# The Presence of Vowels in Tashlhit Root Structure: Evidence from the Free State and the Construct State of the Noun[*]

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*Nous présentons un argument en faveur de la racine vocalique en tachelhit, une racine qui contient une (des) voyelle(s). Sur la base de la morphologie de l'état des noms : l'état libre et l'état d'annexion, nous distinguerons entre voyelles initiales constantes et non-constantes, une distinction que la racine purement consonantique ne peut rendre. Cette étude tient compte en priorité de la structure de la racine et se fonde sur la Théorie de l'Optimalité pour mieux expliquer la morphologie de l'état des noms en tachelhit. Nous montrerons par ailleurs que l'interaction entre les contraintes de bonne formation et les contraintes d'alignement permet une meilleure explication de la morphologie de l'état d'annexion qui se base sur la structure de la racine.*

**Mots clés** : tachelhit, racine, état libre (EL), état d'annexion (EA), alignement, affixation, morphologie, Théorie de l'Optimalité.

## 1. Introduction

The notion of the root has been a moot question in a number of studies. In Semitic literature, many scholars dismiss the 'root hypothesis' assuming that roots are abstract entities which are not functional in Hebrew morphology (Bat-El, 1994b; Aronoff, 1994; Ussishkin, 1999; Ratcliffe, 2004). Contrastively, arguments have been adduced in a number of other studies which claim that roots are significant morphological units (Rose, 2003; Tobin, 1990; Prunet *et al.*, 2000; Arad, 2006). In

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We use IPA symbols in the transcription of Tashlhit data. Emphatic sounds are represented by a dot under the letter.

Amazigh, the concept of root has also been the subject of much debate[1]. One claim defends the idea that roots may consist of vowels in addition to consonants (Dell & Elmedlaoui, 1992; Bensoukas, 2001 and Kossmann, 1997). As opposed to this claim, Cantineau (1950), Galand (1984), Taifi (1991), Chaker (1990) and Idrissi (2001) contend that the root in the Amazigh language is consonantal.

In this paper, we will contribute to the debate on the root structure in Amazigh, Tashlhit in particular. We will argue that the consonantal root is insufficient to account for the constancy and non-constancy of the initial vowel of Tashlhit nouns. To this end, we will try to investigate the status of the initial vowel of derived nouns in both the Free State (henceforth, FS) and the Construct State (henceforth, CS). We will show that initial vowels of Tashlhit nouns are of two types: morphological, as in *argaz* (FS), *urgaz* (CS) 'man', and lexical (root vowel) as in *argan* (FS), *wargan* (CS) 'argan oil'[2]. Our argument supports the idea that Tashlhit lexicon is organized in a way that recognizes both consonantal and vocalic roots.

Our argument is couched in a formal constraint-based analysis under the grounds of Optimality Theory (OT) (Prince and Smolensky, 1993/2004; McCarthy &Prince, 1993; among others). The analysis we provide relies heavily on the reference to the root structure in the input. Our contribution is not limited to Moroccan linguistics, but it also provides further evidence in support of the universal ranking Root-Faith >> Affix-Faith (Beckman, 1998) where only affixal segments and not root segments are subject to phonological contrasts. It also provides a strong argument for the relevance of Alignment constraints.

This paper is divided into four main sections. §2 is a general description of what the CS is and presents basic facts about the behavior of the initial vowel of Tashlhit deverbal nouns. §3 sets the outcomes of the consonant root hypothesis, drawing a distinction between consonantal roots and vocalic roots. §4 is an attempt to provide a constraint-based analysis to constant and non-constant initial vowels of nouns in their FS and more deeply in their CS. §5 discusses the optimization of Tashlhit lexicon in the light of our analysis. Then we conclude (§6).

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[1] In Morocco, Amazigh is not restricted to only one variety but rather refers to three major ones: Tarifit (in the north), Tamazight (in the center) and Tashlhit (in the south). This study investigates the Tashlhit variety spoken in the south of Morocco. However, it is worth noting that the farther you go from one area to another in the south of Morocco the more variation you notice. Data being investigated in the present study represent the variety of Tashlhit spoken in the rural commune Ighrem N'Ougdal in Ouarzazate province.

[2] We will use the term root vowel throughout the paper to refer to lexical vowels.

## 2. The construct state

### 2.1. Context

A noun is in the CS when it functions as the subject of a preceding verb (1-a), the object of a preposition (2), the complement of a noun (3), or the complement of a quantifier (4) (Chaker, 1988; Saib, 1982; Guerssel, 1983). In (1-a), we provide examples of the first context of CS, in which the noun is the subject of a preceding verb. The same noun is shown in the FS as a preverbal subject in (1-b) and as an object of a verb in (1-c):

1. a-  i- smun  **ufruɣ**  kra  n  iẓṛan

    he  gather-perfective  boy-CS  some  of  stones
    'The boy gathered some stones'

   b-  **afruɣ**  i- smun  kra  n  iẓṛan

   c-  mnaggar- **ɣ**  a**fruɣ**
    meet-perfective  I  'boy, FS'
    'I met the boy'

A noun is also in the CS when it is the object of a preposition. In (2), we show examples of both masculine and feminine nouns in the CS.

2. a- i  dda  s  ugdal

    he  go-perfective  to  Agdal-masculine-CS
    'he went to Agdal'

   b-  i  dda  s  tgmmi
   he  go-perfective  to  home-feminine-CS
   'he went home'

We also find nouns in the CS when they function as complement of a noun (3) :

3. sˁsˁʒṛt  n  **wargan**

   the tree  of  argan nut-masculine-CS
   'the argan tree'

In this example, we notice that the noun in the CS appears after the preposition *n*, which makes it similar to the examples in the second context (ii). However, in other varieties of Amazigh, a complement of a noun is put on the CS with no need of a preposition: *awal umaziɣ / awal n umaziɣ* 'the word of an Amazigh person'

(Chaker, 1990). Another category mentioned in Chaker (1990) falls under the same context. It includes some forms that are known by native speakers to refer to certain nouns, say *ajt* for boys and *ist* for girls. The noun that surfaces after these categories is put on the CS. Other forms like *gar*, *bu,* which are referred to as "Termes initiaux" are also followed by nouns in the CS.

