

Syllables and Gemination in Imperfective Stems in Tashlhiyt Berber

François Dell^a and Mohamed Elmedlaoui^b

a) *Centre de Recherches Linguistiques sur l'Asie Orientale, Ecole des Hautes Etudes
en Sciences Sociales, 131 Bd Saint-Michel, 75005 Paris Cedex 06, France*
dell@ehess.fr

b) *Mohamed Elmedlaoui, Institut Universitaire de la Recherche
Scientifique, Université Mohammed V—Souissi, Avenue
Allal Al-Fassi, B.P. 6287. Rabat-Instituts, Rabat, Maroc*
elmedlaoui@yahoo.fr

Abstract

In Tashlhiyt Berber certain verbs form their imperfective stem by geminating one consonant. Since Dell and Elmedlaoui 1988, accounts of imperfective gemination have been based on syllable structure. Lahrouchi (2010) proposes an alternative analysis based on a binary-branching head-complement structure that regulates the distribution of consonant types in verbal roots. This paper argues that the syllable-based account is preferable and that it makes the head-complement structures advocated by Lahrouchi redundant.

Keywords

Tashlhiyt Berber; phonology; syllable structure; gemination; triconsonantal root; stem; quantitative verse; syllable weight; phonotactics

Tashlhiyt is a Berber language of Western Morocco spoken by around five million people.* Elmedlaoui (1985) and Dell and Elmedlaoui (DE; 1985, 1988, 1996, 1997, 2002)¹ have discussed syllabification in Tashlhiyt and have shown that in that language obstruents, even voiceless ones, may be syllable nuclei.² This

*This article was accepted for publication in *Linguistic Inquiry* under the condition that it be drastically shortened so as to fit the *Remarks & Replies* format of the journal. Because we felt that, if modified as indicated, our reply to Lahrouchi would have lost much of its strength we decided to seek an alternative outlet. We are grateful to the anonymous readers of both journals and to Ioana Chitoran, Morris Halle, David Hill and Jonah Katz for their comments.

¹ Hereafter, works by Dell and Elmedlaoui are cited in shorthand: DE85 = Dell and Elmedlaoui 1985, DE02 = Dell and Elmedlaoui 2002, and so on.

² For instrumental data on the vowel-less syllables, see Ridouane 2008. On their realization in songs and their alignment with the melody, see DE08 and Dell 2011.

feature of Tashlhiyt has made it a testing ground for various theoretical proposals concerning syllabification.³ One item of evidence that DE adduced in favor of their account of Tashlhiyt syllable structure was gemination in certain imperfective stems (DE88).

Lahrouchi (2010) has proposed an alternative analysis of imperfective gemination that is based not on syllabification but on a binary-branching head-complement structure that regulates the distribution of consonant types in verbal roots. If Lahrouchi is right in claiming that imperfective gemination has nothing to do with syllables, the evidence in favor of DE's account of syllabification in Tashlhiyt is somewhat weakened and imperfective gemination ceases to be an interesting challenge for theories of the role of syllable structure in word formation. In this essay we argue that once all the relevant facts are taken into consideration, the syllable-based account of imperfective gemination is preferable.

This article is organized as follows. As background to our argument, in section 1 we review DE's analysis of syllable structure in Tashlhiyt and some of the evidence that supports it. In section 2 we summarize Lahrouchi's root-structure hypothesis and his analysis of imperfective gemination. We then point out various problems with Lahrouchi's proposals, both conceptual and empirical (sections 3–4). There is a brief conclusion.

1. Syllables in Tashlhiyt

1.1. *Syllabification*

Tashlhiyt has the following segment inventory: b, f, t, t^ʕ, d, d^ʕ, s, s^ʕ, z, z^ʕ, ʃ, ʃ^ʕ, ʒ, ʒ^ʕ, k, k^w, g, g^w, q, q^w, ɣ, ɣ^w, β, β^w, ħ, ʕ, ħ, m, n, n^ʕ, l, l^ʕ, r, r^ʕ, w, j, u, i, a. (The phonetic symbols have their IPA values.) Except for /u, i, a/, each segment in the list above has a geminate counterpart, and gemination is lexically contrastive: for example, *tamda* 'pond' vs. *tamdda* 'brown buzzard'.

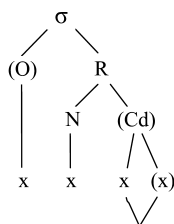
DE have presented two different accounts of how a Tashlhiyt expression is parsed into syllables. The differences between their earlier analysis (Elmedlaoui 1985, DE85, DE88, DE91) and their more recent one (DE97, DE02) are immaterial to the discussion in this article. Unless specified otherwise, this discussion is based on the second analysis, developed at length in DE02. The elements of that analysis that are relevant here are as follows.

All Tashlhiyt syllables satisfy the syllable template in (1) below, where the parenthesized material is optional and where O, R, N and Cd stand for Onset,

³ See Calabrese 2005 and the references in DE02:97 fn 48.

Rime, Nucleus and Coda. Complex onsets and complex nuclei are prohibited. Complex codas are allowed only if they consist of the two halves of a geminate.

(1) SYLLABLE TEMPLATE



Except for /a/, which can only be a nucleus, any segment can be an onset, a nucleus or a coda.⁴ Of the various other requirements that must be met by Tashlhiyt syllables, the only directly relevant ones are the following two.

- (2) NOHIATUS: Except at the beginning of a syllabification domain, syllables must have an onset.
- (3) SONPEAK: A sequence (one or more adjacent segments) that is a sonority peak must contain a nucleus.⁵

A sonority peak is a local sonority maximum within the syllabification domain. Typically, but not always, a sonority peak is a single segment. /lkm/ contains two sonority peaks, /l/ and /m/, and /fsd/ contains one sonority peak, the sequence /fs/. The sonority scale for Tashlhiyt is the following:⁶

- (4) Sonority scale: nonhigh vocoid > high vocoid > liquid > nasal > fricative > stop.

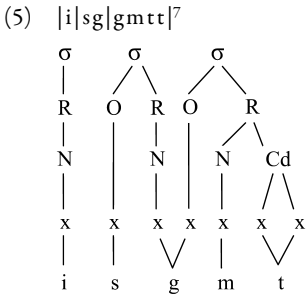
Conformity to the syllable template and to NOHIATUS are inviolable requirements. For the purposes of this essay, SONPEAK may be considered inviolable as well (Violations of it are in fact allowed only in special circumstances.)

To take a concrete illustration of the constraints in (2) and (3), (5) displays the syllable structure of the isolation form of the phonological word *isggmtt* 'he straightened it (f) up'.

⁴ /i/ and /u/ are realized as glides (*j* and *w*) when syllabified as onsets or codas; on the syllabification of the underlying glides, see DE02:203–224.

⁵ SONPEAK is a slight reformulation of the Sonority Peak Principle proposed in Clements 1997:303.

⁶ This is the sonority scale posited for Tashlhiyt in DE02. It replaces the more differentiated scale of DE88, in which voiced stops were deemed more sonorous than voiceless ones, and likewise for voiced and voiceless fricatives.



The sequence /isggmtt/ contains two sonority peaks, /i/ and /m/, and both are syllable nuclei, pursuant to SONPEAK. What about the nucleus of the medial syllable? While SONPEAK requires that sonority peaks be (contain) nuclei, it does not require that nuclei be (or fall within) sonority peaks. This is why the first skeletal slot of the geminate /gg/ can be the nucleus of the medial syllable even though it is not a sonority peak. Finally, note that, in accordance with NOHIATUS, the initial syllable of (5) is the only one that lacks an onset.

In DE02 three kinds of evidence are adduced in support of the analysis we have just summarized: imperfective gemination, poetic scansion in songs, and length alternations in the causative prefix. Due to lack of space, only the first two topics will be discussed here; on the third, see DE02:124–134. Let us consider poetic scansion first, before taking up imperfective gemination in section 1.3.

