units. In the CVCV framework, different surface syllabic structures are not necessarily analyzed as the reflex of different phonological syllabic structures. Rather, the differences observed on the surface mirror the fact that the segments are associated to the skeletal level in a different fashion. In (4.1), the first V position is empty, in (4.2), it is the second one that is empty.

In (5) below, I give the representations in the CVCV model of the objects that are traditionally labelled “light open syllable”, “closed syllable”, “branching nucleus”, “branching onset” and “geminate”.

- (5) 1. light open syllable 2. closed syllable (branching rhyme)
- | | | | | | |
|------|---|-------|---|---|---|
| C | V | C | V | C | V |
| | | | | | |
| b | a | b | a | r | |
| [ba] | | [bar] | | | |
3. branching nucleus (long vowel) 4. branching onset 5. geminate
- | | | | | | | | | | | | |
|---|---|------|---|------|---|---|---|------|---|---|---|
| C | V | C | V | C | V | C | V | C | V | C | V |
| | | \ | / | | | | | \ | / | | |
| | | a | | b | | r | | b | | | |
| | | [aa] | | [br] | | | | [bb] | | | |

As can be seen from the representations in (5), within the CVCV model the distinctions traditionally encoded in the supra-skeletal syllabic structures are reduced to the distribution of empty V positions. For instance, consider the representation in (5.2). The segment located in the “coda”, *r*, is defined as “followed by an empty V position”; *b*, the segment in “onset” position, is interpreted as “followed by a V position identified by some segmental material”. In the CVCV model the distinctions between the various syllabic constituents are reduced to objects that the theory needs anyway: skeletal positions and empty V positions. Crucially, where a classical syllabic model distinguishes two types of object, syllabic constituents and skeletal positions, the CVCV model assumes only one type of object, namely skeletal positions.

In the CVCV model, as in standard GP, the phonetic interpretation of empty V positions is constrained by the conjunction of two devices: Proper Government and the Empty Category Principle.⁴ The basic idea is that the phonetic interpretation of an empty V position is conditioned by the V position located immediately to its right.

(6) Proper Government (PG)

Given V_1 and V_2 , two V positions such that V_2 is on the right of V_1 , V_2 properly governs V_1 if

- a. V_2 is phonetically interpreted, and
- b. V_1 and V_2 are two adjacent V positions.

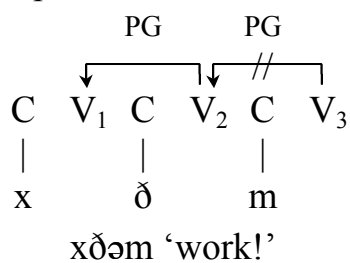
(7) Empty Category Principle (ECP)

In order to remain phonetically non-interpreted, an empty V position must be properly governed.

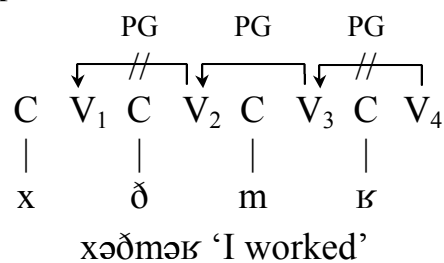
A simple example illustrating how these two devices interact is provided by the two representations of Berber verb forms given in (8).

(8) Berber verb forms

1. imperative, 2s.



2. preterite, 1s.



In (8.1), V_3 is an empty V position,⁵ it does not govern V_2 . According to the ECP, V_2 must be phonetically interpreted, hence a schwa surfaces between [ð] and [m]. V_2 , being phonetically interpreted, governs V_1 , and therefore no vowel is realized between [x] and [ð]. In (8.2), the governing relations between the V positions are different: V_3 is phonetically interpreted, a situation that leads to the different distribution of the schwas in the verb form.

2.2 *Why a CVCV analysis of Berber?*

I adopt the CVCV hypothesis for Berber since this hypothesis makes it possible to give a straightforward account of some phonological characteristics of the language. In this section, I argue that the syllabic inventory of Berber permits neither “branching onsets” nor “rhymes” distinct from the nucleus. I will argue that two-consonant clusters in Berber are better analysed as sequences of two simplex onsets separated by an empty nucleus.

Let us start with an examination of initial consonant clusters. In Berber, initial consonant clusters show very few co-occurrence restrictions. In particular, the following sequences are attested in initial position:

- clusters of the “branching onset” type (see 9.1) below)
- clusters which are not of the “branching onset” type (see 9.2))
- C₁C₂ sequences and their mirror images, C₂C₁ (see 9.3)).

(9) Imperative 2s forms

- | | |
|--|-----------------------------|
| 1. “branching onsets” | 2. non-“branching onsets” |
| <u>f</u> rəç ‘escape’ | <u>n</u> zəf ‘be exhausted’ |
| <u>f</u> ləs ‘ruin’ | <u>x</u> ðəm ‘work’ |
| <u>β</u> lə? ‘be swallowed’ | <u>k</u> fəm ‘go in’ |
| 3. C ₁ C ₂ and C ₂ C ₁ | |
| fsi ‘untie’ | qli ‘make sth. fry’ |
| sfi ‘make gush’ | lqi ‘swallow w/o chewing’ |

I take the absence of co-occurrence restrictions in initial clusters to indicate that no specific structure, meaning in particular no “branching onset”, is required in this position. That is, I propose that the clusters in 9.1) are not “branching onsets”. They simply instantiate one possibility out of the set of the possible sequences of two consonants. All types of initial cluster receive the same analysis: they are sequences of two simplex onsets.

(10) 1. Pseudo “branching onset” 2. Two simplex onsets

C	V	C	V	C	V	C	V	C	V	C	V
f		r	ə	ç		x		ð	ə	m	

On the basis of the data given in (11) below, I will show that consonant clusters of the type “coda + onset” are better analysed as two simplex onsets separated by an empty V position.

- | | |
|--------------------------------|----------------------------|
| (11) 1. preterite, 1s | 2. imperative, 2s |
| zə <u>f</u> əɁ ‘I burnt’ | z <u>l</u> əf ‘burn!’ |
| zə <u>r</u> βəɁ ‘I hurried up’ | z <u>r</u> əβ ‘hurry up!’ |
| sə <u>r</u> fəɁ ‘I tied’ | s <u>r</u> əf ‘tie!’ |
| ðə <u>r</u> fəɁ ‘I was polite’ | ð <u>r</u> əf ‘be polite!’ |

The ban on the configurations in (14) immediately raises the following questions:

- a) what happens to the vocalic element in (16)?
- b) what is the phonetic interpretation of V₁ in (16)?

The parameter (13) is a condition on the **association** of vocalic elements to the skeletal level only, and it does not affect the segmental level. I therefore submit that in (16) the vocalic element remains in the representation as a floating element.

V₁ in (16) is an empty position; as such, it obeys the ECP. My answer to our second question is thus the following: V₁ is phonetically non-interpreted if it is properly governed. If it is not properly governed, it must be phonetically interpreted: it is realized as [ə].

2.4 Consequence for empty V positions

The adoption of the parameter (13) leads us to distinguish two types of empty V positions. The first type is illustrated in (17.1) below: the representation simply does not entail any vocalic element. The second possibility, introduced by the application of (13), is illustrated by V₁ in (17.2). In this representation, a vocalic element is present. However, it cannot be associated to the skeletal level and V₁ remains empty. We will see that this second possibility is indeed attested in Berber.

(17) 1. <div style="margin-left: 40px;"> $\begin{array}{cccc} & & \text{PG} & \\ & & \swarrow // \searrow & \\ \text{C} & \text{V}_1 & \text{C} & \text{V}_2 \\ & & & \\ \text{x} & \emptyset & \text{y} & \end{array}$ </div>	2. <div style="margin-left: 40px;"> $\begin{array}{cccc} & & \text{PG} & \\ & & \swarrow // \searrow & \\ \text{C} & \text{V}_1 & \text{C} & \text{V}_2 \\ & & & \\ \text{x} & \text{I/A/U} & \text{y} & \end{array}$ </div>
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Empty V positions uniformly obey the ECP. Thus, in both configurations illustrated in (17), since V₁ is not properly governed, it is realized as [ə]. Consequently, a [ə] may have four different phonological identities: \emptyset in a configuration of type (17.1); A, I, or U in a configuration of type (17.2).

(18) sums up the phonological representation of the vocalic system of Berber.

	1. Peripheral vowels	2. [ə] is ambiguous	
<i>skeletal level</i>	C V C V C V C V	C V C V C V C V	C V C V C V C V
	\ / \ / \ /	\ / \ / \ /	
<i>segmental level</i>	I U A	I U A	\emptyset I U A
<i>phonetic realization</i>	[i] [u] [a]	[ə] [ə] [ə] [ə]	

Note that if the V position of one of the representations in (18.2) is properly governed, it will be phonetically uninterpreted. Consequently, a phonetically unrealized V position may also have any of the four representations in (18.2).

3. The verbal system of Berber: presentation and issues

The verbal system of Berber is traditionally assumed to be based on a double dichotomy: one opposes two aspects (Imperfective vs. Perfective) and the other opposes two stems within each aspectual category. In the Imperfective, the basic stem, the AORIST is opposed to the INTENSIVE AORIST. In the Perfective, the PRETERITE is opposed to its negative counterpart, the NEGATIVE PRETERITE.⁹ For convenience, I will refer to these four stems as stem I, II, III and IV respectively. The values of the different stems are roughly exemplified for two verbs in table (19) below.¹⁰

(19) Examples: *xðəm* ‘to work’ and *mil* ‘to lean’

<i>imperfective</i>		<i>perfective</i> ¹¹	
<i>stem I</i>	<i>stem II</i>	<i>stem III</i>	<i>stem IV</i>
<i>aorist</i>	<i>intensive aorist</i>	<i>preterite</i>	<i>negative preterite</i>
xðəm ‘work!’ (2s)	xəddəm ¹² ‘usually work!’ (2s)	yə-xðəm ‘he worked’	ur yə-xðim ara ‘he didn’t work’
mil ‘lean!’ (2s)	tsmil ‘usually lean!’ (2s)	i-mal ‘he leaned’	ur i-mal ara ‘he didn’t lean’

In this article, we will leave the details of the formation of stem II aside. We will examine the formal relationship between stem I, stem III and stem IV.¹³ It is sufficient here to note that stem II has the same vocalic melody as stem I, e.g. [ə] for verb *xðəm* and [i] for *mil*.

3.1 Verb types

A wide range of verb types is attested in Kabyle Berber. The table in (20) below provides a representative set of these types.¹⁴ Stem I, in the first column, is representative of the Imperfective aspect; the perfective stems PRETERITE and NEGATIVE PRETERITE appear in the second column of the table under the headings III and IV respectively.