Another example in which the noun is put in the CS is when the noun functions as complement of a quantifier.

4.        jan    **urgaz**

           one    man-CS
           'one man'

           jat **tmɣart**
           one    woman-CS
           'one woman'

It is worth noting that the CS also applies to nouns with initial *i* and nouns with initial *u*. Their masculine form is marked with an initial *i* and an initial *u*, respectively. Apart from intuitive knowledge, it is hard to distinguish between the FS and the CS of masculine nouns with initial *i* and those with initial *u*. However, their feminine counterparts show no difference from nouns with initial *a*; the initial morphological vowel is present in the FS and absent in the CS. The same applies to the plural form. We will exemplify this behavior in the following section.

## 2.2.    Allomorphy

The CS has been given widely disparate treatments in the literature (Vycichl, 1989; Chaker, 1988; Brugnatelli, 1987, 1997, among others)[3]. Applegate (1958) and Abdel-Massih (1971) observe that the *a* alternates with *u* as in *aḍaḍ* (FS)/ *uḍaḍ* (CS) 'finger'. Abdel-Massih (1971) agrees that *ta* alternates with *t* when the feminine noun is in the CS as is exemplified in *tamaɣa*/ *tmaɣa* 'fight'[4]. However, as Guerssel (1983) observes, this is just a description of the data. No

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[3] Focus in this study has been on the morphological treatment of the CS. The latter has also been dealt with from a syntactic perspective. See Guerssel (1987), Ennaji (2001) and Lahrouchi (2013) for that matter.

[4] One possible way to account for the alternation of the initial vowel in the perfective form is 'apophony'. In classical Arabic, Guerssel & Lowenstamm (1996) introduces a null melodic segment and suggests the "apophonic system": ø→i→a→u→u, that acocunts for vowel ablaut noticed in perfective > imperfective forms. The authors add that this has characterized other languages: "Ge'ez (Ségéral 1995), Kabyle Berber (Bendjaballah 1995)" and Modern German "(Ségéral & Scheer 1995, and Ségéral 1995)".

explanation has been provided and no attempt to relate the masculine to the feminine form has been made.

The CS in Tashlhit is marked with a high vocoid /U/ that may surface as a vowel or a glide in the masculine form based on its syllabic status whereas in the feminine form, the CS is marked by the absence of the prefixal initial vowel (Guerssel, 1983; Jebbour, 1991; Dell and Jebbour, 1991). Examples are:

5.

| | |
|---|---|
| i-lla **wtfl** | 'it's snowing' |
| mikk n **utfl** | 'some snow' |
| jat **tgmmi** | 'one house' |

The CS of *atfl* 'snow' is marked with a glide *w* because of the preceding vowel. If the preceding verb is consonant-final, the morpheme is realized as a full vowel *u*; for example *i-ḍr utfl* (it-fell-snow 'it snowed').

The alternant *w* is also attested in *u*-initial nouns as well which suggests that the initial vowel *u* of such nouns is a root vowel. As we already mentioned, our analysis is not restricted to *a*-initial nouns only but also to *u*- initial nouns and *i*-initial nouns. Examples of the latter are as follows:

6. Sg. Pl.

| FS | CS | FS | CS | |
|---|---|---|---|---|
| urti | wurti | urtan | wurtan | 'garden' |
| uʃʃn | wuʃʃn | uʃʃann | wuʃʃann | 'wolf' |

A different alternant is found in the context of *i*-initial nouns.

7.
| imi | jimi | imawn | jimawn | 'mouth' |
|---|---|---|---|---|
| ifis | jifis | ifis | jifis | 'hyena |
| izi | jizi | izan | jizan | 'fly' |

A similar remark can be made with respect to masculine plural nouns

8.
| irgazn | jrgazn |
|---|---|
| ifrxan | jfrxan |

In the following section, we deal with a basic distinction between initial vowels that motivates the vowel/glide alternation characterizing the CS morpheme.

## 2.3.    Initial vowels of non-deverbal nouns

The bulk of this research is of concern to constant and non-constant initial vowels in the FS and more particularly in the CS of Tashlhit nouns, which contributes to the debate on the root structure in Tashlhit. Examples of Tashlhit nouns with different root structures are presented below in their FS and their CS.

9.

| FS singular | CS singular | FS plural | CS plural | Gloss |
|---|---|---|---|---|

a-    Masculine nouns with initial non-constant vowel

| FS singular | CS singular | FS plural | CS plural | Gloss |
|---|---|---|---|---|
| amugaj | umugaj | imugajn | jmugajn | 'bull' |
| igrtil | jgrtil | igrtal | jgrtal | 'straw mat' |

b-    Feminine nouns with initial non-constant vowel

| | | | | |
|---|---|---|---|---|
| tafruxt | tfruxt | tifrxin | tfrxin | 'girl' |
| tifdnt | tfdnt | tifdnin | tfdnin | 'toe' |
| | | tumẓin | tmẓin | 'barley' |

c-    Masculine nouns with initial  constant vowel

| | | | | |
|---|---|---|---|---|
| aḍʒaṛ | waḍʒaṛ | aḍʒaṛn | waḍʒaṛn | 'neighbor' |
| ilm | jilm | ilmawn | jilmawn | 'skin' |
| udm | udm/wudm | udmawn | udmawn | 'face' |

d-    Feminine nouns with initial constant vowel

| | | | | |
|---|---|---|---|---|
| tallunt | tallunt | tallunin | tallunin | 'sieve' |
| tili | tili | tattn | tattn | 'ewe' |
| tunfijjt | tunfijjt | tunfijin | tunfijin | 'hiding' |

The assumption made in the literature is that the CS is derived from the FS or what is also referred to as the 'unmarked state'. Guerssel (1983) proposed a rule based analysis of the CS that has been reformulated later under a non-linear approach stating that Amazigh lexicon consists of two classes of nouns (Jebbour, 1991):

- The first class consists of nouns which have the underlying template / # VCX # / (with non-constant vowel) (examples (9-a and 9-b)

- The second class has nouns that have the underlying template: / # VVCX # / (with constant vowel) (examples 9-c and 9-d)

The Presence of Vowels in Tashlhit Root Structure: Evidence from the Free State and the Construct State of the Noun

According to Jebbour (1991), the behavior of nominal forms depends on whether they belong to class one or two adding that there are two morphological rules to form the CS: one particular to masculine nouns and one to feminine nouns.