1.2. *Syllables in Verse*

Traditional Tashlhiyt songs provide a rich source of data for the study of syllabification in Tashlhiyt. The relative linguistic homogeneity of the Tashlhiyt-speaking area has allowed it to develop a common poetic tradition. In addition to a myriad of traditional songs specific to particular village communities, there are songs composed by professional artists according to the traditional canons. Over a thousand of these songs are available on commercial cassette recordings sold throughout Morocco and in the Tashlhiyt-speaking diaspora in Europe.

Tashlhiyt poetry is transmitted almost exclusively in an oral manner.⁸ Some readers may have concerns about using versification as a source of data about

⁷ We use vertical bars to represent syllable edges in our transcriptions.

⁸ Many of those who compose songs, even among professional artists, are not literate in any language. The language did not have an instituted writing system until the beginning of the 21st century. In past centuries Tashlhiyt speakers have used the Arabic script to write down Tashlhiyt texts, mostly for religious teaching (see van den Boogert 1997), but that literature has not played any role in the transmission of metrical poetry.

syllabification.⁹ It should be noted that there is no explicit teaching of the conventions that regulate the structure of Tashlhiyt verse. Children simply acquire these conventions through repeated listening. In the same way that children naturally become native speakers of Tashlhiyt through exposure to the speech of others, they become fluent participants in the Tashlhiyt poetic tradition through repeated exposure to poetic material. How children acquire this fluency is easier to understand if we assume that the conventions that regulate the structure of verse are grounded in the structure of the language. Specifically, we are assuming that Tashlhiyt versification is using to its advantage elementary groupings of segments—syllables—that preexist in the phonology.¹⁰

The reason that traditional Tashlhiyt songs are able to provide syllabification data is that their lyrics have a metrical structure based on a distinction between heavy (H) and light (L) syllables.¹¹ It is a syllable's structure that determines whether it is H or L,¹² and that is how metrical structure can provide independent verification of syllable structure.

In most traditional Tashlhiyt songs, all the lines are built on the same meter. When lines follow the same meter, they have the same number of syllables, and their H and L syllables are arranged in the same order. We cite in (6) three lines of a song composed in a meter that requires 12 syllables to a line, with the third and seventh syllables H and all the others L.¹³ The scansion of these lines are given

⁹) The data in our 1985 works consisted in Elmedlaoui's native-speaker judgments about syllable count and about the location of syllabic peaks in words and phrases pronounced in isolation. The differences between the syllabic groupings inferred from these judgments and those employed in versification only concern obstruents adjacent to a pause (see DE88:5, DE02:115). As explained in DE02:78, we now think that versification is a more reliable source of data, because we have found that Tashlhiyt speakers vary in their ability to form judgments like those used in our 1985 works.

¹⁰) The fact that the language used in poetry differs in certain respects from that of everyday speech does not invalidate this assumption, for the differences mainly concern the pronunciation of specific morphemes, which have allomorphs that are not acceptable in everyday language. See DE02:93–94, 116, 340.

¹¹) The basic principles of Tashlhiyt versification were discovered by Hassan Jouad; see Jouad 1983, 1995. Abundant syllabification data derived from Tashlhiyt verse can be found in Jouad 1995, DE97, DE02 and DE08. These works cite complete songs with their line-by-line scansion.

¹²) After syllable structure has been erected over a verse, syllables are marked as H or L according to the following rule: a syllable without a coda is L; a syllable with a coda is H, with a special dispensation for syllables in which the coda is the first half of a geminate: such syllables can count as H or as L. It is this special dispensation that makes it possible for syllables 2 and 11 in (7a) to count as L.

¹³) These are lines 5, 47 and 49 of the song discussed in DE02: 343–347 and in DE08: 223–231.

in (7). (In (7), and elsewhere in this paper where syllabic parses are presented, nuclei are underlined. Symbols that are unambiguously syllabic—namely, the vowel symbols /a i u/—are not underlined.)

- (6) a ngann r^ʕza ʁbnadm fkinaw itillas
I had invested my hope in human beings, and I am plunged into darkness.
- b tɪflwin ti nʒzaz lqfl wi nnn^ʕqq^wrt¹⁴
With glass doors with silver locks,
- c ukan ifkak a bab n^ddd^ʕraft tasarut
And in the end, for the keys to be offered to you, O beloved!
- (7)
- | | | | | | | | | | | | | |
|---|----------|-----------|-------------------------|----|-----------|----|------------------------------------|-----------|-----------|-----------|------------------|----------------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | L | L | H | L | L | L | H | L | L | L | L | L |
| a | <u>n</u> | gan | n ^r <u>ʕ</u> | za | <u>ʁb</u> | na | <u>dmf</u> | ki | na | ʁi | til | la <s |
| b | ti | <u>fl</u> | win | ti | nʒ | za | <u>ʒlq</u> | <u>fl</u> | wi | <u>nn</u> | n ^ʕ q | q ^w <u>r</u> <t |
| c | u | ka | nif | ka | ka | ba | <u>bⁿdd^ʕ</u> | ra | <u>ft</u> | ta | sa | ru <t |

To derive scansions like those in (7), we apply the analysis of syllabification summarized in section 1.1.

First, in the scansion of a line of Tashlhiyt verse, morphosyntactic boundaries are ignored and the line as a whole is taken as a single domain of syllabification. We can transcribe line (6a), for instance, as the sequence in (8a) below. The spaces between words have been omitted, and each phonetic symbol represents a skeletal slot and its associated feature bundle.

- (8) a n g a n n r r^ʕ ʒ a ʁ b n a d m f k i n a ʁ i t i l l a < s
- b n gan nrr^ʕ ʒa ʁb na dmf ki na ʁi til la <s

A sequence like (8a) is parsed into syllables as follows. First, the last segment in the line is set aside as extrametrical.¹⁵ After that, the remaining sequence is broken down into successive chunks that all satisfy the syllable template in (1)

¹⁴ There is an issue with the phonological form of words like *nnn^ʕqq^wrt*, which we mention here although it is not relevant to syllabification. When a word contains an emphatic (i.e., dorsopharyngealized) consonant, emphasis spreads over the whole word. In lexemes that are phonetically emphatic and contain several coronal consonants, like this one, there is no way to identify an underlyingly emphatic consonant (or consonants); see DE02:61–63. In such cases our choice of emphatic consonant is arbitrary and is dictated only by typographical convenience.

¹⁵ On line-final extrametricality, see DE08:58 ff. Line-final extrametricality makes it possible to do away with the ‘compound syllables’ of DE02:96–97.

and the conditions NOHIATUS and SONPEAK. The result is shown in (8b), where the line-final extrametrical segment is indicated by an angled bracket. Pursuant to NOHIATUS, which allows onsetless syllables only at the beginning of a syllabification domain, in (8b) the first syllable is the only one to lack an onset.

To get a further idea of how the syllable-structure conditions in (1)–(3) operate, consider the boxed string in (8a), which is parsed into three syllables in (8b). In that string the two occurrences of /a/ are more sonorous than their immediate neighbors, and indeed they are both nuclei as required by SONPEAK. Since these are the only two sonority peaks in the sequence, SONPEAK would be equally satisfied by a disyllabic parse such as [zav|bna] or [zavb|na] as by the actual trisyllabic parse [za|vb|na]. The reason for the trisyllabic parse, in which /b/ is made a nucleus, is to avoid a complex onset /bn/ or a complex coda /vb/, both of which are disallowed by template (1). Within the confines of the syllable [vb], the most sonorous segment is the onset /v/, but this does not violate SONPEAK, for /v/ is not a sonority peak within the syllabification domain, which is the whole line (/v/ is adjacent to /a/, which is higher on the sonority scale).