(20) Verb types

	<i>IMPERF.</i>		<i>PERFECTIVE</i>		<i>gloss</i>	<i>total</i>
	<i>I</i> <i>Aorist</i>		<i>III</i> <i>Positive</i> <i>preterite</i>	<i>IV</i> <i>Negative</i> <i>preterite</i>		
a.	1.	xðəm	xðəm	xðim	‘to work’	682
	2.	bbəɛ	bbəɛ	bbiɛ	‘to dive’	60
	3.	βri	βri	βri	‘to cut’	53
	4.	çil	çil	çil	‘to measure’	2
	5.	ðuβ	ðuβ	ðuβ	‘to be exhausted’	40
	6.	fukk	fukk	fukk	‘to suspect’	44

b.	7.	aðər	uðər	uðir	‘to go down’	30
	8.	aç ^w i	uçi	uçi	‘to wake up’	5
	9.	κəṭṭi	κəṭṭa	κəṭṭa	‘to muffle up’	45
	10.	faθ	fuθ	fuθ	‘to miss’	38
	11.	mil	mal	mal	‘to lean’	35
	12.	qirr	qarr	qarr	‘to admit’	7
	13.	fakk	fukk	fukk	‘to finish’	8
	14.	ðruri	ðrura	ðrura	‘to need’	17
	15.	naði	nuða	nuða	‘to look for’	27
	16.	xθir	xθar	xθar	‘to choose’	10
	17.	nnaκ	nnuκ	nnuκ	‘to fight’	6
c.	18.	wəlləh	wəlləh	wəlləh	‘to guide’	659
	19.	βarəç	βurəç	βurəç	‘to bless’	97
		ʃiwər	ʃawər	ʃawər	‘to consult’	11
	20.	ʃaβ	ʃaβ	ʃaβ	‘to whiten (hair)’	42
	21.	ixfif	uxfaf	uxfaf	‘to be light’	48
aγ ^w ar		uγar	uγar	‘to exceed’		
uzzur		uzzar	uzzar	‘to be scattered’		

This table is horizontally divided into three parts: a, b and c. The verbs recorded in c will be excluded in the remainder of this paper. Actually, they have enough idiosyncratic features that independently lead us to expect them to behave in an irregular way, and they merit listing separately.¹⁵ I will briefly explain, at the end of my analysis, how the verbs of classes 18 and 19, the most numerous classes of group (20.c), may be accounted for within the proposed analysis.

3.2 Vocalic alternations: description

To gain insight into the variety of the verb types recorded in parts a. and b. of table (20), I first concentrate on the expression of the aspectual opposition (section 3.2.1). I then examine in section 3.2.2 the alternations within the perfective stems.

3.2.1 Stem I vs. stem III

I take stem I and stem III to be representative of the imperfective and perfective aspect respectively. The verbs in (20.a) all have identical forms for stem I and stem III. Remarkably, the vocalisation is identical in both forms. But now, if we look at the verbs in (20.b), we notice that the vocalizations of stem I and stem III always differ. When considering the contrast between stem I and stem III, two groups of verbs may therefore be distinguished: on the one hand, the verbs in (20.a) and on the other hand, the verbs in (20.b).

(21) Contrast stem I / stem III

	Vocalic alternation between stem I and stem III
verb types (20.a)	no
verb types (20.b)	yes

The dichotomy in (21) has long been noticed and underlies the traditional classifications of Berber verbs. The grammars distinguish indeed two verb classes: “regular” verbs and “irregular” verbs. “Irregular” verbs are verbs that display an alternation between stem I and stem III whereas “regular” verbs retain the same vocalisation in both forms. This assumption, reminiscent of the classification “strong” vs. “weak” verbs adopted for the description of the Germanic languages, raises two questions. The first one concerns the morphological mechanism that serves to express the aspectual opposition. An examination of the “irregular verbs” suggests that the aspectual opposition is expressed by a vocalic alternation. This conclusion is contradicted by the “regular” verbs that do not display any overt vocalic alternation between stem I and stem III. Could it be the case that the aspectual opposition is not expressed in these verbs? Or is the aspectual opposition expressed via a different mechanism?

A second question concerns the predictability of the vocalic alternations realized in the “irregular” verbs. These alternations are traditionally assumed to be random. For instance, Chaker (1995) writes:

Les oppositions vocaliques entre thème prétérit et aoriste sont très diverses [...] Elles semblent difficilement réductibles à un jeu relativement simple et systématique de distinctions schématiques tel que celui que l’on a proposé pour le sémitique et le chamito-sémitique. Chaker (1995:228)

As a consequence, the “irregular” verbs are dispatched in many classes according to two criteria:

- a) the vocalic alternation they display,
- b) the number of alternating vowels.

Two observations lead us to the conclusion that a more principled classification is possible. First, consider table (22) below. It presents the set of all theoretically possible pairings (vowel in stem I, vowel in stem III). The shaded cells indicate the pairings that are attested.

(22) A restricted set of pairings

<i>stem I</i> \ <i>stem III</i>	i	a	u	ə
i	yes	yes	no	no
a	no	no	yes	no
u	no	no	yes	no
ə	no	no	no	yes

We observe that some logically possible combinations are not attested. For instance neither the pairing (u, i) nor the pairing (i, u) is instantiated.¹⁶ This fact indicates that there is a non-random relationship between the vocalization of stem I and that of stem III.

A second interesting fact emerges if we compare the pairings attested in the verbs with two vowels with the pairings attested in the verbs with only one vowel.

(23)

<i>Identity of the vowel (stem I, stem III)</i>	(i, i)	(i, a)	(a, u)	(u, u)	(ə, ə)
Verbs with one radical vowel	3, 4	11, 12, 16	10, 13, 17	5, 6	1, 2
Verbs with two radical vowels	8	9, 14, 15	7, 8, 15	14	7, 9

The table in (23) reveals that the pairings attested in the verbs with two vowels are identical with those attested in the verbs that only contain one vowel. The vocalic alternations are therefore independent of the number of radical vowels.

3.2.2 Stem III vs. stem IV

Let us now consider the processes involved within the Perfective. Compare stem IV, the negative preterite, on the right hand side of table (20) with its positive counterpart, stem III. Such a comparison shows that stem IV is, in most cases, identical with stem III. The only cases that show two different forms for stem III and IV are the classes 1, 2 and 7. In these cases, an [i] surfaces in stem IV before the last consonant. Again, the verbs can be divided into two groups.

(24) Negation in Perfective: contrast stem III / stem IV

	<i>Voc. alternation between stem III and stem IV</i>
<i>verb types (20.1), (20.2), (20.7)</i>	yes
<i>other verb types</i>	no

Faced with this situation, a question immediately arises: are these two groups the same as those defined above in section 3.2.1? The answer to this question is provided by the table in (25) below.

(25)

	<i>'regular' verbs (no vocalic alternation stem I / stem III)</i>	<i>'irregular' verbs (vocalic alternation stem I / stem III)</i>
<i>no alternation stem III / stem IV</i>	types 3 to 6	types 8 to 17
<i>alternation stem III / stem IV</i>	types 1 and 2	type 7

The first line of the table in (25) shows that verbs whose stems III and IV are identical are attested among both regular and irregular verbs. The second line shows that an [i] “appears” in stem IV of some regular verbs and of one irregu-

lar verb. The dichotomy “alternation stem III / stem IV or not” cuts across the classes “regular” and “irregular” verbs.

This observation suggests that the traditional bipartition regular / irregular verbs is inconsistent. Namely, in order to prove true, the membership to a class should be manifested independently in the sense that, within each class, the elements should behave in a unified way with respect to morphological processes. That is, if “regular” and “irregular” corresponded to natural classes we would expect them to be homogeneous with respect to the derivation of the negative perfective. As (25) shows, this is not the case.

3.3 Summary

Under (26) I summarize the whole range of vocalic alternations that we will examine. The verbs are arranged in four groups (A-D), which we will examine in turn.

(26) Vocalic alternations: summary

	reference in (20)	IMPERF.	PERFECTIVE		verbs
		stem I	stem III	stem IV	
A	11, 12, 16	i	a	a	mil, qirr, xθir
	10, 13, 17	a	u	u	faθ, fakk, nnaʕ
	5, 6	u	u	u	ðuβ, fukk
	15	a i	u a	u a	naði
	14	u i	u a	u a	ðruri
B	1, 2	ə	ə	i	xðəm, bbəʕ
	7	a ə	u ə	u i	aðər
C	9	ə i	ə a	ə a	ʔətti
D	3, 4	i	i	i	βri, çil
	8	a i	u i	u i	aɣ ^w i

4. The apophonic derivation: evidence from group A

Consider the alternations manifested by the “irregular” verbs of group A (i.e. in all verbs except types 5 and 6). In these cases, the mutation of the vowel exclusively opposes paradigms belonging to different aspectual classes, namely imperfective stems (I, II) vs. perfective stems (III, IV). That is, these verbs suggest that the morphological category of aspect is expressed by a vocalic alternation.

The vocalic alternations in A are context free and bear a morphological function. These properties characterize them as apophonic alternations. And we already have an instrument for the analysis of such alternations, namely the APOPHONIC PATH, as evidenced for Classical Arabic by Guerssel & Lowenstamm (1993, 1996) and illustrated in a series of recent studies of different languages.¹⁷

4.1 The Apophonic Path

Consider in (27) the data illustrating two well-known cases of Ablaut, namely the vocalic alternations involved in the verbal system of Classical Arabic and those attested in the strong verbs of German.

(27) 1. Classical Arabic

<i>Perfective, 3ms</i>	<i>Imperfective, 3ms</i>	<i>gloss</i>
labis-a	ya-lbas-u	'to dress'
katab-a	ya-ktub-u	'to write'

2. German

<i>present, 1s</i>	<i>preterite, 1s</i>	<i>past participle</i>	<i>gloss</i>
sing-e	sang	ge-sung-en	'to sing'
bind-e	band	ge-bund-en	'to bind'

In the examples from Classical Arabic in (27.1) the vowel located between the second and the third radical consonant is subject to an alternation: for instance, in the first verb, the vowel in V_2 is [i] in the Perfective; it is [a] in the Imperfective. Faced with this situation, Guerssel & Lowenstamm (1993, 1996) argue that perfective and imperfective forms are in a derivational relationship and that the direction of derivation is Perfective \square Imperfective. The alternations illustrated in (27.1) instantiate the following two derivations: $i \square a$ and $a \square u$. These derivational steps, once linearized, yield the path $i \square a \square u$. This path is not specific to Classical Arabic. The examples in (27.2) clearly show that the same apophonic path underlies the German verbal system.