Adopting another approach, the CVCV model, Lahrouchi (2013) tries to explain why the CS marker *w-* and the feminine marker *t-* do not co-occur resulting in forms like *tfruxt* 'girl' and not *\*tufruxt*. Details of this analysis are provided in Lahrouchi (2013: 63). However, under the premises of the same approach, Ben Si Said (2014) argued against the proposed analysis by stating that there is no explanation of why the position V of the initial CV is not occupied by the CS marker, which may surface as a vowel *u* as well. Following this possibility, Lahrouchi's (2013) analysis would produce erroneous forms. More details about this argumentation are provided in Ben Si Said (2014: 88-89) although the latter study did not provide any alternative analysis to the matter. Ben si said (ibid.) adds that the realization of the CS marker as *u* or *w*, in Kabyle, is subject, on the one hand, to the presence or absence of a vowel in the final position in the preceding word and, on the other hand, to root initial segments, i.e. if the root's initial segments are CC, the CS marker surfaces as *w* whereas if the root's initial segments are CV, the CS marker surfaces as *u*. In Tashlhit, however, this generalization does not apply. Examples are: *argaz* 'man' and *argan* 'argan oil'. They seem to have the same internal structure but their CS is *urgaz* and *wargan*, respectively. As for the question of why feminine nouns do not surface with a morphological vowel, we will try to provide an alternative analysis to the matter in a later section.

We will limit the scope of the present study to the status of the initial vowel of nouns. As is already mentioned in the literature (Guerssel, 1983 and Dell and Elmedlaoui, 1992), there are two types of initial vowels: constant and non-constant. Non-constant vowels are assumed to be morphological, denoting "number marker" (Basset, 1952; Guerssel, 1983 and Dell and Elmedlaoui, 1992). Constant vowels, on the other hand, are intriguing inasmuch as they are subject to controversy. In studies of Tashlhit (Guerssel, 1983; Jebbour, 1991) and Kabyle (Ben Si Said, 2014), this type of vowel is realized as a stem vowel whereas Dell & Elmedlaoui (1992) suggests that constant vowels are radical although the study did not present any further explanation on this point.[5]

In the present paper, we contend that constant vowels are root vowels and not stem vowels. Our argument emerges from deverbal nouns whose initial vowels are constant and remain as such in the FS and more clearly in the CS. Unlike the assumption cited earlier that the FS forms the base of derivation of the CS, we base our analysis on the proposition that the FS and the CS are two derivations

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[5] We consider 'stem' as different from 'root'. The two terms may be used interchangeably as in Matthews (1972) (cited in Aronoff, 1994) where it was mentioned that 'root' and 'stem' may be used as "equivalent senses".

that take the root as their input. We argue that constant initial vowels are root vowels, and it is their privileged status that militates against any alternation. We will prove that the constant initial vowels in the CS are maintained from the the root and we will show that the presence and or absence of the initial vowel in the CS of feminine Tashlhit nouns is better accounted for in OT manner as the result of conflicts between positional faithfulness, markedness and Alignment constraints.

## 3. Consonantal root vs. vocalic root

### 3.1. Constant vowel vs. non-constant vowel in deverbal nouns

It is worth reiterating that our study attempts to provide further evidence for the idea that Tashlhit lexicon is characterized by both consonantal roots and vocalic roots. To this end, let us consider some verbal inflections and nominal derivation of the same roots.

| 10. Aorist | Imperfective | Perfective | Noun (FS) | Noun (CS) |
|---|---|---|---|---|
| a- | | | | |
| **a**si 'carry' | tt**a**si | **u**si[5] | **a**sisi | w**a**sisi |
| **a**ls 'repeat' | tt**a**ls | **u**ls | **a**llas | w**a**llas |
| **a**ss 'tie' | tt**a**ss | **u**ss | **a**ssas | w**a**ssas |
| b- | | | | |
| **a**g$^w$l 'hang' | tt**a**g$^w$l | **u**gl | t**a**guli | t**a**guli |
| **a**ru 'give birth' | tt**a**ru | **u**ru | t**a**rwa/**a**rraw | t**a**rwa/w**a**rraw |
| c- | | | | |
| kʃm 'enter' | kʃʃm | kʃm | **a**kʃʃum | **u**kʃʃum |
| fsi 'open' | fssi | fsi | **a**fsaj | **u**fsaj |
| frg 'border' | ffrg | frg | **a**frig | **u**frig |
| d- | | | | |
| nkr 'wake up' | nkkr | nkr | t**a**nkra | tnkra |
| lwr 'escape' | lgg$^w$r | lwr | t**a**lwra | tlwra |
| gn 'sleep' | ggan | gn | t**a**guni | tguni |

The constancy of the initial vowel in the verbal inflections and nominal derivations in (10-a) and (10-b) presented above suggests the presence of this vowel in some underlying structure which forms the basis of these derivations. The examples in

(10-c) and (10-d) show a clear derivational and inflectional process of the consonantal root with vowels emerging from morphological patterns. In this article, I will confine myself to the nominal derivations particularly to the presence/ absence of the initial vowel in CS with reference to the presence/ absence of this vowel in the verbal paradigms.

## 3.2.    The Consonantal-Root hypothesis

As is amply discussed before, the root structure is much debated in the literature. Thus, it would be of interest to see how both the consonantal root hypothesis and the vocalic root hypothesis would explain the issue at hand. We first suppose that Tashlhit lexicon consists of only one type of roots: consonantal roots (Taifi, 1991; Idrissi, 2001; Lahrouchi, 2010). On this assumption, forms like *asisi* 'gifts that the groom gives to the bride on the wedding day', *allas* 'afternoon meal/darkness' and *assas* 'tightening' (x-a) will have the roots √*s*, √*ls* and √*ss* or √*s*, respectively. For the sake of illustration, we take the root √*ls* as an example from which we can derive ***allas*** and *timlsit* 'clothing'.