As stated earlier, we only give as much detail about DE's analysis of Tashlhiyt syllabification as is necessary for the discussion of imperfective gemination. Note, for instance, that conditions NOHIATUS and SONPEAK are not sufficient to ensure a unique syllabic parse for string (8a). Take the sequence /gannrr^s/ near the beginning of the string, in which /nn/ and /rr^s/ are both geminates. This sequence is parsed as [gan|nrr^s] in (8b). Conditions (1)–(3) do not explain why this parse is preferred to [ga|nn|rr^s], where each geminate forms a syllable on its own. Readers are referred to DE02 for answers to questions like this.

The lines cited in (6) follow the conventions of the traditional singing idiom, what Tashlhiyt speakers call *amarg aqqdim* 'old poetry'. Until recently this idiom enjoyed a virtual monopoly in Tashlhiyt-speaking areas. It still occupies most of the airtime devoted to music in the daily programs on the state radio. In rural areas everyone is proficient in traditional singing, and everyone sings.¹⁶ Besides singing songs whose words are memorized, Tashlhiyt speakers often engage in singing of a different kind, in which a familiar tune is combined with new words. Only certain people are able to improvise verse worth listening to, but anyone has the ability to fit new words to a familiar tune.

¹⁶ On poetry and music in Ashlhiy society, see Galand-Pernet 1972, Schuyler 1979a,b, Lortat-Jacob 1980, Rovsing Olsen 1997, and DE08.

1.3. Imperfective Gemination

We now turn to imperfective gemination, the topic at the center of Lahrouchi's article. The basic generalizations about the formation of imperfective stems in Tashlhiyt were first laid out in Elmedlaoui 1985, DE88 and DE91.¹⁷ Before getting into the detail of imperfective gemination, we briefly sketch some basic features of Tashlhiyt verbs. We will follow DE89 and DE91, which provide a systematic description of Tashlhiyt verbal morphology.

Tashlhiyt has two kinds of verbs, primary and secondary. Secondary verbs are causatives, reciprocals and passives formed from other verbs. Based on the primary verb *ḥada* 'be next to', for instance, one can form the reciprocal verb *m-ḥada* 'be next to one another', and the causative verbs *s-ḥada* 'put next to' and *s-m-ḥada* 'put next to one another'. As illustrated by the last form, secondary verbs can be derived from other secondary verbs.

A stem is the string that remains when a verbal form is stripped of its agreement markers. Tashlhiyt verbs agree in person, number and gender with their subjects. The agreement markers form the outer layer in the verbal morphology; they are prefixes and/or suffixes. In *t-ss-lkam-t* 'you cause to reach (impf)', for instance, 2nd person singular is marked by the prefix *t-* and the suffix *-t* and the stem is *ss-lkam*. This is the imperfective stem of the causative verb *ss-lkam*, derived by inserting /a/ before the last consonant (*ss-* is the causative prefix).

Every verb, primary or secondary, has four stems: perfective affirmative, perfective negative, aorist and imperfective. Different verbs use different means to mark the differences between the four stems, but how they do it is to a large extent predictable from their morphological and phonological makeup. To be more precise, the morphological and phonological makeup of verbs constrains, but does not necessarily determine, how they form their stems.

The table below gives the aorist and imperfective stems of various verbs chosen to give an overview of the principal ways of forming imperfective stems.¹⁸ We have included secondary verbs (9q,r,s) in order to emphasize the fact that the processes employed to form imperfective stems are found to operate throughout the verbal lexicon—with the exception of gemination. The abbreviations 'ch', 'T' and 'G' in the columns on the left are mnemonics for these processes, which are explained directly below.

¹⁷ DE91 is devoted in its entirety to verbal stems. As far as imperfective gemination is concerned, DE02 simply reiterates the analysis proposed in DE88 and DE91. These papers are available on the website of the Centre de Recherches Linguistiques sur l'Asie Orientale (CRLAO).

¹⁸ Berberists traditionally equate the roots of verbs with their aorist stems. We follow this practice here in order to facilitate comparison with Lahrouchi's article.

(9)	V	C	aor	impf			
a		G	krf	kkrf	tie up; cf. (9q)] geminating verbs]] CCX verbs]
b		G	lkm	lkkm	reach; cf. (9r)		
c		G	ʒlu	ʒllu	lose		
d	ch	T	χdm	tt-χdam	work		
e		T	fdu	tt-fdu	redeem		
f	ch		sni	snaʒ	sign		XXX verbs]
g		T	ali	tt-ali	cluster		
h		T	adr	tt-adr	pin down		
i		T	huz	tt-huz	corner		
j		T	bbz	tt-bbz	flail		
k	ch	T	gzʒ ^ʕ	tt-gzaz ^ʕ	crunch		
l	ch	G	dl	ddal	cover		
m		T	kkil	tt-kkil	curdle		
n	ch	T	fssr	tt-fssar	explain		
o	ch	T	skkiws	tt-skkiwis	sit		
p	ch		ssumm	ssumum	suck		
q	ch	T	(n)n-krf	tt-nn-kraf	tie one another up		
r	ch		ss-lkm	ss-lkam	cause to reach		
s	ch		s-nufl	s-nuful	cause to lose patience		

The one process that involves vowels is the insertion of a chameleon vowel ('ch') before the last segment in certain verbs. We call the inserted vowel a chameleon because it copies the preceding vowel, if there is one, as in (9o,p,s). If no vowel precedes, the inserted vowel is /a/ (see (9d,f,k,l,n,q,r)).

There are two processes that involve consonants, and they are mutually exclusive: the prefixation of /tt-/ ('T') and the gemination of a consonant of the root ('G').¹⁹

Let us use the expression 'geminating verb' to refer to a verb that uses gemination to form its imperfective stem. Geminating verbs are always primary verbs; secondary verbs cannot be geminating. Among the primary verbs, gemination only occurs in CC verbs and in a subset of the trisegmental verbs that we dub the CCX verbs. In a CCX verb the root contains three skeletal slots, each linked with a feature bundle of its own (i.e. it does not contain a geminate), and the first two slots are linked with consonants; the third slot may be either a consonant or a vowel. Items (9a–f) are CCX verbs. Other trisegmental root shapes, such as VCV (9g) and VCC (9h), are never geminating.

¹⁹ We use the term 'root' to designate the underlying representation of a monomorphemic lexical item, without any implication that the morphology of Tashlhiyt is of the root-and-pattern type.

Not all CCX verbs are geminating: see (9d–f). The fact that a given verb is geminating does not seem to be predictable from its phonological makeup. In (10) below, each row displays a pair of CCX verbs that have identical or similar phonological makeups; the first verb in each pair is a geminating verb while the second is not.

(10)	geminating		nongeminating	
a	dru / drru	'share the same lot'	dru / tt-dru	'be deep'
b	h1b / h1h1b	'eat (broth)'	h1nd / tt-h1nad	'commit perjury'
c	wrs ^s / qqrs ^s	'cut the throat'	qrs ^s / tt-qras ^s	'relapse' (wound)
d	krz / kkrz	'plow'	brz / tt-braz	'be overdressed'
e	wr ¹ m / qq ^r m	'pay (a fine)'	ʃlm / tt-ʃlam	'warn'
f	fsr / assr ²⁰	'spread'	ʒzr / tt-ʒzar	'glare at'

To form their imperfective stems, the nongeminating verbs on the right-hand side all prefix /tt-/; in addition, they insert /a/ before the last segment unless it is the vowel /u/. As discussed further in section 4.3, this combination constitutes the default imperfective morphology of Tashlhiyt; DE91 argues that geminating verbs are specifically marked as such in the lexicon.

Given a verb that is a geminating verb, which consonant will actually be geminated in the formation of the imperfective stem? To begin with, there is no verb that geminates its final consonant and CCV verbs all geminate their second consonant, which must be a syllable onset, in view of (4). As for the CCC verbs, some geminate their initial consonant while others geminate their medial consonant. To account for the gemination pattern, DE formulated the following rule, which makes crucial reference to syllable structure.