A more general examination of the vowel alternations involved in Classical Arabic leads Guerssel & Lowenstamm to add two further steps to the $i \square a \square u$ path, namely $\emptyset \square i$ and $u \square u$. Hence, the apophonic path (henceforth AP) given in (28) arises.

(28) Apophonic path: $\emptyset \square I \square A \square U \square U$ ¹⁸

For more details on AP, see Guerssel & Lowenstamm (1993, 1996). Here, I only mention the characteristics of AP that are relevant for my analysis, and I will show how AP can provide an explanation for the alternations involved in the verbal system of Berber.

AP provides a formula that controls the vocalic alternations that serve as a morphological marker. It predicts that if a basic term is an I, the derived one is an A. According to such a formula, the apophonic relation has the shape $a \square b$, that is, a basic term is the source of one and only one derived term; the derived term is thus predictable without ambiguity on the basis of the source vowel. As a consequence, the pair (a,b) involved in a vocalic alternation no longer has to be viewed as lexical: only the basic element is lexical, the derived one is not. AP is of particular interest to us here since it may enable us to derive the vocalic melody of one of the stems involved in the aspectual opposition from a more basic stem. In that respect, the lexical entry of a given verb would not have to

specify both vowels of Imperfective and Perfective but only one of them. If this analysis is on the right track, the role of the lexicon in the verbal system of Berber would be much more limited than is commonly assumed.

Two properties in particular derive from an analysis using AP in Berber. First, AP establishes a relation of implication between two vocalic elements: the process conveyed by the alternation is analysed as a derivation. Specifically, in our case, either Imperfective is derived from Perfective or conversely, Perfective is derived from Imperfective. A second remark concerns the “substance” involved in AP. As stated in (12) above, the vocalic system of Berber consists of three peripheral vowels and a schwa. AP in (28) involves exactly the same elements Ø, I, A and U. I will propose that in Berber each vocalic segment may be identified as the source term of another vowel. With AP we will then be able to predict an unambiguous output for each vowel involved in an alternation.

4.2 The transparent cases of application of the apophonic path: group A

To begin with, consider the alternations summarized in table (26) above. Strong evidence for an apophonic activity along AP between stem I, on the one hand, and stems III, IV, on the other hand, comes from group A. If we assume a derivation Imperfective \square Perfective, we can provide a straightforward account of all types in group A: all pairings instantiate a step of AP. The different verb types of group A and the corresponding apophonic steps are given in (29).

(29) Group A: the alternations between stem I and stems III, IV all instantiate AP

	<i>IMPERFECTIVE</i> (stem I)	<i>PERFECTIVE</i> (stems III&IV)	<i>verb type</i> (table (20))
1. apophonic step			
i \square a	m <u>i</u> l	m <u>a</u> l	11
	q <u>i</u> rr	q <u>a</u> rr	12
	x <u>θ</u> ir	x <u>θ</u> ar	16
a \square u	f <u>a</u> θ	f <u>u</u> θ	10
	f <u>a</u> kk	f <u>u</u> kk	13
	nn <u>a</u> ɣ	nn <u>u</u> ɣ	17
u \square u	ð <u>u</u> β	ð <u>u</u> β	5
	ʃ <u>u</u> kk	ʃ <u>u</u> kk	6
2. combinations			
(a \square u, i \square a)	na <u>ð</u> i	nu <u>ð</u> a	15
(u \square u, i \square a)	ð <u>r</u> u <u>r</u> i	ð <u>r</u> u <u>r</u> a	14

As can be seen from (29.1), the alternations / non-alternations in the verbs with one radical vowel all instantiate the following steps of AP: i \square a, a \square u, u \square u. This result is already interesting, but the case of the verbs with two radical vowels in (29.2) provides even stronger evidence for an analysis along AP: in these

cases, the alternations of **both** vowels follow AP. We find exactly the same steps: a \square u, i \square a for *naði* and u \square u, i \square a for *ðruri*.

To sum up, the alternations in group A are not unpredictable: for these verbs, the vocalization of perfective stems can entirely be predicted on the basis of stem I and the independently attested AP.

4.3 Directionality of AP and morphological complexity

Now, is there any independent reason to assume that it is the perfective stems (III, IV), and not the imperfective one, that are derived? An examination of the inflectional paradigms supports the same directionality. Stem I is the basis of the imperative conjugation. As shown below in (30.1), in imperative forms the inflectional markers are suffixes only. The paradigm relying on the perfective stems involves both a suffix and a prefix (see (30.2)).

(30) Morphological complexity of imperfective and perfective forms

1. IMPERFECTIVE	2s	mil	‘lean!’
	2mp	mil-ən	id.
	2fp	mil-ənt	id.
2. PERFECTIVE			
POSITIVE PRETERITE:	2s	θ-mal-əð	‘you leaned’
	2mp	θ-mal-əṃ	id.
	2fp	θ-mal-əṃθ	id.
NEGATIVE PRETERITE:	2s	ur θ-mal-əð	‘you did not lean’
	2mp	ur θ-mal-əṃ	id.
	2fp	ur θ-mal-əṃθ	id.

Imperfective forms are morphologically simpler than perfective ones: they do not bear any inflexional prefix. I take the fact that the move from Imperfective to Perfective mirrors increasing morphological complexity as an indication that imperfective forms are basic forms from which the perfective forms are derived.

4.4 [u] / [u] revisited

One striking peculiarity of the vocalization of Berber verbs is that [u] in a stem I never alternates (see in table (26), group A, types 5, 6 and 14).¹⁹ This fact has always been considered a mere accident: there would be no principled reason why [u] should not alternate and as such behave unlike the other peripheral vowels [i] and [a].

An analysis using AP makes a different claim regarding this outstanding specificity of [u]. The output of /u/ in AP is /u/, that is, AP predicts that [u] should never alternate. In other words, the non-alternating [u] has exactly the same status as the alternating [i] or [a]: in all cases we are dealing with the input of an apophonic step, u \square u on the one hand, i \square a and a \square u on the other hand. In this section, we will see that this rationalization of the status of the non-

alternating [u] enables us to capture regularities that remain obscured under the traditional view.

4.4.1 Consequence for the dichotomy “regular” vs. “irregular” verbs

First, according to the traditional view, the verbs that have [u] both in Imperfective and Perfective are “regular” and as such different from a verb that displays for instance the alternation [i] / [a]. According to the apophonic analysis, the verbs that display [u] in the Imperfective and in the Perfective have exactly the same status as the so-called “irregular” ones. An analysis in the light of AP thus provides a unified account of all vocalizations in group A. This considerably weakens the motivation for the dichotomy between “irregular” and “regular” verbs, a dichotomy that has already been shown to be problematic (see section 3.2.2). This is illustrated in table (31) below.

(31) No dichotomy “irregular”/“regular” verb in the apophonic analysis

<i>verbal stem:</i> <i>IMPERF./PERF.</i>	<i>traditional presentations</i>	<i>apophonic analysis</i>
mil / mal	irregular	i □ a
faθ / fuθ	irregular	a □ u
ðuβ / ðuβ	regular	u □ u
	dichotomy: regular vs. irregular verb	one mechanism: IMP □ PERF = instantiation of an apophonic step

4.4.2 The verbs with two radical vowels.

A second by-product of the apophonic analysis concerns the verbs with two radical vowels. Group A contains two types of verbs with two radical vowels: *naði* and *ðruri*. According to the traditional position, these two types behave in a distinct way. Namely, in the *naði* type, both radical vowels alternate (alternation a...i/u...a) whereas in the second type, only one of the two radical vowels is alternating, namely the second one (alternation i/a).²⁰ This position leads one to distinguish lexically between, on the one hand, verbs whose entire vocalic melody alternates, e.g. *naði*, and, on the other hand, verbs for which only part of the vocalization is subject to an alternation, e.g. *ðruri*. Such a position not only burdens the lexicon, it also does not account for the properties of the vocalic alternations. We saw in (23) that the alternations found in the verbs with two radical vowels are identical with those realized in the verbs with one radical vowel. In the analysis I propose, no separate stipulation is necessary: AP uniformly applies to all vowels of the stem.

(32) No stipulation concerning the number of alternating vowels in the apophonic analysis

<i>verbal stem:</i> <i>IMPERF./PERF.</i>	<i>traditional presentations</i>	<i>apophonic analysis</i>
nađi / nuđa	2 alternating vowels	a i □ u a
đruri / đrura	1 alternating vowel, only	u i □ u a
	number of alternating vowels is variable	uniform application of AP to the entire vocalic melody

To conclude this section, notice that, so far, we have seen examples for each step of AP (alone or in combination) except for the first one: namely $\emptyset \square i$. Assuming the phonetic realization of \emptyset to be [ə] (see section 2.4), potential inputs for the step $\emptyset \square i$ are the verbs that have a schwa in their vocalic melody, i.e. the verbs of groups B and C. And as can be seen from (26), in these verbs, schwa does not alternate between stem I and stem III. The question I address in the following section is why precisely the only step of AP whose input is 0 and whose output is a peripheral vowel is not overtly (meaning phonetically) realized in Berber.

5. Opacity and the status of the NEGATIVE PRETERITE

Examination of the verbs of group B in section 5.1 will lead me to focus on the status of the negative preterite stem in section 5.2 Building on the results obtained in the preceding section, I will propose a new analysis for this verb form, rationalizing its status within the verbal system of Berber (sections 5.3 and 5.4). Finally section 5.5 is devoted to the verbs of group C.

5.1 Group B verbs are problematic

Let us consider the various stems of the verbs of group B, repeated for convenience below in (33).

(33) Group B

	<i>IMPERFECTIVE</i>	<i>PERFECTIVE</i>			
	<i>stem I</i>	<i>stem III</i>	<i>stem IV</i>	<i>status</i>	<i>gloss</i>
a.	xđə̣m	xđə̣m	xđim	regular	'to work'
b.	bbə̣ɣ	bbə̣ɣ	bbiɣ	regular	'to dive'
c.	ə̣đə̣r	uđə̣r	uđir	irregular	'to go down'

These verbs raise two problems for the apophonic analysis proposed in the preceding section.

First, as can be seen from (33a) and (33b), the vowel of stem I is a schwa and so is that of stem III. The absence of an overt alternation between stem I and stem III constitutes a first problem: on the basis of the behaviour of the

verbs of group A, we were led to the hypothesis that AP applies between stem I and stem III. We thus expect the vocalization of stem III to be the apophonic result of Ø, i.e. [i]. As for (33.c), if the first vowel indeed apophonizes as predicted by AP (a □ u), the second vowel, [ə], remains identical in stem III. Do we need to postulate that, for this verb type, only part of the vocalic melody is a target of AP?