11.
√ls=root

|        | Aorist        | Imperf.   | Perf.   | Noun (FS)   | Noun (CS)   |
|--------|---------------|-----------|---------|-------------|-------------|
| a-     | als 'repeat'  | ttals     | uls     | allas       | wallas      |
| b-     | ls 'wear'     | lssa      | lsa/i   | timlsit     | tmlsit      |

Given the basic description of the CS, we would expect the nominal form *allas* (FS) to have the corresponding form *ullas* (CS) with the initial vowel as being a number marker in the FS and the CS marker in the CS. In the second derivation *timlsit*, the initial vowel does not pose a problem to the description provided so far; it is absent in the CS. This does not present any difference from the regular pattern in which the initial vowel of the CS is absent in the feminine form. This raises the question of why the two derivations behave differently although they have the same root structure √ls; i.e. we expect the masculine form of the noun to be *ullas* in the CS. The constancy of the initial vowel in (11-a) and the non-constancy of the initial vowel in (11-b) are hard to account for using the consonantal root √ls.

In addition to this, the initial vowel in *allas* surfaces not only in the nominal paradigm but also in the verbal forms. One obvious question is of concern to the difference between the derivations and inflections in (11-a), which surface with a constant initial vowel and the ones in (11-b), which do not. Having the same root √ls, the initial vowel in (11-a) is problematic. Thus, we question the affiliation of that vowel since it is clearly not a consistent morphological vowel. The distinction being made between (11-a) and (11-b) suggests that the two cases may have different roots and not the same root √ls as it seems to be. The presence of the

initial vowel in all the forms in (11-a) suggests that it emerges from some underlying structure which, in our case, we assume is the root √als.

## 3.3. The Vocalic-Root hypothesis

Now that we have shown that the consonantal root is insufficient to account for the constancy of the initial vowel in examples like *allas*, we should appeal to the vocalic root hypothesis. With the same examples of *allas* and *timlsit*, we suggest that they have the roots √als and √lsa, respectively, which accounts for the presence/ absence of the initial vowels in the forms in (11-a) and (11-b). Given what has amply been discussed so far, we will present a constraint-based analysis that puts our explanation into a formal theoretical framework.

# 4. Free state (FS) and construct state (CS) of the noun and constraint interaction

## 4.1. On Optimality Theory

Optimality Theory is a grammatical framework of linguistic analysis introduced by Prince and Smolensky (1993/2004) and McCarthy and Prince (1993a, b) as a constraint-based approach which differs from earlier models in various ways. OT dropped the notion of rule-based analysis and emerges as an alternative to the serial derivation in SPE (Chomsky and Halle, 1968). It presents a new model which relates the input to the output. OT shifts focus from language specific rules (SPE & Aspects) to universal and violable constraints.

OT's architecture can be explained through the following figure: (McCarthy, 2002)

12. Input → GEN → Candidates → EVAL → Output

GEN and EVAL, two main components of OT grammar, are responsible for determining the optimal candidate on the basis of a constraint hierarchy. GEN (generator) emits an infinite number of candidates which are related to the input in diverse ways without any restrictions. EVAL, on the other hand, takes over through eliminating all candidates but the one incurring the least number of violations of the highest ranking constraint, i.e. it filters candidates and selects the most harmonic one with respect to the constraint hierarchy.

The basic tenet of OT lies in the interaction between markedness and faithfulness constraints. Markedness constraints predict cross-linguistic unmarked phenomena. They require some well-formedness structures in the output. Unlike faithfulness constraints, markedness constraints focus on the output form regardless of the input. Faithfulness constraints, on the other hand, preserve the lexical contrasts of the input in the output. In addition, it has been proved cross-linguistically that roots exhibit more markedness than do affixes (McCarthy and Prince, 1995; Beckman, 1998; Lombardi, 1999 and others). In her proposal, Beckman argues that roots

exhibit a particular behavior regarding phonological contrasts and processes. Roots are privileged for retaining phonological contrasts which non-privileged positions seek to neutralize. Second, roots may trigger phonological processes. Third, roots are not targeted by all phonological processes. These phenomena prove that the positional privilege of roots may be accounted for through the higher ranking of root faithfulness constraint.

Having presented briefly the basic tenets of OT, we can now turn to an examination of the morphology of the FS and the CS from an Optimality-theoretic perspective.

## 4.2.    Basic account: FS morphology

In this section, we will present a brief and basic analysis of the FS morphology. The latter is realized through affixation in both masculine and feminine nouns. Although constancy vs. non-constancy of the initial vowel is not explicitly clear in the FS, we will present a formal constraint based account of the FS morphology and show that the initial vowel in the FS may also be a root vowel or a morphological vowel (number marker). The universal ranking Root-Faith>> Affix-Faith preserves the root initial vowel in both the FS and the CS leaving the option for the morphological vowel to occur only in cases whose root is consonant initial. Before we turn to the specifics, we will present the constraints that prove crucial to our analysis of the FS morphology.

13.

| **MAX-RT:** | input root segments should correspond to output root segments |
|---|---|
| **DEP:** | output segments should correspond to input segments |
| **\*VV:** | adjacency of vowels is prohibited |
| **MAX-Aff:** | input affix segments should correspond to output affix  segments |
| **ALIGN-L (FS):** | the left edge of the FS affix coincides with the left edge of the prosodic word |

Tashlhit does not tolerate vowel sequences. Hence, the constraint *VV is undominated militating against any vowel hiatus. On the other hand, j-epenthesis is resorted to in other contexts as in *a-j-argaz* suggesting that DEP is a dominated constraint which may be outranked by another constraint that drives j-epenthesis in specific contexts. The FS and the CS of masculine nouns are always marked with the initial vowel, which explains the low ranking of MAX-Aff. It is important to note that the positional faithfulness ranking MAX-RT>>MAX-AFF is of great relevance to this analysis for it preserves the root vowel from any morphological operation driven by the FS and/or the CS. ALIGN-L (FS) is responsible for prefixation. The role of Alignment constraints will be discussed more deeply in a later section when we talk about the absence of the initial vowel of the CS in feminine nouns with consonant initial roots. Summarizing thus far, we get the ranking schema presented below.