- (11) The segment that is geminated in the imperfective stem is that segment that is a syllable onset when the root, taken in isolation, is syllabified.²¹

DE88 reported that in a list of all the CCX geminating verbs that M. Elmedlaoui was able to find in his dialect (the total number was 177), only four were exceptions to the above generalization.²² The paper included a list of all the geminating CCC verbs, 113 in all.²³ (The remaining 64 CCV verbs were not listed to save space.)

²⁰ An initial labial is replaced by *a* in the imperfective of several geminating verbs. Other examples are *b3r/a33r* 'pluck (feathers)' and *msl/assl* 'plug'.

²¹ We explain below why there is always one and only one onset in such a case.

²² They are *bzg* 'swell', *wr^sa* 'read', *w^wma* 'coat' and *wli* 'go up', whose imperfective stems are *azzg*, *aqqr^sa*, *aq^wma* and *aqqlaj*, instead of the expected *bbzg*, *wrr^sa*, *w^wmma*, and *wlli*.

²³ Three verbs were added to form the list in DE02, which contains 116 verbs. The added verbs are *wrs^s* 'slit the throat', *kls* 'slash (meat)' and *fsd* 'be spoiled'.

The 9 (3²) logically possible contours are all attested in CCX verbs, but two (EE and RE) happen not to be found among geminating CCX verbs. The CCC sequences displayed in rows h and i are constructs.²⁴ Among the 7 remaining contours, the only one that raises questions is EF (12g), which we have found in only one geminating verb, *fsd* 'be spoiled', whose imperfective stem is *ffsd*.²⁵ While the sonority peaks in rows (12a–f) all consist of a single segment, that in *fsd* is the sequence /fs/.²⁶ The parses |f|s|d| and |fs|d| both satisfy SONPEAK (3). If this verb is to follow rule (11), the correct syllabic parse must be |fsd|. However the sequential syllabification procedure proposed in DE85, DE88 predicts |f|s|d|. *fsd* fares no better in the DE02 analysis, which leaves its syllabification indeterminate; see DE02:109 ff.

To summarize this section: Among trisegmental verbs, imperfective gemination only occurs in a subset of the CCX verbs. CCX verbs that do not use gemination to form their imperfective stems resort to the same affixes and alternations that are used at large by verbs that are not of the form CCX. Imperfective gemination obeys rule (11), which refers to the syllable structure of the root. Out of the 117 geminating CCC verbs discussed in DE02, only two are problematic for the syllable-based account of imperfective gemination: and *fsd* / *ffsd* 'be spoiled' and *bzg* / *azzg* 'swell'.²⁷

Lacking a generalization that would enable them to sort the CCX verbs into geminating and nongeminating, DE assume that geminating verbs are marked idiosyncratically in the lexicon. Lahrouchi (2010) takes issue with this feature of their analysis, as we shall see below.

Rule (11) can hardly be called an analysis of imperfective gemination; it is a fragment of an analysis at best. It leaves important questions unanswered. Why does imperfective gemination not occur outside of verbs with shapes CC and CCX? What is the status of (11) within the word-formation component of a grammar of Tashlhiyt, and how should this component be organized if it is to allow morphological processes to make reference to the syllable structure of roots and stems syllabified in isolation? There have been attempts to answer these questions; see Shaw 1996, Jebbour 1996, 1999, Clements 1997, Bensoukas 2001 and Calabrese 2005. These works share DE's assumption that syllable structure is involved in the choice of the consonant that geminates in the imperfective, and

²⁴ There is an attested verb *syf* 'swoon', but it is nongeminating (impf. *tt-syaf*). On the constraint NOPICOR, which is responsible for the syllabifications in rows h and i, see DE02:109 ff.

²⁵ *fsd* is one of the three verbs mentioned above in note 23. We also found the contour EF in two nongeminating verbs, *zfid* (*tt-zfiad*) 'be strong' and *fhd* ⁵ (*tt-fhad* ⁵) 'mow with a scythe'.

²⁶ See DE02:100 for a precise definition of sonority peaks.

²⁷ On the initial *a* of the imperfective stem, see note 20.

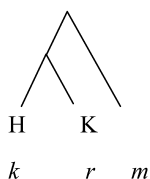
so the analyses presented there are all syllable-based, to use Lahrouchi's terminology. In Lahrouchi's discussion, which in fact challenges all syllable-based analyses, the DE analysis is taken as representative of the whole family, and so we shall use the expression 'the syllable-based analysis' to refer specifically to the DE analysis, but this should not overshadow the other syllable-based analyses proposed in the works cited above.

2. Head-Complement Structure (Lahrouchi 2010)

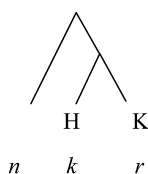
The central issue in DE's discussion of imperfective gemination was this: if a CCX verb uses gemination to form its imperfective stem, how can one predict which consonant geminates? In Lahrouchi 2010 the center of attention shifts to a different question: among the CCX verbs, can one predict which ones use gemination to form their imperfective stems? According to the author, the answer is: yes, with a smattering of exceptions. His paper ends with an appendix that contains 193 CCX verbs, some geminating and some nongeminating. The forms listed in the appendix and in other sources do not always bear out the sweeping statements made in the body of the text, as we shall see.

Lahrouchi 2010 will hereafter be referred to as *OIS*, an acronym based on the beginning of its title. *OIS* presents an account of imperfective gemination in which the structure relevant for picking the consonant that geminates in the imperfective is not syllable structure, but a kind of phonological organization specific to lexical morphemes that the author calls root structure. Root structure is a binary-branching tree in which the lower node dominates a head and its complement. It has two variants, left- and right-branching. The diagrams in (13) show how the roots *krm* 'be dried out' and *nkr* 'stand up' fit into a head-complement structure.

(13) a $[kr]m$



b $n[kr]$



H and K are our own labels for 'head' and 'complement'. The unlabelled node, which is called a satellite, may occur on either side of the HK constituent. The following inviolable conditions must furthermore be met.²⁸

²⁸⁾ The original conditions in *OIS* have been reformulated to facilitate comparison with the

- (14) The complement follows the head.
- (15) KPEAK: The complement is the most sonorous segment.
- (16) KNOOB: The complement is not an obstruent.

OIS p. 263 posits the following sonority scale, which does not distinguish between fricatives and stops: vowel > glide > liquid > nasal > obstruent.

Let us show how trisegmental sequences are analyzed in terms of HK structures. In *krm* the most sonorous segment is *r*, which must be a complement as required by KPEAK, and so the HK constituent must be *kr*. *krm* is thus analyzed as *[kr]m*, as diagrammed in (13a). (In our transcriptions we enclose a sequence between square brackets to indicate that it is analyzed as an HK constituent.) In *nkr* the most sonorous segment is *r*, hence the analysis *n[kr]* diagrammed in (13b).

HK structure makes certain predictions about the phonotactics of CCX verbs, which will be taken up in section 4.2. *OIS*'s central claim is that it is HK structure, rather than syllable structure, that is relevant for imperfective gemination. *OIS* posits the following generalization:

- (17) The segment that is geminated in the imperfective is the one that appears in the head position of the root.²⁹

The verb *krm* 'be dried out' is an instance of generalization (17), since the head in its HK structure *[kr]m* is *k* and it is *k* that geminates to form the imperfective stem *kkrm*. The verb *nkr* 'stand up' also follows the generalization, since its HK analysis is *n[kr]*, with a head *k* that geminates in the imperfective *nkkr*.

The conditions in (14)-(17) recapitulate *OIS*'s analysis of CCX verbal roots. *OIS* does not discuss the syllable structure of Tashlhiyt, but the similarities between syllable structure and HK structure should be obvious. Not all the trisegmental sequences have an HK structure (a fact that *OIS* uses to advantage; see below), but for those that have one, syllable structure can always be deduced from HK structure. The following correspondences obtain:

- (18) Correspondences between HK structure and syllable structure

HK		right		left
structure	head	complement	satellite	satellite
↓				
syllable	onset	nucleus	coda	onsetless nucleus
structure				

syllable-based approach. Taken together, (14) and KPEAK are equivalent to condition (10a) in *OIS*, and KNOOB (no obstruent complement) is condition (10b). The names KPEAK and KNOOB are our own.