An examination of the perfective stems in (33) raises a second problem: the alternations in group A exclusively oppose stem I to stems III/IV. That is, they oppose the aspectual value “Imperfective” to the “Perfective”; no alternation obtains within the same aspectual value. Now, notice in (33) that stem III and stem IV always have a different vocalic melody: a vocalic alternation is manifested **within** the aspectual value “Perfective”. Why does stem IV have a specific melody, different from that of stem III?

In the verbs listed in (33), and there lies our first problem, [ə] does not alternate between stem I and stem III. It is thus here crucial to examine the status of [ə]. In order to do this, I will use the hypothesis on vowel length in Berber proposed earlier, repeated here in (34).

(34) Hypothesis about the representation of Berber vowels

1. [i], [a] and [u] are not opaque			2. [ə] is opaque										
C	V	C	V	C	V	C	V	C	V	C	V	C	V
\	/	\	/	\	/								
	I		U		A	Ø	I	U	A				
	[i]		[u]		[a]	[ə]/Ø	[ə]/Ø	[ə]/Ø	[ə]/Ø				

According to this hypothesis, a schwa is ambiguous in the sense that it may be the phonetic realization of any of the three elements I, A, U, or of Ø. The problem we are confronted with when examining forms involving a schwa such as stem I *xðəm* and stem III *xðəm* in (33.a) is one of neutralization: what is the real identity of the [ə] — Ø, I, A or U? And more generally the question is: how are the speakers of the language able to establish the real identity of [ə] in these forms?

In other well known neutralization effects, e.g. the one induced by final devoicing in German, the reconstruction of the identity of neutralized segments requires the adjunction of a suffix. For instance, [bunt] is the phonetic interpretation of both forms /bunt/ ‘colorful’ and /bund/ ‘bound’. The adjunction of the plural suffix -e makes it possible to recover the phonological identity of the final [t] in [bunt]. The plural form of /bunt/ is [buntə], that of /bund/ is [byndə]. What sort of test could make it possible to discover the real identity of the elements neutralized as [ə] in Berber? To answer this question, let us have a closer look at the origin of the ambiguity. As can be seen from (34.2), opacity arises from the fact that whenever the vocalic elements I, A und U have access to only one V position, they cannot be linked to the skeletal level. In this case, they all surface

as [ə] or Ø, depending on the phonotactic constraints. One way of discovering the real identity of a [ə] is thus to look at forms that give to the neutralized vocalic element the opportunity of branching: a branching element reveals unambiguously its real identity as a peripheral vowel (see (34.1)). In the CVCV framework, it means that we have to look at forms adding a [CV] unit to the template of the stems whose vocalization is schwa. The negative preterite stem, I argue, provides exactly such an environment.

5.2 An analysis of the NEGATIVE PRETERITE

5.2.1 Preliminary remarks

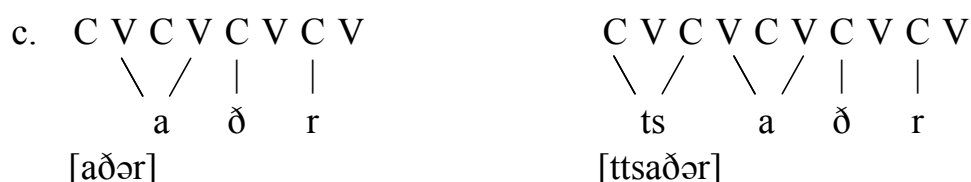
In Berber, negation triggers two processes: on the one hand, the use of the discontinuous particle *ur...ara*, on the other hand, the use of a specific verbal stem. Consider the examples in (35).

	IMPERFECTIVE		PERFECTIVE	
	positive	negative	positive	negative
a.	xǝm 'work!'	ur xəddəm ara 'do not work!'	yə-xǝm 'he worked'	ur yə-xǝm ara 'he did not work'
b.	bbək 'dive!'	ur θəbbək ara 'do not dive!'	yə-bbək 'he dived'	ur yə-bbək ara 'he did not dive'
c.	aǝr 'go down!'	ur ttsaǝr ara 'do not go down!'	y-uǝr 'he went down'	ur y-uǝr ara 'he did not go down'

In the Imperfective, the stem used in the negative form is the intensive stem (stem II). The reason why this is so is not clear to me. It may be viewed as a reflex of the general fact that many languages require the irrealis mood with negation: as the intensive stem is not marked for tense, it is a possible irrealis form. Stem II is characterized by a geminated medial consonant ((35.a)) or by a prefix (*θə-* in (35.b) and *tts-* in (35.c)). The representations of the positive and negative imperfective stems of group B verbs are given in (36).

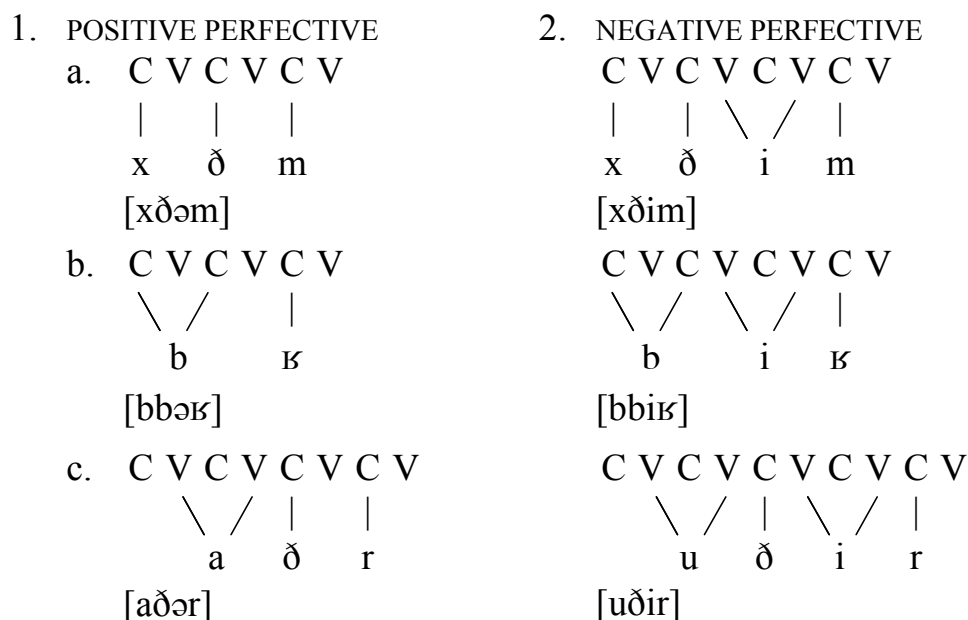
(36) Representations of the two IMPERFECTIVE stems

1. POSITIVE IMPERFECTIVE	2. NEGATIVE IMPERFECTIVE
a. C V C V C V	C V C V C V C V
	\ /
x ǝ m	x ǝ m
[xǝm]	[xəddəm]
b. C V C V C V	C V C V C V C V
\ /	\ /
b k	θ b k
[bbək]	[θəbbək]



I will not be concerned with the details of the formation of stem II. It is sufficient to note that, in all cases, the template of stem II entails a CV unit more than the template of stem I. Now, let us turn to the perfective stems on the right hand side of table (35). I assumed that in Berber peripheral vowels must branch in order to realize their vocalic quality. Accordingly, the [i] of stem IV, since it is phonetically realised, is a branching segment. Stems IV of group B verbs then have to be represented as in (37.2).

(37) Representations of the two PERFECTIVE stems.



If we compare the representations in (36) with those in (37), we notice that the two conjoined hypotheses, CVCV and vocalic length, allow us to capture a parallelism between perfective negative forms and imperfective negative forms: in both aspects, the template of the stem used in the negative form (i.e. stem II in the Imperfective, stem IV in the Perfective) contains one CV unit more than its positive counterpart.

5.2.2 Analysis

Taking this remark as a starting point, I propose that NEGATIVE PRETERITE stem formation proceeds according to the mechanism in (38).

(38) NEGATIVE PRETERITE formation

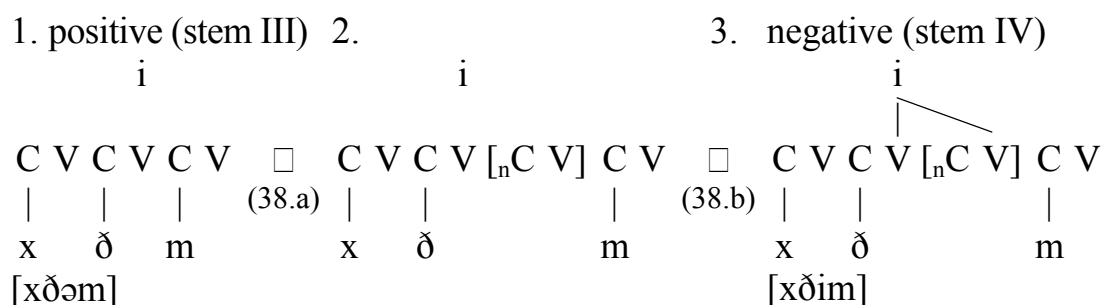
- a. Insertion of a CV unit into the template of the positive stem. The site of insertion is immediately before the last CV unit of the template:
- (CV)CVCVCV □ (CV)CVCV [CV] CV

- b. Identification of this position ($[_nCV]$ in the representations from now on) by the vocalic melody.

Let us see how this hypothesis accounts for the data. In the following, the analysis will focus on the type $x\delta am$, which represents the typical Berber verb. Triliterals with schwa are the most numerous: they represent nearly one third of the whole set of verbs. Moreover, this is an expanding class; for instance, Arabic loans are often adapted to this shape, and even in Berber, other verb classes tend to move into this class.²¹ These verbs are thus part of the productive morphology of the language.

According to the analysis proposed here the [i] of the negative preterite stem $x\delta im$ in (39.3) below is the result of a propagation to the $[_nCV]$ unit, namely the propagation of an underlying /i/. This implies that the /i/ is already present in stem III. Consider the representation in (39.1): in stem III, the underlying /i/ does not have access to two V positions. Consequently it cannot be linked to the template; the /i/ remains floating and stem III displays a schwa.