14.*VV>> MAX-RT >> DEP >> ALIGN-L (FS) >> MAX-Aff (FS)

Let us, now, consider the FS form of masculine and feminine nouns derived from roots whose initial segment is a vowel.

15. Masculine Nouns with the Root Vowel

| FS, als | *VV | MAX-RT | DEP | ALIGN-L (FS) | MAX-Aff (FS) |
|---|---|---|---|---|---|
| i- a+ allas | * | | | | |
| ii- a+ jallas | | | * | | |
| iii-a+llas | | * | | | |
| ☞ iv- allas | | | | | * |

As has been already mentioned, focus will be on the initial vowel only. The prefinal vowel is assumed to be templatic[6]. ALIGN-L (FS) ensures the prefixation of the number marker *a* in the FS. The candidate (15-i) surfaces with two adjacent vowels: the root vowel *a* and the number marker *a*, creating a hiatus that violates the markedness constraint *VV[7]. As a way to avoid hiatus, candidate (15-ii) resorts to epenthesis violating the constraint DEP. Candidate (15-iii) violates the high-ranked constraint MAX-RT by virtue of deleting the root vowel and retaining the prefixal one. In nouns with root initial vowel, candidates like (15-iv) are the optimal ones because they satisfy the root faithfulness constraint and delete the prefixal vowel *a* incurring a non-fatal violation of the lower ranked constraint MAX-Aff (FS). Nouns whose root is vowel initial, the ones that surface with a constant vowel, lack the affixal/morphological vowel in the FS word initially.

Feminine nouns in the FS ($\sqrt{ag^wl}$ → *taguli* 'hanging') act in the same way as masculine nouns do[8]. The *t-* is the feminine marker in Tashlhit. The latter may occur as a circumfix *t—t* (*tiflut* 'door') or just as a prefix, but we will not dwell on that point for now. In like manner as masculine nouns, the output feminine noun is

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[6] One fairly persuasive argument emerges from consideration of Action nouns and Agentive nouns (Bensoukas, 2001: 48-50). It has been argued that this vowel is templatic and is "a property of the nominal component of the morphology in which the root is realized." Bensoukas (ibid.) adds that this type of vowel has a fixed position in the template having no root affiliation. For the sake of convenience, we will skip consideration of this type of vowel in all the following tableaux.

[7] The use of ONSET constraint in this case is not appropriate, for it is not actually about the syllable structure. Both *rzm* and *ag^wl* are onsetless word initially, which is tolerated in Tashlhit, and both have the exact same syllable structure. Although Tashlhit has syllabic consonants, this is not of any relevance here. It is more about whether the initial segment surfaces as a vowel or a consonant. *rzm* would allow for prefixation because this would create no vowel hiatus word initially, but *ag^wl* would not for the same reason.

[8] The labial *w* of *ag^wl* does not surface in the output form due to the presence the templatic round vowel in the candidates. For more details about labial dissimilation, see Bensoukas (2014).

always the one that maintains the root vowel and avoids hiatus (t+a+aguli) through the deletion of the morphological initial vowel.

So far, we have provided an analysis for nouns whose roots are vowel initial and explained that they do not take the initial morphological vowel in the FS form. Now, we examine the FS of nouns which are derived from consonant initial roots and which surface with the initial morphological vowel.

16. Masculine nouns with the morphological vowel

| FS,r̥zm | *VV | MAX-RT | DEP | ALIGN-L (FS) | MAX-Aff (FS) |
|---|---|---|---|---|---|
| i- r̥zm | | | | | *! |
| ☞ ii- a+r̥ẓẓum | | | | | |

For nouns whose root is consonant initial, MAX-RT is always satisfied since the consonants of the root are preserved in all competing candidates. The constraints DEP and *VV are vacuously satisfied since there is no root initial vowel at play that would serve to create hiatus with the morphological vowel (FS). In the tableau above, the FS affix is not realized in the first candidate violating MAX-Aff. Note that nouns whose roots are consonant initial surface with the initial morphological vowel *a* in the FS form. The same applies to feminine nouns in which the morphological vowel surfaces in the output form. Examples are: √*nkr*→ *tankra* 'wake up (N.)' and √*lgr* —> *talgrawt* 'lock, Action N.'. Now, we are in a position to turn to examine the constancy and non-constancy of initial vowels in the CS.

## 4.3.  Constant and non-constant initial vowel in the CS

The distinction between the root vowel and the morphological vowel is made more explicit and clear in the CS of nouns. It is worth reiterating that in the present analysis, we adopt a different approach stating that the root forms the base of derivation of both the FS and the CS. We will prove that there is no denying that a reference to the root segment proves very crucial in the understanding of the different behavior of the CS of Tashlhit nouns.

As is amply discussed, the CS of *a*-initial masculine nouns is characterized by the initial vowel *u* (√*r̥zm* → *ur̥zzum*, CS), and their feminine counterpart is characterized by the absence of this initial vowel (√*nkr* → *tnkra*, CS/ *tunkra*). Thus, it is our contention that the CS of Tashlhit nouns is realized through affixation as is the case for the FS. We propose that the CS morphology is characterized by the same basic ranking we argued for in the FS morphology. The CS of Tashlhit nouns with vowel initial roots surface with an initial glide *w* instead of an initial full vowel *u*. This violates the faithfulness constraint IDENT-[voc]. This constraint ensures the preservation of the vowel suggesting that it is ranked lower than the other constraints so as not to rule out outputs surfacing with a

prefixal glide. The tableaux below present illustrative examples of the rankings we have established.