²⁹) (20) p. 272.

Compare for instance the HK structure $[kr]m$ and the syllable structure $|kr̄m|$, or the HK structure $n[kr]$ and the syllable structure $|n|kr̄|$.

In (18) the arrow draws attention to the fact that the correspondence is one-way: when a segment plays a certain role in HK structure its status in syllable structure is that indicated in the bottom row, but the converse is not true (e.g., not all segments that are syllable onsets are heads in HK structure). The reason for this asymmetry is that while CCX sequences can all be assigned a syllable structure, some of them lack an HK structure. nff 'scrape' is a case in point. Its syllabic structure is $|n|f̄|$, but any binary-branching tree built over the sequence nff will fail to meet at least one of the conditions in (14)-(16): for instance $[n]f̄$ and $n[f̄]$ both violate KPEAK, since n , the most sonorous segment, is not a complement in either structure.

The scheme advocated in *OIS* thus divides the CCX verbs into two classes that we can call HK-compatible and HK-averse. HK-compatible verbs are all those whose roots can be analyzed as HK structures meeting conditions (14)-(16); the remainder are HK-averse.

We now turn to *OIS*'s predictions concerning the bifurcation of CCX verbs into geminating and nongeminating ones. If a verb is HK-compatible, *OIS* targets the same consonant for gemination as the syllable-based account. Every head in HK structure is a syllable onset (see (18)), and rule (17) requires that the segments that geminate in the imperfective must be heads; equivalently, the syllable-based rule (11) requires that they be onsets.

If, on the other hand, a verb is HK-averse, it is not assigned any HK structure. Verbs that lack an HK structure cannot undergo rule (17), which makes reference to HK structure, and so they must resort to other means than gemination in forming their imperfective stems. In this way, *OIS* predicts that HK-averse verbs are nongeminating.

3. An Embarrassment of Riches: HK Structure alongside Syllable Structure

Let us first take a closer look at KPEAK (15) and show that once it is reformulated to accord with *OIS*'s intent, the resemblance between HK structure and syllable structure is even closer than suggested by (18).

Like *OIS*'s original formulation ((10a) p. 264), our reformulation above in (15) provides that the complement is 'the most sonorous segment', but this admits of two interpretations. The strong interpretation mandates that the complement is more sonorous than any other segment in the verb; the weak interpretation only mandates that it is more sonorous than its sister within the inferior node in the tree, that is, it is more sonorous than the head. Either interpretation is problematic, as it turns out. In order to accord with the author's intent, the original formulation must instead be replaced with the following:

(19) KPEAK: The complement is more sonorous than *an adjacent segment*.

Here is why this reformulation is necessary. On pp. 277–278 various geminating verbs of the form LON (liquid-obstruent-nasal) are assigned the HK structure L[ON], e.g. $l[km]$ ‘arrive’, $r[f^{\text{r}}m]$ ‘mark’. Since liquids are more sonorous than nasals, and since *OIS*’s constraints are inviolable, L[ON] structures are well-formed HK structures only if the weak interpretation is taken: the complement is more sonorous than the head. But the strong interpretation is necessary in order to assign a unique HK structure to verbs like $g^w mr$ ‘hunt’, whose sonority contour is a continuous rise: while $[g^w m]r$ and $g^w [mr]$ both satisfy KPEAK (15) under its weak interpretation, only $g^w [mr]$ satisfies the strong interpretation.³⁰

Reformulating KPEAK as in (19) resolves this conundrum. While $[g^w m]r$ violates (19), $g^w [mr]$ meets it. $l[km]$ also meets it, and so does $[kr]m$ (13a). Note that (19) bears a close resemblance to SONPEAK (3), the cornerstone of DE02’s account of syllable structure in Tashlhiyt. But while syllabification operates in the language at large, KPEAK is only meant to assign structure to roots in the lexicon.³¹

The new version of KPEAK contradicts *OIS*’s claim that in HK structure the feature content of satellites is absolutely free: “verbal triconsonantal roots in Tashlhiyt Berber are basically binary, in that only the head and its complement are constrained. Their binary-branching structure locally determines their co-occurrence restrictions. Indeed the phonological constraints they obey are limited to the inferior node in the tree” (pp. 265–266). Contrary to this claim, the new version of KPEAK implies that a satellite is less sonorous than an adjacent complement, which is what enables it to exclude $[g^w m]r$.

There is another reason why the claim cited above is untenable: additional machinery must be included to prevent *OIS*’s system from making wrong predictions about the geminating or nongeminating status of verbs of the form VCV and CVC, and this machinery will inevitably constrain the feature content of the satellites. The discussion in *OIS* is limited to the CCX verbs, and VCV and CVC verbs are not CCX verbs, but they accept nonetheless well-formed HK structures. Unless this is explicitly prevented by some component of the system, *ali* ‘cluster’ would be assigned the structure $a[li]$, in which case rule (17) predicts that its imperfective stem should be *alli* instead of the attested form *tt-ali*.

³⁰ In *OIS*, verbs like $g^w mr$ are discussed on p. 265 in section 3.3.

³¹ Note that the reformulation in (19) does not do away with the class of HK-averse verbs: *nff* ‘scrape’ remains HK-averse, since the only segment eligible to be a complement per (19) is *n*, which is not preceded by any segment that could serve as the head.

Similarly, *ħuz* 'corner' would have the structure [*ħu*]z, whence the imperfective stem *ħħuz* (the attested stem is *tt-ħuz*).³²

We can now take stock. *OIS* and the syllable-based account of imperfective gemination start from the following fact, which they both take as a given: among the trisegmental verbs, only primary CCX verbs can use gemination to form their imperfective stems.³³ After *KPEAK* has been suitably amended, the HK-based account makes the same predictions as the syllable-based account about the choice of the consonant that undergoes gemination in the imperfective.³⁴ Where the two accounts disagree is in what they say about the division of CCX verbs into geminating and nongeminating. The syllable-based account says that the geminating verbs must be marked in the lexicon as [+ rule (11)] (see DE91: 91–92). On the other hand the HK-based account claims that the partitioning of CCX verbs into geminating and nongeminating reflects their phonological structure: the geminating verbs are those that are HK-compatible and the nongeminating ones are those that are HK-averse. The syllable-based account cannot capture this purported structural difference because it lacks the requisite formal apparatus. According to *OIS*, then, the facts of Tashlhiyt imperfective gemination are evidence in favor of HK structure, and they can no longer be considered to support the specific claims made in DE's work about syllable structure in Tashlhiyt.

We now have an embarrassment of riches. Adopting HK structure would not render syllable structure superfluous, because invoking syllables of the kind posited in DE88 and DE02 remains necessary in order to account for poetic scansion and for length alternations in the causative prefix, two phenomena that *OIS* does not even mention. Since the author does not deny the existence of syllables in Tashlhiyt, his discussion implies in fact that HK structure and syllable

³² Cf. (9g) and (9i).

³³ Jebbour (1996, 1999) and Bensoukas (2001) both propose explanations for this fact. On Jebbour 1996, 1999, see DE02:122–132. Bensoukas's (2001) thoughtful work contains a serious attempt to provide a unified account of imperfective stem formation in Tashlhiyt. This account, which is couched in the framework of Optimality Theory, analyzes consonant gemination and the *tt*- prefix as two allomorphs of a single imperfective morpheme which consists in a featureless mora that is affixed to the verbal root. A serious problem with this account is that it assumes, following Jebbour, that syllables with consonantal nuclei are unimoraic even if they have a coda. This assumption conflicts with the facts of versification, which show that a coda has the same effect on syllable weight regardless of whether the nucleus is consonantal or not.