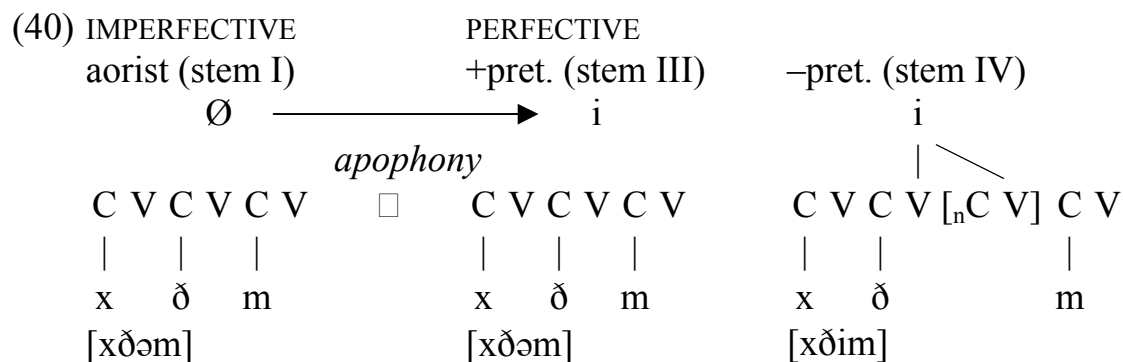
(39) Verb type $x\delta am$: POSITIVE and NEGATIVE PERFECTIVE



We now have a hypothesis for the negative preterite formation and the representations of both perfective stems (see (39.1) and (39.3)). In the following section I come back to the imperfective forms. In the Imperfective, the surface form is vocalized by [ə] (stem I: $x\delta am$). In my analysis a surface [ə] can correspond to four different underlying configurations (see (18.2)). In what follows we will establish the phonological identity of the surface schwas realized in the stem I of group B verbs.

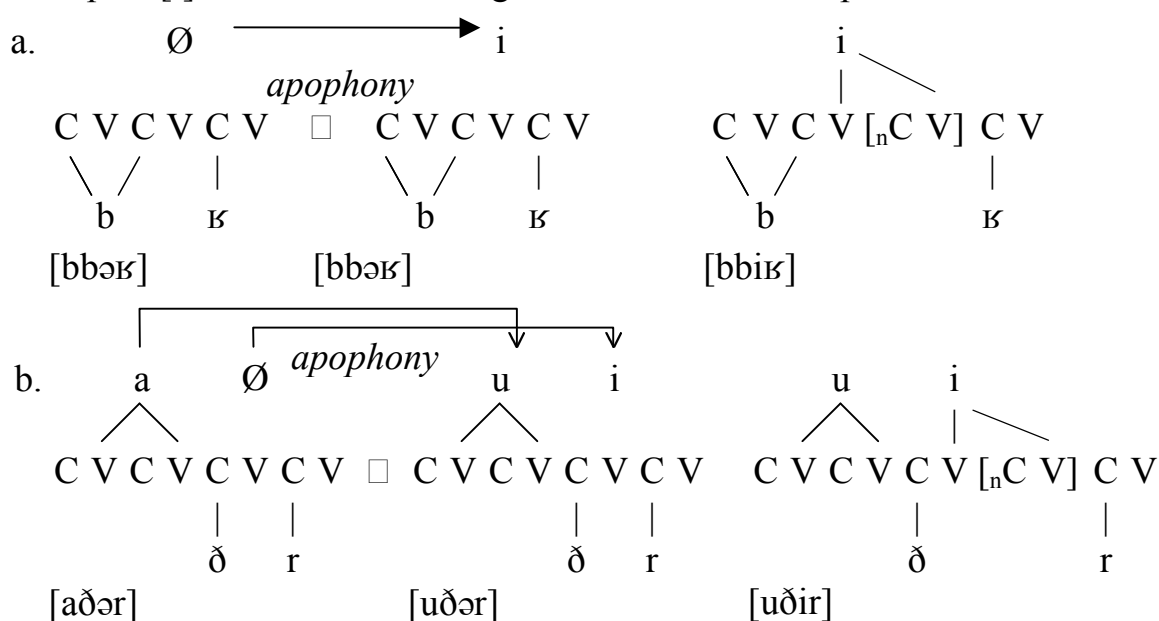
5.3 The identities of schwas

According to the present analysis, the vocalic melody of Perfective is derived from that of Imperfective along AP. For the verb $x\delta am$, for instance, the vocalization of Perfective (that surfaces in the negative form) is /i/. The only apophonic source of an /i/ in AP is \emptyset (first step: $\emptyset \square i$), this implies that the underlying vocalization of Imperfective must be \emptyset .



The different stems of the remaining verbs of group B are represented in (41) below.

(41) Group B: [i] in stem IV revealing an instantiation of step $\emptyset \square i$



The phonological identities of the schwas involved in the different stems of group B verbs have now been identified: the [ə] in stem III is due to the fact that the underlying /i/ cannot be linked to two V positions and remains floating. The [ə] in stem I yields an /i/ under apophony and is therefore necessarily an underlying \emptyset . The results appear in (42) below.

(42) Identity of schwas in group B

<i>Verb type</i>	<i>stem I</i>	<i>melody</i>	<i>stem III</i>	<i>melody</i>
xðəm	xðə̣m	/Ø/	xðə̣m	/i/
bbəɛ	bbə̣ɛ	/Ø/	bbə̣ɛ	/i/
aðər	ạðə̣r	/a...Ø/	ụðə̣r	/u..i/

According to table (42), all schwas in stem I are phonological \emptyset . However, theoretically, the elements I, A, U should be allowed to appear in this position as well. I have no explanation for this characteristic. Still, notice that the vocalic melodies of Berber verbs are constrained.²² I assume the restriction on the iden-

tity of schwa in stem I to be ascribed to a constraint on the vocalic melody as well.

5.4 Results: the rationalization of the status of stem IV

We have seen that for verbs of group A the vocalic alternation opposes stem I and stem III (see section 4.2). For group B verbs, which we dealt with above, the overt vocalic alternation opposes stem I and stem III on the one hand with stem IV on the other hand (stem I and stem III: $x\delta\varnothing m$, stem IV: $x\delta i m$). The analysis presented above now allows us to unify group A and group B verbs: in fact the vocalic alternation opposes stem I and stem III for both verb groups. For group B verbs, however, this is obscured by the fact that the alternating vowel only has one skeletal position available in stem III. The move from Imperfective to Perfective exclusively involves apophony and no modification of the skeletal tier. Since the \emptyset of the Imperfective occupies one V position, the /i/ that apophonically derives from it has access to only one V position in stem III as well. Since a full vowel requires two skeletal positions, the underlyingly alternating vowel cannot be linked to the skeleton and a schwa surfaces. In stem IV, on the other hand, the negation morpheme provides /i/ with an additional position into which it can propagate: since the vowel is linked to two positions, it is phonetically realized.

As for $x\delta\varnothing m$ and $bb\varnothing\kappa$, the vowel of the melody does not surface in stem III; it is the form of stem IV that allows us to hear the real identity of the vocalic melody. The third verb type in group B, $a\delta\varnothing r$ represented in (41.b) above, is particularly interesting: this verb is usually labelled “irregular”, yet the mechanism in operation is exactly the same as the one involved in the “regular” verbs $x\delta\varnothing m$ and $bb\varnothing\kappa$ in (40) and (41.a). This example further shows how AP applies to the whole vocalic melody of the stem: /a... \emptyset / yields /u...i/; only the first alternation (a~u) is phonetically realized between stem I and stem III. Our results are summarised in (43).

- (43) 1. In group B,
- a. there is no phonological vocalic alternation inside the perfective aspect. Stem III and stem IV share the same vocalic melody, which is derived from stem I by apophony.
 - b. the mechanism by which the speakers of the language have access to the real identity of an element neutralized in [ə] in stem I is the apophonic derivation.
2. More generally, all verbs of groups A and B, whether “regular” or not, obey the same regularity: the vehicle of the aspectual opposition is AP.

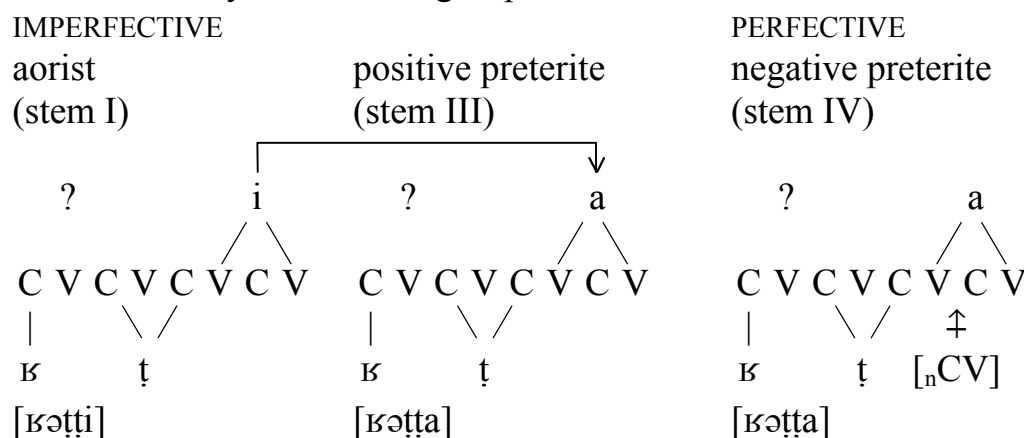
5.5 Recoverability of the elements neutralized in schwa: opacity in group C

All verbs whose vocalic melody contains a [ə] are gathered in groups B and C. Let us examine type 14 in group C, namely the verb *κətti*. The three stems of this verb are repeated in (44) for convenience.

(44) Imperfective	Perfective		
stem I	stem III	stem IV	gloss
κətti	κətta	κətta	'to muffle up'

The identity of the second vowel of the *κətti* type is transparent, and it apophonizes as expected (i → a). Does the mechanism of negative formation make it possible to recover the real identity of the schwa involved in the three stems of this verb type as well? The representations below in (45) show that the identity of the vocalic element that surfaces as [ə] remains opaque.

(45) Irrecoverability of schwa in group C



The [ə] in the verb *κətti* cannot surface as a full vowel since the skeletal position to which it corresponds is located between the first and the second radical consonant. According to my hypothesis, the site of [nCV] unit insertion is located in another place in the template, namely immediately before the last CV unit: the insertion of the [nCV] can therefore never result in a supplementary skeletal position for the vowel between C₁ and C₂. I leave the question of the identification of [ə] in this verb for further research and leave the lexical vocalization of this verb partially unspecified as /?...i/.

The representations in (45) raise an additional question: since the insertion of the [nCV] unit takes place at a precise site in the positive template, it is crucially conditioned by the configuration resulting from the association of the radical segments to the template. The next section examines how the analysis proposed for group B extends to groups A, C and D.

6. The “negative preterite”: extension of the analysis to groups A, C and D

6.1 Data

I have proposed that the negative preterite is derived from the positive preterite by an increase in the number of skeletal positions. Now consider the two last columns of table (46). For groups A, C and D, both perfective stems are identical. Why do these verbs not exhibit an increase in stem IV?