17. Masculine nouns (with a consonantal root)

| CS, r̥zm | *VV | MAX-RTRT | DEP | ALIGN-L (CS) | MAX-Aff (CS) |
|---|---|---|---|---|---|
| i- r̥zm | | | | | *! |
| ☞ ii- u-r̥z̥z̥um | | | | | |

18. Masculine nouns (with a vocalic root)

| CS, als | *VV | MAX-RT | DEP | ALIGN-L (CS) | MAX-Aff (CS) | IDENT-[voc] |
|---|---|---|---|---|---|---|
| i- als | | | | | * | |
| ii- u+ allas | * | | | | | |
| iii- u+ jallas | | | * | | | |
| iv- u+llas | | * | | | | |
| ☞ v- w+allas | | | | | | * |

The input in the tableaux above consists of the root in addition to the CS affix. The output form surfaces with the root vowel and the CS vowel that alternates to a glide, satisfying MAX-RT and *VV. The candidate in which the CS is not realized is ruled out by virtue of violation of MAX-Aff(CS).

Unlike the CS of masculine nouns, feminine nouns are not marked by the initial vowel. The absence of the initial vowel in feminine nouns is due to the competition of the feminine affix and the CS affix over the initial position. This idea has been argued for in Lahrouchi's (2013) from a CVCV approach. A wrap up to a criticism to the latter analysis is provided in section 2.3. In this paper, we argue that the absence of the prefixal vowel in the the CS of Tashlhit feminine nouns is a result of the interaction between ALIGN constraints. The two constraints that come at play in the CS of Tashlhit feminine nouns are ALIGN-L (Fem) and ALIGN-L (CS). The former constraint is satisfied when the left edge of the prosodic word coincides with the left edge of the feminine affix and is violated otherwise. The latter constraint is satisfied when the left edge of the prosodic word coincides with the left edge of the CS affix and violated otherwise. The outranking of ALIGN-L (Fem) over ALIGN-L (CS) preserves the initial position for the feminine affix. As a repercussion of this ranking, the CS prefix is not realized favoring deletion over misalignment.

However, ALIGN constraints do not distinguish between root vowels (constant) and morphological vowels (non-constant). Thus, we appeal to the ranking MAX-Root >> MAX-Aff that militates against any alternation of the root vowel. As it is in the FS, in the CS morphology, MAX-RT is always a dominating constraint to

rule out the possibility of making the root vowel subject to deletion when adjacent to the prefixal vowel. The role of the root vowel is clearer in the CS morphology; the adjacency of the root vowel and the prefixal one in Tashlhit masculine nouns results into the alternation of the prefixal vowel into a glide *w* (*u-allas* → *wallas*).

19. Feminine nouns (with a consonantal root)

| Fem, CS, nkr | *VV | MAX-RT | DEP | ALIGN-L (Fem) | ALIGN-L (CS) | MAX-Aff (Fem) | MAX-Aff (CS) |
|---|---|---|---|---|---|---|---|
| i- tunkra | | | | | * ! | | |
| ii- utnkra | | | | * ! | | | |
| ☞ iii- tnkra | | | | | | | * |
| iv- unkra | | | | | | * ! | |

20. Feminine nouns (with a vocalic root)

| Fem, CS, agʷl | *VV | MAX-RT | DEP | ALIGN-L (Fem) | ALIGN-L (CS) | MAX-Aff (Fem) | MAX-Aff (CS) |
|---|---|---|---|---|---|---|---|
| i- tuaguli | * ! | | | | * | | |
| ii- utaguli | | | | * ! | | | |
| iii- tujaguli | | | * ! | | * | | |
| iv- uguli | | * ! | | | | * | |
| v- tuguli | | * ! | | | * | | |
| ☞ vi- taguli | | | | | | | * |

Only the root vowel surfaces in the CS of feminine nouns for it is preserved by MAX-RT; the morphological vowel does not surface by virtue of the non-availability of the initial position. The latter is occupied by the feminine affix.

The non-realization of the CS in Tashlhit feminine nouns has also been argued for in Bensoukas (2010) where he explains that the CS affix opts for non-realization to avoid the mis-alignment of the CS-Affix, even at the cost of deletion. The author extends the idea to masculine plurals, in which the CS affix is not realized either. This is exemplified in the illustrative tableau below (Bensoukas, 2010).

| i+funas+n, CS | Realize-M(Pl.) | Align-L M-Pl | Align-L-M-CS |
|---|---|---|---|
| ☞ ifunasn | | | |
| funasn | *! | | |
| ufunasn | *! | | |
| jufunasn | | | *! |
| wifunasn | | *! | |

The optimal candidate surfaces with the plural affix in the initial position and deletes the CS affix. As is the case for feminine nouns, both the plural affix and the CS affix compete for the initial position. The CS never surfaces in the initial position when competing with feminine and plural affixes because of the low-ranking of ALIGN-L (CS).

Summarizing thus far, the CS of Tashlhit nouns distinguishes between initial constant vowels and non-constant vowels in a clearer way. Constant vowels are proved to be root vowels and preserved by the root faithfulness constraint MAX-RT against any alternation. We notice that the initial morphological vowel of the CS surfaces as a full vowel when affixed to a root with an initial consonant and surfaces as a glide when affixed to a root with an initial vowel. We also explained that the absence of the initial morphological vowel of the CS in feminine nouns is due to the high ranking of ALIGN-L (Fem) over ALIGN-L (CS).

In the following section, we will discuss the theoretical implications of our argumentation for the distinction between the root vowel and the morphological vowel.

## 5. Implications for the organization of the lexicon

So far, we have shown that the root is highly relevant in the understanding of the presence/absence of the initial vowel in the CS of nouns in Tashlhit. In contrast to the significance of the root in studies of morphological phenomena, Bat-El (2003) argues that the input is a fully specified word rather than a root. The input is selected from the surface forms in a given paradigm, which may change whenever the paradigm incurs any changes. Given the principle of "lexicon optimization" (Prince and Smolensky, 1993/2004), the learner selects the actual input which incurs fewer violations of ranked constraints from all possible inputs ("richness of the base"). Based on this, Bat-El (2003) contends that having a consonantal root as an input would incur more violations than having a word as an input. Thus, a word-to-word process is more harmonic than the root-based approach. Other arguments in favor of this claim emerge from historical change like changes in semantic property or suppression from the language, which tend to affect all morphemic entities but not roots (Bat-El, ibid.).