³⁴ The fact that the sonority scale in *OIS* does not distinguish between fricatives and stops is without consequence: as far as CCX sequences are concerned, the difference between fricatives and stops matters only for COO sequences, but none of these is subject to the gemination rule (17) since they are all HK-averse.

structure coexist in the grammar of Tashlhiyt. (On p. 265 fn 16, Tashlhiyt is included among languages that have syllabic consonants.) In view of table (18) and of the resemblance between SONPEAK (3) and KPEAK (19), HK structure and syllable structure come close to being notational variants of one another, except that while Tashlhiyt expressions all have syllable structure, only a subset of them are endowed with HK structure. We don't know what the boundaries of this subset are, as *OIS* does not contain any discussion of how its scheme could be extended to strings larger than CCX, in Tashlhiyt or in other languages. Considered on purely conceptual grounds, then, HK structure can be dismissed out of hand as a superfluous contrivance. The only way it could still claim our attention would be in making good on its claim of affording us new insights about imperfective gemination or about the phonotactics of Tashlhiyt. In the next section we look at how well the predictions of *OIS* square with the data.

4. The Empirical Evidence

4.1. Imperfective Gemination

A central idea in *OIS* is that compatibility with HK structure is what sets apart the geminating verbs—the verbs that use gemination to form their imperfective stems—from those that resort to other means. The data in support of this claim are gathered in an appendix that lists 219 Tashlhiyt verbs.³⁵ Each verb in that list is represented by two stems, aorist and imperfective. 193 verbs have the shape CCX and 26 have biliteral roots. Since *OIS*'s discussion of the biliteral verbs does not give any reason to prefer HK structure over the syllable-based approach, we concentrate on the CCX verbs.³⁶

³⁵ The list in the appendix “was collated from various sources including Dell and Elmedlaoui 1988, 2002, El Mountassir 2003, and Boumalk 2003” (p. 260). Loanwords were not included. On the exclusion of loanwords, see below, section 4.3.

³⁶ *OIS* also briefly mentions uniconsonantal verbs and quadriconsonantal ones. On p. 265 the fact that uniconsonantal verbs all have obstruent roots is presented as evidence that in root structure the lower node is left-headed. This is a non sequitur: since HK structure allows sonorant heads (e.g. in $g^w[mr]$), it allows verbal roots consisting of a single sonorant, contrary to fact.

Quadriconsonantal verbs are mentioned in fn 18 on p. 265. They are said to support the HK structure hypothesis, since “most of them are reduplicated biconsonantal roots” like *ffff* or *durdr*. This is contrary to fact. We have found over 70 primary verbs that are quadriconsonantal, and only 7 of them have fully reduplicated biconsonantal roots. Many cannot be analyzed as concatenations of HK structures, e.g. *mrurd* ‘lie on the ground’, *sin*¹*sg* ‘whistle’, *χubz* ‘smear’, *zgzaw* ‘be green’.

OIS's argument for the superiority of the HK approach revolves around the following statement (p. 269, italics added):

- (20) *All and only* verbs that contain at least one sonorant in a noninitial position [...] undergo gemination in the imperfective.

(This is repeated almost verbatim on p. 270, and the same claim is made again on p. 271.) This is more a rhetorical device than a statement of fact. The cut-and-dried language is quite misleading, since there are counterexamples, some of them predicted by the HK-based analysis as the author himself later acknowledges.³⁷

Let 'O' stand for 'obstruent'. Among the CCX verbs, COO verbs are those like *fk* 'sprain' or *nff* 'scrape', in which the last two consonants are obstruents, and ~COO verbs are verbs whose shape is not COO, that is, verbs "that contain at least one sonorant in a noninitial position", as the generalization in (20) puts it. That generalization is equivalent to the conjunction of (21a) and (21b) below, where the italicized words refer to their counterparts at the beginning of (20):

- (21) a *All*: All ~COO verbs use gemination to form their imperfective stems.
b *Only*: No COO verb uses gemination to form its imperfective stem.

In *OIS*'s system the purported generalizations in (21) are consequences of constraints (14) and KNOOB (16). The COO verbs are all those that run afoul of KNOOB. KNOOB mandates that the complement is not an obstruent, and by (14) the complement can only be the second or the third segment in an HK structure. Consequently COO verbs are HK-averse, and so they cannot undergo the gemination rule, or at least this is what the HK-based analysis predicts.

Consider first (21b), which is a direct consequence of KNOOB. Contrary to (21b), some COO verbs use gemination in the imperfective, such as *nff* 'scrape' and *fk* 'sprain', whose imperfective stems are *nfff* and *fttk*.³⁸ The only thing *OIS* says about them is that they are "exceptions" (p. 273). In terms of the HK-based approach, all that can be done is to list *nfff* and *fttk* as allomorphs in the lexicon, with no explanation for the fact that it is the second consonant that geminates, as predicted by the syllable-based analysis, rather than the first.

³⁷ This is not the only categorically-phrased generalization that is not correct. On p. 263 it is claimed that in a triconsonantal root "if two sonorants are contiguous, then the second sonorant is necessarily more sonorous". However, counterexamples occur on pp. 278–279, e.g. *frn* 'sort', *krm* 'be dried out'.

³⁸ *fk* is not listed in the appendix, but on p. 273 it is given as geminating. The author mistakenly writes on p. 270 that DE88 were unable to find geminating verbs entirely made of obstruents. In fact four such verbs are listed in DE88: *fk* 'sprain', *zbd* 'pull', *stv* 'split' and *zdx* 'inhabit'. In DE88, our reasons for using hypothetical examples on p. 12 are clearly explained in the last sentence of p. 11 and in fn 22 p. 16.

Consider next (21a), which has two kinds of counterexamples in the appendix to *OIS*. First there are *mrg* ‘be ashamed’ (p. 279) and *mlu* ‘be limp, flabby’ (p. 280), whose imperfective stems are *tt-mrag* and *tt-mlu*. To account for the fact that they are nongeminating in spite of their having HK structures (*[mr]g, m[lu]*) these verbs should be marked in the lexicon as exceptions to the gemination rule (17).

A counterexample to (21a) of a different kind is *lmd* ‘learn’, whose imperfective is *tt-lmad*. As noted on p. 279, the sequence /lmd/ is HK-averse since *[lm]d* and *l[md]* both violate KPEAK, and so the failure of this verb to geminate in the imperfective is predicted by the HK-based approach.³⁹

The upshot of our discussion of (21) is this: *OIS*’s only argument against the syllable-based analysis of imperfective gemination is that it must in some cases resort to lexical idiosyncrasy, but then so must the HK-based analysis. Furthermore, while the syllable-based account posits only one kind of idiosyncrasy, a feature [+ rule (11)] that triggers gemination in some CCX verbs, the HK-based approach implies that CCX verbs have two different idiosyncratic ways of forming an imperfective stem, depending on whether they have HK structure or not. Some verbs with an HK structure must be marked in the lexicon as failing to undergo the gemination rule (17), e.g. *mrg* / *tt-mrag*; this kind of idiosyncratic behavior is the analogue of that posited in the syllable-based analysis. The other kind of idiosyncrasy is that of verbs like *nff* / *nfff*, which seem to undergo the gemination rule even though they do not meet the conditions of the rule—they lack an HK structure. Unless there is independent evidence for it, this bifurcation of idiosyncrasy is but an arbitrary complication forced on us by the HK-based approach, and it is yet another reason to prefer the syllable-based account of imperfective gemination.

4.2. Phonotactics

The main piece of empirical evidence that *OIS* adduces in support of HK structure is the fact that in CCX verbs the distribution of segment types is heavily biased in favor of the sonorants. The reasoning is presumably this: although CCX sequences that violate constraints (14)-(16) are not excluded outright from the lexicon—HK-averse verbs do indeed exist, as we have seen—there should at least be a strong tendency to avoid violations, and such a tendency favors sonorants over obstruents in lexical entries.