(46) Verb types of groups A, C and D

verb type	reference	examples (stem I)	Perfective stems	
			positive (stem III)	negative (stem IV)
a. CVC _i C _i	6, 12, 13 (group A)	fakk	fukk	fukk
b. CVCV	15 (group A)	naði	nuða	nuða
c. CCVCV	14 (group A)	ðruri	ðrura	ðrura
d. CCV	3 (group D)	βri	βri	βri
e. VCV	8 (group D)	aɣ ^w i	uɣi	uɣi
f. CəC _i C _i V	9 (group C)	ɤəʈti	ɤəʈta	ɤəʈta
g. CVC	4, 5, 10, 11 (groups A, D)	mil	mal	mal
h. CCVC	16, 17 (group A)	nnaɤ	nnuɤ	nnuɤ

I propose that the shape of the radical of the verbs listed in (46) prevents the mechanism of negative formation from applying. The fact that stem IV does not show an “increase” is the reflex of this blocking effect.

There are two points at which the increase may fail: either (a) the insertion of [_nCV] is blocked or (b) a [_nCV] may be inserted but the site cannot be identified by any skeletal material. I propose that the verbs in the first part of table (46) (types a. to f.) instantiate the case in (a) while the verbs in the second part (types g. and h.) can be attributed to (b).

6.2 Identity of stem III and IV is due to an impossible insertion of the negative infix

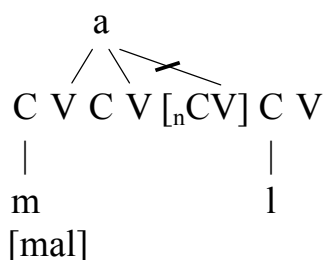
A close examination of the verbs listed in the first part of table (46) reveals that these seemingly disparate types have something in common: they all end either with a geminate (46.a) or with a peripheral vowel (other cases). This means that the corresponding radicals end in a branching segment. I claim that this is the reason why the negative augment is not manifested in stem IV; specifically, I submit that the strategy of [_nCV] insertion fails to apply.

Let us consider, in (47) and (48), the representations of both perfective stems of verbs *fakk* and *naði* respectively. Types (46.c) to (46.f) can easily be deduced. As shown in (47.1) and (48.1), in the positive stem, the final branching segment, consonantal and vocalic respectively, branches across the two last CV

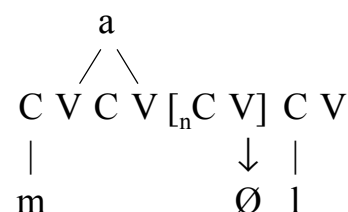
and $[_nCV]$ cannot be identified (see (50.1) below). I assume $[_nCV]$ insertion to be a blind process that occurs whenever possible. If $[_nCV]$ remains segmentally empty, it cannot be maintained in the template. Accordingly I propose that the negative infix is dropped; this results in the representation in (50.2), yielding a stem IV form which is identical with stem III.²⁴

(50) Verb type *mil*

1. impossible propagation



2. stem IV = stem III



AP and the hypothesis about negative preterite formation made it possible to provide a unified account for the vocalization of all stems of groups A, B and C verbs. I will finish with a brief examination of the behaviour of group D verbs.

7. Why [i] does not alternate in group D

Consider the different stems of the group D verbs given in (51) below.

(51) Group D verbs

	<i>IMPERFECTIVE</i>	<i>PERFECTIVE</i>		<i>status</i>	<i>gloss</i>	
	<i>stem I</i>	<i>stem III</i>	<i>stem IV</i>			
a.	βri	βri	*βra	βri	regular	'to cut a piece'
b.	aç ^w i	uçi ²⁵	*uça	uçi	irregular	'to wake up'
c.	çil	çil	*çal	çil	regular	'to measure'

These verbs seem to provide counterevidence to the apophonic mechanism: the [i] that surfaces in stem I does not alternate, i.e. stem III and stem IV do not display the apophonic result of [i], namely [a]. In this section, I argue that the verbs of class D do not contravene the apophonic mechanism. My argument can be summarized as follows.

(52) The [i] that surfaces in the verbs of group D is not part of the vocalic melody but the realization of a radical glide. Since the apophonic mechanism applies to the vocalic melody only, an element that surfaces as a vocalic [i] but reflects a radical glide is not affected by the apophonic derivation. It thus remains [i] in all verbal stems.

7.1 "Defective" verbs

First, consider the verbs that display an [i] in final position above in (51.a) and (51.b). An argument for the proposal in (52) comes from an examination of the deverbal noun.

7.1.1 The deverbal noun: a test for the identification of [i]

In Berber, noun formation on the basis of a verb is a regular and productive process: for each verb, a noun that denotes the action corresponding to the verb is attested. The shape of this noun depends on the verb type, but in every case all radical consonants are preserved. Some examples are given in (53).²⁶

(53) Deverbal noun, examples

<i>verb (stem I)</i>	<i>gloss</i>	<i>derived noun</i>	<i>rad. cons</i>	<i>gloss</i>
xǎəm	‘to work’	axǎəm	xǎm	‘the act of working’
ay ^w əm	‘to draw’	ay ^w am	y ^w m	‘the act of drawing’
qqən	‘to bind’	θuqqna	qn	‘the act of binding’

The derived noun corresponding to the $C_1C_2əC_3$ verb type is of the shape $aC_1C_2aC_3$. Some examples appear in (54).

(54) Verb type $C_1C_2əC_3$ □ noun: $aC_1C_2aC_3$ (Dallet 1953:373)

<i>verb</i>		<i>derived noun</i>	<i>rad. cons</i>	<i>gloss</i>
<i>stem I</i>	<i>stem III</i>			
xǎəm	xǎəm	axǎəm	xǎm	‘to work’
βǎər	βǎər	aβǎər	βǎr	‘to quote’
β□əθ	β□əθ	aβ□aθ	β□θ	‘to inquire’

Let us now examine the C_1C_2i verbs for which [i] resists apophony (see (51.a)). We discover that the deverbal noun corresponding to these verbs always has the shape aC_1C_2ay .

(55) Verb type C_1C_2i , i non-alt. □ noun: aC_1C_2ay (Dallet 1953:379)

<i>verb</i>		<i>derived noun</i>	<i>rad. cons</i>	<i>gloss</i>
<i>stem I</i>	<i>stem III</i>			
βri	βri	aβray	βry	‘to cut a piece’
ǎri	ǎri	aǎray	ǎry	‘to hit one’s finger’
ǎni	ǎni	aǎnay	ǎny	‘to be fat’
ndi	ndi	anday	ndy	‘to set a trap’

If we compare the examples in (55) with those in (54) it becomes apparent that in nouns derived from C_1C_2i verbs where [i] is stable, a glide surfaces in exactly the same position where C_3 surfaces in nouns derived from $C_1C_2əC_3$ verbs:

<i>verb</i>		<i>derived noun</i>
xǎəm	□	axǎəm
βri	□	aβray

Conversely, a look at nouns derived from verbs in which the final [i] apophonizes reveals that the [i] appears as such and, of course, no glide surfaces. Some examples are given in (56).²⁷

- (56) Verb type $C_1\partial C_2C_2i$ / i alt. \square noun: $aC_1\partial C_2C_2i$ (Dallet 1953:417)
 C_1aC_2i / i alt. aC_1aC_2i (Dallet 1953:422)

verb		derived noun	rad. cons	gloss
stem I	stem III			
ɤətti	ɤətta	aɤətti	ɤt	'to muffle up'
βərri	βərri	aβərri	βr	'to take no further interest in'
naði	nuða	anaði	nð	'to look for'
fali	fula	aƒali	ƒl	'to roam'

The data in (55) and (56) constitute strong evidence for the assumption that, in C_1C_2i verbs, the non-alternating [i] reflects a glide in the root.

For verb types C_1C_1i and aC_1i with a non-alternating [i] the same reasoning can be extended. This is exemplified in (57) and (58) respectively; verbs with no radical glide appear in a., glide final radicals in b.

- (57) Verb type $C_1C_1\partial C_2$ \square noun: $\theta uC_1C_1C_2a$ (Dallet 1953:381)
 C_1C_1i / i non-alt. \square noun: θuC_1C_1ya (Dallet 1953:382)

verb		derived noun	rad. cons	gloss
stem I	stem III			
a. bbəɤ	bbəɤ	θub ɤ ɤa	bɤ	'to dive'
ʃʃəy	ʃʃəy	θu ʃ ʃya	ʃy	'to slip'
b. bbi	bbi	θub b ya	by	'to pinch'
kki	kki	θuk k ya	ky	'to take part'

- (58) Verb type $aC_1\partial C_2$ \square noun: aC_1aC_2
 $aC_1C_1uC_2$ (Dallet 1953:406)
 aC_1i / i non-alt. \square noun: aC_1ay
 aC_1C_1uy

verb		derived noun	rad. cons	gloss
stem I	stem III			
a. aɣ ^w əɤ	uɣəɤ	aɣ ^w <u>a</u> ɤ	ɣ ^w m	'to draw'
aðəf	uðəf	a <u>d</u> ð <u>f</u>	ðf	'to go down'
b. aç ^w i	uçi	aç ^w <u>a</u> y	ç ^w y	'to wake up'
ali	uli	a <u>l</u> l <u>u</u> y	ly	'to go up'
ani	uni	a <u>n</u> n <u>u</u> y	ny	'to delouse'

Examination of the deverbal noun has established that [i] in types βri and $aç^wi$ is not part of the vocalic melody, but the expression of a radical glide. This state of affairs raises the following two questions:

- (59) a. Why does the final glide of the radical not surface as a glide in stem I but as an [i]?
 b. What is the vocalic melody of these verbs since the [i] they display

does not behave as a vocalic segment?

7.1.2 Representations

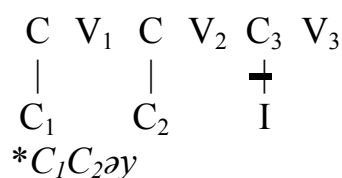
As for the question raised in (59.a), I adopt the following constraint on glides in Berber proposed by Guerssel (1990a:44-47).

(60) If [a] glide is not followed by a phonetic vowel in the nuclear position, then it occupies that nuclear position.

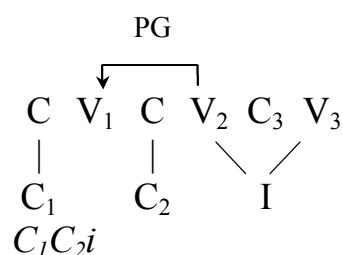
This proposal accounts for the fact that the final glide in C_1C_2Y radicals is interpreted as [i] (see (61)).

(61) Glide final verbs: $\square C_1C_2Y$.

1.



2.