However, in the present study, we argue for the relevance of the root structure in the morphology of the FS and the CS. We provide evidence that a reference to the root segment is very crucial in the understanding of the presence/absence of the initial vowel in the CS of nouns in Tashlhit. The relevance of the root structure has already been carried over in studies of Semitic languages. However, it is of interest to point out that our argumentation for the significance of a root-based morphology does not necessarily suppress the role of a word-based approach in the

understanding of Tashlhit morphology[9]. The appeal to a consideration of both root-based morphology and word-based morphology in the same language has already been argued for in Semitic languages (Ethiopian: Rose, 2003; Arabic: McCarthy, 1979, 1981 and Hebrew: Arad, 2003).

## 6. Conclusion

Summarizing thus far, we have distinguished between constant and non-constant initial vowels in the free state (FS) and in the construct state (CS) of Tashlhit nouns. We confirmed that non-constant initial vowels are morphological and we argued for the root affiliation of the constant vowel providing additional support for the vocalic-root hypothesis. Our argument emerges from derived nouns in the FS and more particularly in the CS. We propose that both states of Tashlhit nouns take the root as their base of derivation. We argued that the consonantal root theory is not sufficient to account for the presence of constant initial vowels in verb inflections and in nominal derivations in Tashlhit. We focused on the morphological operation called for by the FS and the CS morphology (affixation) where we showed that the maintained vowel is a root vowel. The root faithfulness constraint MAX-RT is ranked higher in our analysis militating against any contrast that may be subject to the root vowel. Hence, the latter always surfaces in the output. A constraint-based analysis is presented to better account for the constancy of the initial vowel in the FS and more clearly in the CS. We provided a basic analysis that accounts for both the FS and the CS of Tashlhit nouns. MAX-RT is a dominating constraint that preserves the root vowel in both the FS and the CS. In addition to this, it is worth noting that the proposed analysis is not exclusive to nouns derived from roots with the initial vowel *a*, but it also accounts for nouns derived from roots with initial *u* or *i*. This set of facts we presented so far lends credence to the presence of vocalic roots in Tashlhit lexicon and we believe that the results reached in this study give significant grounds for continuing along the lines proposed.

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[9] Bensoukas, El Hamdi and Ziani (2016) argue for the relevance of a stem-based approach in the morphology of French loan infinitives in both Moroccan Arabic and Moroccan Amazigh.

# Bibliography

Abdel-Massih, E. T. (1971), *A reference grammar of Tamazight: A comparative study of the Berber dialects of Ayt Ayache and Ayt Seghrouchen*, Center for Near Eastern and North African Studies, University of Michigan.

Anasse, K. (2005), "A study of some deverbal action nouns in Ayt Mzal Tashelhiyt Berber within the correspondence theory", in *Structures morphologiques de l'Amazighe*, Travaux de 2ème séminaire de CAL, Rabat. ed., IRCAM, p. 140-150.

Applegate, J. R. (1958), *An outline of the structure of Shilha*, American Council of Learned Societies, New York.

Arad, M. (2003), "Locality constraints on the interpretation of roots: the case of Hebrew denominal verbs", in *Natural Language & Linguistic Theory*, Vol. 21, Nº 4, p. 737-778.

Arad, M. (2006), *Roots and patterns: Hebrew morpho-syntax*, ed., Studies in Natural Language and Linguistic Theory, Springer Science & Business Media, Haegeman, L et al., Vol. 63.

Aronoff, M. (1994), *Morphology by itself: Stems and inflectional classes,* MIT press, Cambridge, Massachusetts.

Basset, A. (1952/2012). *La Langue Berbère*. Faculté des Lettres et des Sciences Humaine, Rabat & IRCAM, Rabat (eds.).

Bat-El, O. (1994), "Stem modification and cluster transfer in Modern Hebrew", *Natural Language & Linguistic Theory*, Vol. 12, N°4, p. 571-596.

Bat-El, O. (2002), "True truncation in colloquial Hebrew imperatives", *Language*, Vol. 78, N°4, p. 651-683.

Bat-El, O. (2003a), "The Fate of the Consonantal Root and the Binyan in Optimality Theory", *Recherches Linguistiques de Vincennes*, N° 32, p. 31-60.

Beckman, J., N. (1998), *Positional Faithfulness*, Doctoral dissertation, University of Massachusetts Amherst.

Bendjaballah, S. (1995), *Aspects du système verbal du berbère (kabyle)*, Mémoire de DEA, Université Paris 7.

Ben Si Said, S. (2014), *De la nature de la variation diatopique en kabyle: étude de la formation du singulier et pluriel nominaux,* Doctoral dissertation, Nice.

Bensoukas, K. (2001), *Stem forms in the nontemplatic morphology of Berber*, Doctoral dissertation, Mohammed-V University.

Bensoukas, K. (2010), "Construct State Allomorphy in Amazigh: What can Alignment Explain?", ms. Mohammed-V University, Faculty of Letters, Rabat.

Bensoukas, K, El Hamdi, F. & Ziani, Z. (2016). "The Morphology of French Loan-Infinitives: A Comparison of Moroccan Arabic and Moroccan Amazigh", To appear in the 4th International Conference on Cultures and Languages in Contact, Chouaib Doukkali University, El Jadida.

Brugnatelli, V. (1987), "Deux notes sur l'état de l'annexion en Berbère", in *proceedings of the 4th International Hamito-Semitic Congress,* ed., John Benjamins, Amsterdam.

Brugnatelli, V. (1997), "L'état d'annexion en diachronie", ed., *Afroasiatica Neapolitana,* Bausi, A. & Tosco, M., Vol. 8, p. 139-150.

Cantineau, J. (1950), "Racines et schèmes", *Mélanges offerts à William Marçais*, Paris G-P, Maisonneuve, p. 119-124.

Chaker, S. (1988), "L'état d'annexion du nom", *Encyclopédie bebère*, Peeters publishers, Vol. 5, p. 686-695.

Chaker, S. (1990), "Les bases de l'apparentement chamito-sémitique du berbère", *Etudes et Documents Berbères*, N° 7, p. 28-57

Dell, F., & Elmedlaoui, M. (1992), "Quantitative Transfer in the nonconcatenative Morphology of Imdlawn Tashlhiyt Berber", *Afroasiatic Languages*, Vol. 3, p. 89-125.