³⁹ Note, however, that earlier *lmd* was a geminating verb. Its imperfective stem occurs as *lmm*d in line 399b of *The Ocean of Tears*, a 1312-line Tashlhiyt poem written in the early 18th century using the Arabic script (see van den Boogert 1997, Afa 2009).

As evidence that sonorants are overrepresented in the verbal lexicon, *OIS* presents statistics on the distribution of segment types in the list of verbs given in the appendix. These statistics must be treated with caution, because the appendix represents only a subset of the CCX verbs listed in *OIS*'s sources, and *OIS* does not indicate how this subset was chosen.⁴⁰ Solid evidence exists nonetheless to back Lahrouchi's claim.

The segmental content of Tashlhiyt roots is subject to various cooccurrence restrictions involving place of articulation and voicing, on which see Elmedlaoui 1995 and the references cited there. We have calculated that if the verbal roots of the form CCX that are attested in Tashlhiyt were drawn at random from the CCX sequences that obey these cooccurrence restrictions, one would expect 50% of them to be COO sequences.⁴¹ Among the 306 CCX verbs listed in El Mountassir 2003, only 48 have roots of the form COO, which is 15% instead of the expected 50%. The analogous ratios in Boumalk 2003 and in DE02 are respectively 34% and 18%. It is a fact, then, that a major category of HK-averse sequences, COO sequences, are underrepresented among CCX verbs, and the syllable-based approach does not have anything to say about this fact. On the other hand the HK-based analysis "explains" it in a rather loose sense, and as we have seen, the price to pay for this explanation is the massive redundancy implied by the coexistence of HK structure and syllable structure within the same theoretical framework. We now show that there is yet another problem with the HK-based analysis: it does not enable one to make sense of an ongoing change in the conjugation of the CCX verbs.

4.3. *Progressive Attrition of the Geminating Verbs*

Although Tashlhiyt speakers from different regions have no difficulty in understanding one another, Tashlhiyt is far from uniform across the Tashlhiyt-speaking area. Among the local varieties of Tashlhiyt, there is none that is considered a standard. As a consequence of the urbanization on a massive scale that is currently taking place, transplanted rural dialects are brought into close contact with one another and with Moroccan Arabic. The result is dialect mixture combined with language shift at the expense of Tashlhiyt, especially among younger speakers, with the attendant linguistic changes typical of such situations.⁴²

⁴⁰⁾ On *OIS*'s sources, see above note 35. To give just one example, 24 of the native verbs listed in El Mountassir 2003 are absent from *OIS*'s appendix.

⁴¹⁾ According to our calculation, there are 14,452 CCX sequences that obey the cooccurrence restrictions and among them 7,268 are COO sequences.

⁴²⁾ See Boukous 1995, 2000, DE02, Ennaji 2005. On similar situations elsewhere and their linguistic consequences, see Trudgill 1986. The language of the older generations in the

In particular, verbal inflection is undergoing several processes of simplification. One of these is the generalization of default imperfective formation to all CCX verbs.

Before we get to this morphological change, let us briefly mention for comparison two phonological changes in progress involving gemination. The geminate reflex of /w/, which is /gg^w/ in the speech of older speakers, has been replaced by /ww/, and the geminate reflex of /d^ʕ/, which is /tt^ʕ/, is now being gradually replaced by /dd^ʕ/. Examples are given in (22) below, where column A gives the aorist stem of a verb and the following columns display its imperfective stem according to Destaing 1920 (B), Boumalk 2003 and El Mountassir 2003 (C), and *OIS* (D).

(22)	A	B	C	D	
a	rwi	rgg ^w i	rwwi	rwwi	'stir to mix'
b	zwi	zgg ^w i	z ^ʕ wwi	z ^ʕ wwi	'bring down with a pole'
c	rdl ^ʕ	rttl ^ʕ	rttl ^ʕ	rttl ^ʕ	'lend, borrow'
d	md ^ʕ i	mtt ^ʕ i	mtt ^ʕ i	mdd ^ʕ i	'taste'
e	kd ^ʕ u	ktt ^ʕ u	kdd ^ʕ u	kdd ^ʕ u	'smell'

While the change /gg^w/ > /ww/ is systematic in the data of columns C and D, the change /tt^ʕ/ > /dd^ʕ/ is still in progress, as is suggested by the content of columns C and D in (22c–e).

The changes illustrated in (22) involve phonological simplification through the elimination of a paradigmatic alternation. We now consider a case of morphological simplification, namely the generalization of default imperfective formation.

Looking back at table (9), one can see that imperfective gemination only occupies a small region in the global scheme for the formation of imperfective stems in Tashlhiyt. An overall account of the formation of imperfective stems with disjunctively ordered generalizations was proposed in DE91:93–94. According to that account, the default exponents of the imperfective are the prefixation of *tt-* and the insertion of a chameleon vowel; the CCX verbs that resort to gemination to form their imperfective stems have in their lexical entries a feature [+GEM] that triggers rule (11). The notation [+GEM]/[-GEM] employed by DE91 wrongly suggests that the relationship between geminating and nongeminating verbs is a symmetrical one. In fact only the geminating verbs need to be

Tashlhiyt-speaking countryside is extensively documented in folktales, riddles, proverbs, etc. collected during the 20th century (e.g., Destaing 1920, Podeur 1995, Amard 1997, Stroomeer 2001a,b,c, 2002, 2003a,b, 2004) or in the 19th (Afa 2004). As indicated in section 1.2, another source of data is the vast corpus of songs in the 'old poetry' style recorded on commercial audio cassettes; see DE08 and the enclosed CD.

marked in the lexicon—let us say that their lexical entries contain a privative feature [G]. As a consequence of not being lexically marked, the other verbs will resort to the default markers for the imperfective. The situation in Tashlhiyt is analogous to that in French, where alongside the regular verbs that are conjugated by default (e.g., *manger* ‘eat’) there exist irregular verbs that are marked as such in the lexicon (e.g., *boire* ‘drink’).

In CCX verbs the formation of imperfective stems is currently in a state of flux, with a tendency for geminating stems to be replaced by default ones. Some verbs are in a transitory stage, with two acceptable imperfective stems. Examples of such doublet verbs are given in DE91.⁴³ The examples in (23) are from Boumalk 2003.

(23)	aorist	imperfective		
	a ngd ^ɕ	nggd ^ɕ	tt-ngad ^ɕ	‘drown’
	b bsr	bssr	tt-bsar	‘spread’
	c ftu	fttu	tt-ftu	‘walk, go’
	d ʒdr	ʒddr	tt-ʒdar	‘burn’

There are also verbs for which *OIS*'s sources give different imperfective stems. The examples in (24) are from Boumalk 2003 and El Mountassir 2003:⁴⁴

(24)	aorist	imperfective		
		Boumalk	El Mountassir	
	a nʒd	nqqd	tt-nʒad	‘refine’
	b frs	ffrs	tt-fras	‘be sharp’
	c hbu	tt-hbu	hbbu	‘hide’
	d ʒlu	tt-ʒlu	ʒllu	‘be expensive’

In order to understand the morphological change that is currently taking place, one must be aware that (i) the processes employed by nongeminating CCX verbs to form their imperfective stems are merely the default processes for imperfective formation in Tashlhiyt verbs at large, and (ii) borrowed verbs make use of these same default processes. These facts lie beyond the empirical purview of *OIS*, since (i) the discussion in that paper is limited to verbs with roots of the form CCX and CX and (ii) loanwords are not examined.

⁴³) Doublet verbs were not mentioned in DE88 and DE02 because they are irrelevant to the only question about imperfective gemination that was discussed there, which was how to predict which consonant geminates in those stems where gemination occurs.