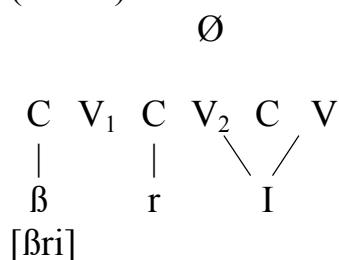


In (61.1), following (60), the element I cannot associate to C_3 because V_3 , being empty, does not license it to do so.²⁸ Thus, in (61.2), I associates to V_2 and V_3 . Hence the realization: C_1C_2i .

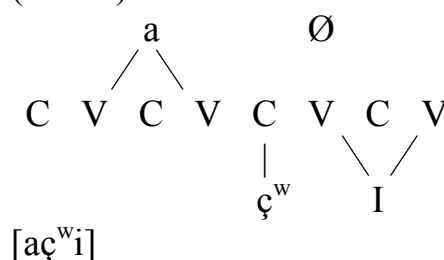
This proposal is however problematic: it predicts that no final [y] should be attested in the language, a prediction which is not borne out (e.g. see the deverbal nouns in (55) and (58)). I have no solution to this problem and leave it for further research.

As for the vocalic melody of $\square C_1C_2Y$ verbs, the simplest answer to the question raised in (59.b) is that these verbs have the same melody as their “sound” equivalents: a C_1C_2i verb, which I have shown to be $\square C_1C_2Y$, has the same vocalic melody as a verb whose root is $\square C_1C_2C_3$ where C_3 is not a glide. In section 5, we saw that the vocalic melody of a $\square C_1C_2C_3$ verb is \emptyset . Therefore, I assume the vocalic melody of verb type C_1C_2i to be \emptyset . The same reasoning applies to the type aC_1i , which is $\square aC_1Y$, and whose vocalic melody is therefore the same as a $\square aC_1C_2$ verb, namely /a... \emptyset /. Accordingly, the complete representations of the verbs βri and $a\zeta^w i$ are as under (62.1) and (62.2) respectively.

(62) 1. Verb type βri , $\square BRY$
(stem I)



2. Verb type $a\zeta^w i$, $\square \zeta^w Y$
(stem I)

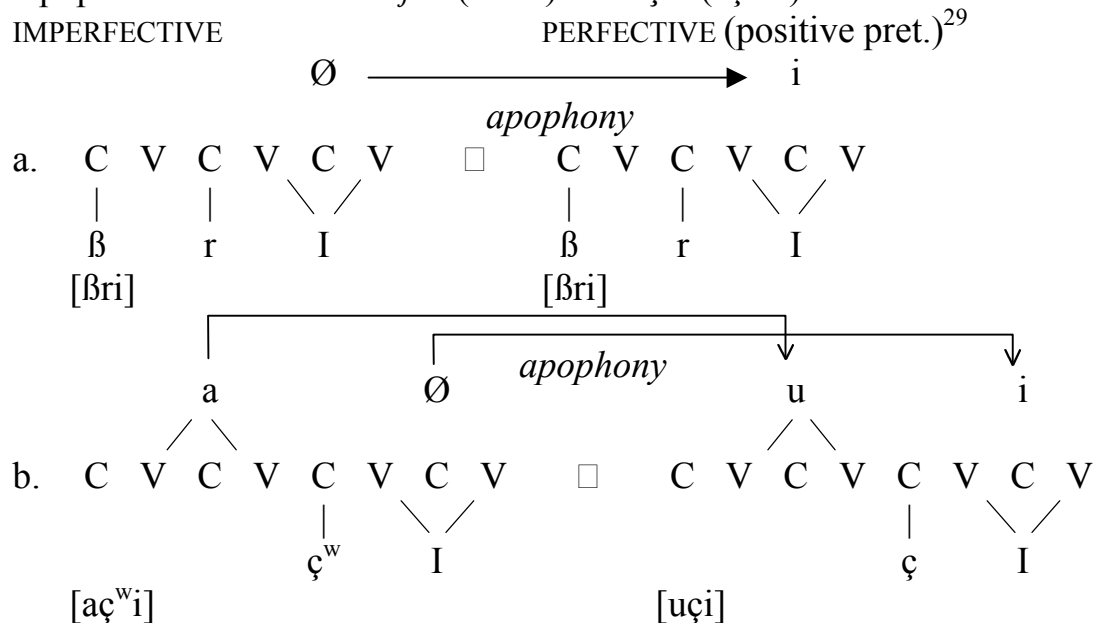


In (62.1) the only empty V position is V₁. But V₁ is properly governed by V₂; as a consequence, no schwa surfaces and the phonetic interpretation of the representation is [βri]. The template in (62.2) does not contain any empty V position, and the surface form is [aç^wi].

7.1.3 Apophonic derivations

To conclude, let us consider the apophonic derivations of glide final verbs in (63).

(63) Apophonic derivations of *βri* (BRY) and *aç^wi* (aç^wY)



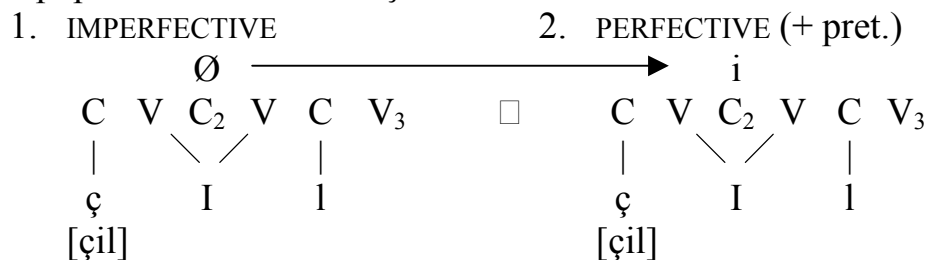
7.2 “Hollow” verbs

To close our examination of Berber verbs, let us finally consider the verbs that display a non-alternating [i] in medial position (type *çil* in (51.c)). I claim that for this verb type as well, [i] is the realization of a radical glide. Here, the evidence comes from the fact that the verbs of this class have a variant in which a glide surfaces. This variant has either the same meaning as the C_1iC_2 verb or a causative meaning as illustrated with the verb *çil* in (64).

(64) A “hollow” verb: *çil*. (loan: < Ar. □KYL).

□çYL *verb* stem I: çil stem III: çil ‘to measure’ (intr. & tr.)
variant stem I: çəyyəl stem III: çəyyəl ‘to measure’ (tr.)

Accordingly, I propose to represent these verbs as under (65). The assumptions made about verbs with final glide in section 7.1.2 also carry over to these verbs: first, the element I does not surface as a glide because its association to C₂ is impossible (see (60) above). Second, since these verbs are □C₁YC₃, their vocalic melody is the same as that of □C₁C₂C³ verbs, namely ∅. Finally, note that in both stems under (65.1) and (65.2), the only anchoring site available to the vocalic melody is V₃. But there is no final [ə] in Kabyle Berber. Therefore no schwa surfaces.³⁰

(65) Apophonic derivation of *çil*

7.3 What about the glide W?

Until now, all the verbs examined contained a radical glide Y. What about radicals containing the other glide of the language, W?

We have seen that an [i] reflecting an underlying radical glide is characterized by the fact that it is not apophonic. Since AP prescribes “i □ a”, this means that [i] does not alternate. Now, similarly, an [u] reflecting a radical glide is not subject to AP and remains [u] in all stems. But /u/ has a peculiar status in AP: its apophonic derivate is also /u/ (step u □ u). This means that an apophonic [u] is an [u] that does not alternate. Therefore, a phonetically non-alternating [u] is ambiguous: it may be either an instantiation of the last step of AP or the expression of a radical glide, which as such, I claim, does not alternate. A closer look at verbs whose vocalization is [u] is thus needed to decide whether [u] is part of the vocalic melody or reflects a radical consonant. Examples of both cases are given below in (66).

(66) Glide W: opacity³¹

<i>radical cons.</i>	<i>loan Arabic</i>	<i>verb</i>		<i>variant</i>		<i>status of [u]</i>	<i>gloss</i>
		<i>stem I</i>	<i>stem III</i>	<i>stem I</i>	<i>stem III</i>		
Hn	HNN	Hun	Hun	(none)	(none)	vocalic melody	‘to pity so’
fɖ	fDD	fudd	fudd	(none)	(none)	melody	‘to bind’
ðwl	TWL	ðul	ðul	ðəbb ^w əl	ðəbb ^w əl	radical	‘to be long’
Hwɟ		huɟɟ	huɟɟ	həbb ^w əɟ	həbb ^w əɟ	glide	‘to shake’

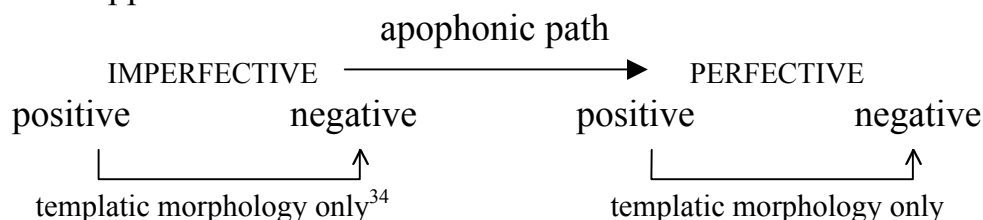
8. Conclusion

In this article, I have attempted to shed some light on the complex system of vocalic alternations that underlies the organization of the Berber verbal system. I have argued that the vocalizations of the perfective stems are predictable on the basis of the imperfective stem: the vocalic melodies of the Imperfective and the Perfective are linked by the apophonic path (AP), a regularity that has already been shown to play a pivotal role in the morphology of various unrelated languages.

I have argued that the aspectual opposition can be reduced to a single process, namely apophonizing the vocalic melodies along AP. AP uniformly applies between the Imperfective and Perfective to all radical vowels and in all verb types.³² The vowel may fail to surface in the stem III forms due to place restric-

tions of the template. Since stem IV is formed by extension of the template, this verb form offers a window onto the vocalic melody in the stem III forms. Accordingly, all that needs to be lexicalized is the AORIST stem.³³

(67) Aspectual opposition



The analysis proposed here may open a new perspective for the derived verbs as well, as shown by the provisional set of data given in the following table. I leave a closer examination of the derived verbs for further study.