Dell, F. & Jebbour, A. (1991), "Phonotactique des noms à voyelle initiale en Berbère (chleuh de Tiznit, Maroc)". *Linguistic Analysis*, Vol. 21, N° 3-4, p. 119-144.

Ennaji, M. (2001), "The Construct State in Berber". *Studies in the Linguistic Sciences*, Vol 31, N° 2, p. 55-72.

Fábregas, A., & Scalise, S. (2012), *Morphology: from Data to Theories*, Edinburgh University Press.

Galand, L. (1984), "Le comportement des schèmes et des racines dans l'évolution de la langue : exemples touaregs", ed., Bynon, J., *Current progress in Afroasiatic linguistics*, John Benjamins.

Galand, L. (2010), "Regards sur le berbère" . *Centro Studi Camito-Semitici*, Milan.

Guerssel, M. (1983), "A phonological Analysis of the Construct State in Berber", *Linguistic Analysis*, Vol. 13, N° 3, p. 309-329.

Guerssel, M. (1987), "The Status of the Lexical Category Preposition in Berber: Implications for the Nature of the Construct State", ed., Guerssel, M & Hale, K., *Studies in Berber Syntax. Lexicon project working paper*, Vol. 14, p. 159-191.

Guerssel, M., & Lowenstamm, J. (1996), "Ablaut in Classical Arabic measure I active verbal forms", *Studies in Afroasiatic grammar*, p. 123-134.

Iazzi, E. M. (1991), *Morphologie du verbe en tamazight (Parler des Aït Attab,*

*Haut-Atlas Central) Approche prosodique*, D.E.S. thesis, Mohammed-V University, Faculty of Letters, Rabat.

Idrissi, A. (2001), *Toward a root-and-template approach to shape-invariant morphology*, Doctoral dissertation, Québec University, Montréal.

Jebbour, A. (1991), "Structures morphologiques du nom et problème de la voyelle initiale des noms en Tachelhit : Parler de Tiznit", *Etudes et Documents Berbères*, Vol. 8, p. 27-51.

Kager, R. (1999), *Optimality Theory*. Cambridge University Press, Cambridge.

Kossmann, M. G., & Stroomer, H. J. (1997), "Berber phonology", *Phonologies of Asia and Africa*, Vol. 1, p. 461-475.

Kramer, R, (2006), "Root and pattern morphology in Coptic: evidence for the root", eds., C. Davis, A.R. Deal and Y. Zabbal, *Proceedings-NELS*, Vol. 36, No. 2, p. 399-412, Amherst: GLSA.

Lahrouchi, M. (2010), "On the internal structure of Tashlhiyt Berber triconsonantal roots", *Linguistic Inquiry*, Vol. 41, N° 2, p. 255-285.

Lahrouchi. M. (2013), "Templates, markers and syntactic structure in Tashlhiyt Berber", *Lingua*, Vol. 133, p. 53-72.

Lombardi, L. (1999), "Positional faithfulness and voicing assimilation in Optimality Theory", *Natural Language & Linguistic Theory*, Vol. 17, N° 2, p. 267-302, retrieved from http://www.phil-fak.uni-duesseldorf.de/summerschool2002/Ito1.pdf

McCarthy, J. J. (2002), *A Thematic Guide to Optimality Theory*, Cambridge University Press, Cambridge.

McCarthy, J. J. (2006), " Morphology: Optimality Theory", ed., *Encyclopedia of Language and Linguistics*, Elsevier, Brown, K. et al., p. 308-316.

McCarthy, J. J. (2006), "Prosodic Morphology", ed., *Encyclopedia of Language and Linguistics*, Elsevier, Brown, K. et al., p. 182-190.

McCarthy, J. J. (2007), "What Is Optimality Theory?", *Language and Linguistics Compass*, Vol. 1, N° 4, p. 260-291.

McCarthy, J. J. & Prince, A. (1993), "Prosodic Morphology I: Constraint Interaction and Satisfaction", ms. Linguistics Department Faculty Publication Series, Paper 14, Retrieved from http://scholarworks.umass.edu/linguist_faculty_pubs/14

Prince, A. & Smolensky, P. (1993/2004), *Optimality Theory: Constraint Interaction in Generative Grammar*, Blackwell Publishing.

Prunet, J. F. et al. (2000), "The Mental Representation of Semitic Words", *Linguistic inquiry*, Vol. 31, N° 4, p. 609-648.

Prunet, J. F. (2006), "External evidence and the semitic root", *Morphology*, Vol. 16, N° 1, p. 41-67.

Ratcliffe, R. R. (2004), "Sonority-based Parsing at the margins of Arabic Morphology: In reply to Prunet, Béland & Idrissi (2000) and Davis & Zawaydeh (1999, 2001)", *Al-'Arabiyya*, Vol. 37, p. 73-95.

Rose, S. (2003), "The Formation of Ethiopian Semitic Internal Reduplication", ed., *Language Processing and Acquisition in Languages of Semitic, Root-Based, Morphology*, John Benjamins, Shimron, J., Vol. 28, p. 79-97.

Saib, J. (1982), "Initial Vowel Syncope and Reduction in Tamazight-Berber-nouns", *Langues et Litérature*, FLSH, Rabat, p. 159-184.

Ségéral, P. & Scheer, T. (1995), "L'apophonie dans les verbes forts de l'allemand modern", ms. Université Paris 7.

Ségéral, P. (1995), *Une théorie généralisée de l'apophonie*, thèse de doctorat, Université Paris 7.

Taifi, M. (1991), *Dictionnaire Tamazight-Français : Parlers du Maroc Central*, L'Harmattan-Awal.

Tobin, Y. (1990), "A Combinatory Phonology of the Hebrew Triconsonantal (CCC) Root System", *La linguistique*, Vol. 26, pp. 99-114.

Ussishkin, A. (1999), "The Inadequacy of the Consonantal Root: Modern Hebrew Denominal Verbs and Output-output Correspondence", *Phonology*, Vol. 16, N° 03, p. 401-442.

Vycichl, W. (1989), "Article défini", *Encyclopédie Berbère*, Peeters publishers, Vol. 6, p. 939-940.