- (68) Derived verbs :
- a. /s/– causative base
 - b. /m/– reciprocal base
 - c. /ts/– passive base

<i>primary base</i>		<i>secondary base</i>						
		<i>causative</i>		<i>reciprocal</i>		<i>passive</i>		
<i>I</i>	<i>III</i>	<i>I</i>	<i>III</i>	<i>I</i>	<i>III</i>	<i>I</i>	<i>III</i>	
<u>anəf</u>	<u>unəf</u>	ssimən	ssamən	myanəf	myunəf	—	—	‘to let’
rəbbi	rəbba	—	—	mrəbbi	mrəbba	ttsurəbbi	ttsurəbba	‘to bring up’

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Notes

- * I am grateful to Jean Lowenstamm for stimulating discussions of the issues dealt with here and more generally for his help and for sharing his insights with me. Many thanks are due to Patricia Cabredo Hofherr and Philippe Ségéral for their comments on an earlier draft of this article.
- 1 In this article, the following notation is used: /x/ = voiceless uvular fricative, /□/ = voiceless pharyngeal fricative, /y/ stands for API /j/. A dot below (e.g. /t/, /ð/) indicates that the segment has emphatic articulation. All other symbols are standard.
 - 2 Other works within this framework are: Bendjaballah (1998, 1999a, 1999b), Boyé (1996, 2000), Chekayri & Scheer (1996), Guerssel & Lowenstamm (1993, 1996), Hérault (1989), Larsen (1994, 1998), Lowenstamm (1998), Scheer (1996, 1998a, 1998b, 2000), Ségéral (1995, 1996), Ségéral & Scheer (1996, 1999).
 - 3 In this article, I will not discuss the case of the glides, which are elements that can be linked to C positions and V positions as well. For discussion see Kaye & Lowenstamm (1984), and, for a different point of view, Guerssel (1986a).
 - 4 The definitions given in (6) and (7) differ from those given in standard GP. For discussion specifically within the CVCV model, see Larsen (1994), Lowenstamm (1998), Scheer (1996, 1998b).

- 5 I assume the interpretation of final empty V positions to be dealt with by the licensing of final empty nuclei proposed in Kaye (1990). This point will however not be crucial in what follows.
- 6 For a similar argumentation for Moroccan Arabic, see Kaye, Lowenstamm & Vergnaud (1990:214).
- 7 This hypothesis has been adopted by Kabbaj (1990) for Maghribi Arabic, Lowenstamm (1996) for Chaha and Ségéral (1995) for Ge'ez. An independent motivation for this hypothesis in Berber is provided by the formation of the INTENSIVE AORIST. A detailed discussion of the argument is however beyond the scope of this paper; for details, see Bendjaballah (1995).
- 8 The parameter in (13) is a condition on the association of vocalic elements to V positions only. I do not consider here the case where the elements I and U are associated to C positions.
- 9 For such a position, see among others Chaker (1984:175), Hanoteau (1906:106-111), Mameri (1976:80; 1986:47-60), Naït-Zerrad (1994:16, 32-33, 36-44, 59-62).
- 10 An adequate characterization of the aspectual values of the different stems is beyond the scope of this paper. For discussion, see for instance Chaker (1995:53-62).
- 11 In perfective forms, the stem itself is preceded by the third masc. sg. personal marker *i-/yǝ-*. The negative preterite form involves the discontinuous particle *ur...ara* on both sides of the verb. This particle is a negative marker.
- 12 In Kabyle Berber, gemination is accompanied by occlusivisation for the whole set of obstruents, by occlusivisation and devoicing for the emphatics. Here gemination of [ð] yields [dd].
- 13 For the special status of stem II within the verbal system of Berber, see Basset (1929: LI).
- 14 This picture emerges from a systematic examination of Dallet (1953). The 21 types listed in (20) represent 1966 verbs out of the 3432 verbs given in Dallet (1953). The verbs that have been excluded all display properties that independently lead us to expect them to behave in an irregular way. I have excluded:
- the derived verbs (causatives, passives ...),
 - the so-called "verbes de qualité". These verbs are not conjugated according to the normal pattern but bear specific inflectional markers, suggesting that they should be treated separately,
 - quadri- and quinquiliterals,
 - reduplicants,
 - biliterals without any peripheral vowel, i.e. verbs whose syllabic structure is CǝC or ǝCC (=17 verbs).
 - verbs that display a vocalic alternation conditioned by the inflexional marker in the positive perfective (e.g. *βðī-β* 'I started' vs. *yǝ-βðǝ* 'he started'). These verbs are the only ones for which a vocalic alternation is manifested inside a given inflectional paradigm.

I therefore assume the 21 types in table (20) to constitute the core of Berber verbs.

- 15 Here is a survey of these characteristics.
- *Verb types 18 and 19*: the formation of stem II proceeds by prefixation and vocalic insertion. Apart from types 18 and 19, such a formation is attested only for quadriliterals. Compare the following forms:
- type 18: *stem I*: wəlləh *stem II*: tswəllih 'to guide'
 - type 19: *stem I*: βarəç *stem II*: tsβarəç 'to bless'
 - quadriliterals: *stem I*: nəzyəm *stem II*: tsnəzyim 'to worry'

Consequently, I assume verbs of type 18 to be quadriliterals. See Guerssel (1983a:40) for a similar position in the Aït Seghrouchen dialect. As for type 19, I do not know what the structure of these verbs is, but I observe that they have a peculiar form for stem II.

– *Verb type 20:*

- This group exclusively contains loans from Arabic “hollow” verbs.
- For some of these verbs, the glide of the root appears in other forms (verbal noun or causative).
- They all have a variant in class 11 (see Dallet (1953: 395)).

For instance, *fəβ* ‘to whiten (hair)’, is a loan from Ar. □fYB. It has a variant *fjβ*; the radical glide Y appears in the derived noun, *ffayəβ*, ‘someone who is white haired’ and in the causative, *fəyyəβ*, ‘to whiten’ (tr).

Hollow verbs are known to be problematic. The question of their adaptation in Berber is thus particularly complex.

– *Verb type 21:*

- the initial vowel of these verbs is always the same as the internal one.
- apart from type 21, this outstanding specificity characterizes the so-called “verbes de qualité” only.

Compare type 21: ixfif ‘be light’
with “verbe de qualité”: iβriç ‘be black’

Most type 21 verbs express a state. One possible explanation would be that these verbs are ancient “verbes de qualité” whose conjugation has been regularized.

- This restriction has been noticed by Basset (1929:XXIII).
- Other works treating apophony: Bendjaballah (1998) on Berber, Bendjaballah (1999a) on Beja, Boyé (1996) on Nepali, Boyé (2000) on French and Spanish, Chekayri & Scheer (1996) on Classical Arabic, Ségéral & Scheer (1994, 1996) on German and Ségéral (1995, 1996) on Akkadian and Ge’ez.
- AP involves elements and not segments (for a justification, see Ségéral & Scheer 1996). The vocalic system of Berber entailing only three peripheral vowels [i], [a] and [u], the elements I, A, and U may be replaced by the segments i, a and u. For convenience, I use this notation from now on.
- This fact has already been noticed in Basset (1929:30): “Le son u, *tout étrange que cela semble*, paraît échapper à toute alternance.”
- Such a presentation appears for instance in Naït-Zerrad (1994:61-62).
- For these facts, see Basset (1929:XXIV).
- Possible vocalizations for a Berber verb in stem I are Ø, I, A, U, A...I, A... Ø, U...I.
- This is reminiscent of what has been called “geminate integrity” in the literature. For discussion, see among others Goldsmith (1990:76-82), Guerssel (1978) and Kenstowicz (1994:410-416).
- Interestingly, an examination of the negative imperfective forms shows that the following implication is true:
 - no realization of [nCv] in the negative Perfective (i.e. stem III = stem IV)
 - ⇒ no gemination of C2 in the negative Imperfective.
 This might be taken as a confirmation of the analysis suggested in section 6.1 in the sense that, if the configuration of the root prevents a realization of the negative infix in the Perfective, and if the negative infix is located in the same position in both aspects, then we expect it to have the same blocking effect in Imperfective, since, what Imperfective and Perfective have in common is the configuration of the root. And this is indeed the case.
- The labial appendix disappears in Perfective forms as a consequence of a general rule of delabialization in Kabyle Berber that could informally be stated as follows: /C^w/ □ C / {u__ ; __u}.
- In this section, the shapes of the derived nouns have been established on the basis of Dallet’s classification (Dallet 1953:373-427).
- I have not been able to find C₁C₂i verbs, where the final [i] alternates. Here again we are confronted with constraints on the vocalic melody of verbs.
- I assume the glide Y to be an element I, see section 2.1 above.
- Note that in perfective forms, for the same reasons that have been precised for imperfective ones in section 7.1.2, the vocalic melody /i/ does not have any opportunity to surface.
- In GP this observation is encoded as follows: final empty V positions are finally licensed.
- Note that, in Kabyle Berber, [w] geminates as [bb^w].

- 32 It is here interesting to compare the directionality of application of AP in Berber and in Classical Arabic. In Classical Arabic, the input of AP is the Perfective, the output the Imperfective. For instance, the 3ms perfective and imperfective forms of \square ktb ‘to write’ are respectively *katab*-a and *ya-ktub*-u. The directionality of application of AP is thus apparently opposite in Berber and in Classical Arabic.

However, if we examine the morphological complexity of perfective and imperfective forms in Classical Arabic, we discover that perfective forms do not bear any prefix whereas imperfective forms do. This observation confirms that the directionality of application of AP corresponds to an increasing morphological complexity.

	Classical Arabic		Berber	
	perfective (simplex, non-prefixed)	imperfective (complex, prefixed)	imperfective (simplex, non-prefixed)	perfective (complex, prefixed)
$\emptyset \square i$	<i>dar</i> \emptyset <i>b</i>	<i>ya-dri</i> <i>b</i>	<i>x</i> δ <i>am</i>	<i>y</i> α - <i>x</i> δ <i>am</i>
<i>i \square a</i>	<i>lab</i> <i>s</i>	<i>ya-lb</i> <i>s</i>	<i>m</i> <i>il</i>	<i>i-m</i> <i>al</i>
<i>a \square u</i>	<i>kat</i> <i>ab</i>	<i>ya-kt</i> <i>ub</i>	<i>f</i> <i>a</i> θ	<i>i-f</i> <i>u</i> θ
<i>u \square u</i>	<i>kab</i> <i>ur</i>	<i>ya-kb</i> <i>ur</i>	<i>f</i> <i>u</i> <i>dd</i>	<i>i-f</i> <i>u</i> <i>dd</i>

- 33 In this study, verb types (20.18) to (20.21) have been excluded. Note however that, if types 18 and 19 are problematic for the mechanism of negative formation since no increase is manifested in stem IV, they do not constitute counter-examples to the apophonic analysis. In the *wallah* type, the vocalization remains completely opaque. As for the *βarəç/fiwər* type, if the first vowel indeed apophonizes as expected, the second vocalic element is neutralized as schwa. Finally, only types 20 and 21 resist the proposed analysis. They entail respectively 39 and 51 verbs, i.e. 3 % of the whole set of verbs.
- 34 I leave the precise analysis of the negative imperfective stem for further research.

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