⁴⁴) *OIS* does not mention the existence of doublet verbs like those in (23)–(24), despite the fact that *OIS*'s appendix includes a number of verbs that have alternate imperfective stems in *OIS*' sources. While *ngd*^ɕ (23a) and *nʒd* (24a), which are HK-averse, are listed in *OIS* as nongeminating, *OIS* lists the other verbs in (23)–(24) as geminating.

There is no reason why borrowed verbs should be excluded from consideration. The Berber languages and Arabic have coexisted in Morocco for over a millennium and as a result, the Tashlhiyt lexicon is shot through with Arabic loans. The only justification given in *OIS* for the decision not to take borrowed verbs into account is that “loanwords [...] behave differently from native words” (fn 10 p. 260). This is true to some extent of nouns,⁴⁵ but not of verbs. Aside from the statistical tendencies to be presented below, there are no phonological or morphological differences between CCX verbs that are Arabic loans and those that belong to the native stratum.⁴⁶ There is nothing exceptional about this situation. French has many verbs that are borrowed from English and that are phonologically and morphologically indistinguishable from native French verbs (e.g. *shooter*, *stopper*), and the same is true for English verbs borrowed from French (e.g. *join*, *doubt*).

To determine the direction of the change in progress, let us look at the distribution of geminating and nongeminating verbs in the dictionary by El Mountassir, which contains 306 CCX verbs, 183 of them borrowed from Arabic.⁴⁷

(25)	native	loans	total
geminating	61	13	74
default (nongeminating)	62	170	232
total	123	183	306

As can be seen from (25), the proportion of nongeminating verbs is much higher in loans (170/183 = 92%) than in native verbs (62/123 = 50%).⁴⁸ In the world's

⁴⁵ On Tashlhiyt nouns borrowed from Arabic, see, e.g., DE02:34–36.

⁴⁶ That native speakers of Tashlhiyt do not always find Arabic loans easy to spot is shown by the fact that El Mountassir (2003) has overlooked a sizeable number of borrowings; see note 48. Similarly, among the 193 CCX verbs listed in *OIS*'s appendix, the following 34 turn out to be Arabic loans: *bdu* 'start', *bnu* 'build', *bɣl* 'be stingy', *bɣs* 'discredit oneself', *fl* 'roll', *gzr* 'slaughter', *zbd* 'pull', *zlu* 'lose', *kmi* 'smoke', *krm* 'be dried out', *kru* 'rent', *mɣl* 'comb', *nx^{wz}* 'spur', *nzm* 'remain unharmed', *rdm* 'fill up, demolish', *rkz* 'dance', *ulu* 'be expensive', *vml* 'mold', *ɣld* 'mix', *ɣlu* 'destroy, be insane', *ɣmr* 'ferment', *ɣng* 'choke', *ɣrb* 'scratch', *ɣsr* 'be damaged', *ɣtl* 'feint', *ɣzr* 'look nastily', *zhr* 'blaze up', *frk* 'share', *hfu* 'stick', *hml* 'like', *hrf* 'be rough', *hr* 'burn', *hr^g* 'be forbidden by religion, be devoid of', *hsr* 'stop'.

⁴⁷ In El Mountassir's dictionary there are only six CCX verbs that are listed with alternate imperfective stems, four of which are irrelevant for the purposes of this paper. In table (25) the remaining two are counted as geminating.

⁴⁸ Among the 306 CCX verbs, only 135 are marked by El Mountassir as Arabic loans. We have found 48 more that have escaped the author's notice, hence the total of 183 loans recorded in (25). If these 48 additional loanwords are not taken into account, the balance between native and borrowed verbs is reversed (171 vs. 135 instead of 123 vs. 183), but this does not affect the main finding based on (25), which is that the percentage of nongeminating verbs

languages it is common for the inflection of novel words to follow the default pattern. This is for instance the case for English verbs borrowed from French, such as *cry* and *search*.⁴⁹ The numbers in (25) accord with the supposition that gemination is progressively being replaced by the default markers for the imperfective. In doublet verbs like those in (23)-(24) the geminating stem is presumably an older form that is being gradually superseded. Pinker and Prince (1994) suggest that the preponderance of verbs with a regular inflection in the lexicon of Modern English might be a consequence of the fact that many verbs were borrowed from French and Latin. An analogous situation seems to hold in Tashlhiyt as far as CCX verbs are concerned.

The figures of (25) would only mesh with the HK-based analysis if the different proportions of nongeminating verbs in the two columns were due to different proportions of HK-averse verbs. The table in (26) below shows that this is not the case: HK-averse verbs only account for 20% of the loans (38/183) and for 8% of the native verbs (10/123).

(26)⁵⁰

	native			loans			total
	~HK	HK	total	~HK	HK	total	
geminating	1	60	61	0	13	13	
default (non-geminating)	9	53	62	38	132	170	
total	10	113	123	38	145	183	
			123			183	306

In terms of the syllable-based analysis, the ongoing change is a simplification of the lexicon: lexical entries are losing their [G] markings.⁵¹ On the other hand the change does not make sense in terms of the HK-based analysis. Instead of predicting the gradual attrition of the geminating verbs across the board, the HK-based analysis predicts that novel verbs that are HK-compatible should add new recruits to the class of geminating verbs. This does not accord with table

is much higher in loans than in native verbs. Based on the only verbs marked as loans by El Mountassir, the percentage of nongeminating verbs among the loans is 96% while that among the native verbs is 59%, still a large difference.

⁴⁹ This is not exceptionless. As noted by Pinker and Prince (1994), new irregular forms are on occasion created by analogy with existing ones. English has a few borrowed verbs that have an irregular inflection, such as *quit* and *cost*. Analogously, 13 out of the 183 loans recorded in (25) are geminating verbs.

⁵⁰ 'HK' and '~HK' stand respectively for 'HK-compatible' and 'HK-adverse'. The shaded cells correspond to the first two columns in (25).

⁵¹ The change was already in progress three hundred years ago. In *The Ocean of Tears* (see note 39), the imperfective stem of *str* 'conceal, keep quiet about' is *str* (line 107b) while that of *ndm* 'regret' is *tt-ndam* (line 402b). *str* is an Arabic loan (see note 49), and so is *ndm*.

(26), which indicates that loans tend to be nongeminating regardless of their phonological makeup.

Looking now at these data from a synchronic point of view, the result of tabulating the geminating vs. nongeminating distinction against HK-compatibility is given in the left-hand side of table (27). The shaded cells represent verbs that must be considered lexically idiosyncratic in the HK-based approach, either because they are geminating despite being HK-averse, or because they are HK-compatible and yet nongeminating. (The right-hand side gives the same figures for the 193 CCX verbs listed in the appendix to *OIS*.)

(27)	El Mountassir			<i>OIS</i>		
	~HK	HK	total	~HK	HK	total
geminating	1	73	74	6	142	148
default (nongeminating)	47	185	232	21	24	45
total	48	258	306	27	166	193

Table (27) indicates that among the 306 CCX verbs contained in El Mountassir's dictionary, 186, or 60%, do not fit in with the HK-based approach. This figure destroys any hope that an HK-based gemination rule would require only a minimal use of lexical idiosyncrasy. The consequences of *OIS*'s policy of excluding loans from consideration can be seen by comparing the two sides of the table. Only 30 out of the 193 CCX verbs listed at the end of *OIS* must be considered idiosyncratic—that is 15%, as against 60% in El Mountassir.

There is one aspect of (27) which could be viewed as supporting the HK-based analysis: the proportion of geminating verbs is much higher among HK-compatible verbs than among HK-averse ones. In El Mountassir it is 28% for HK-compatible verbs (73/258), and only 2% for HK-averse verbs (1/48). Rather than a manifestation of a productive process, we think that this is an instance of the "hypersimilarities"—partial regularities based on memory-driven analogies—that are discussed in Pinker and Prince 1988, 1994. (See also Bybee and Slobin 1982, Marcus et al. 1995.) Classes of irregular lexical items often share phonetic similarities that cannot be pinned down by means of necessary and sufficient conditions. For instance, the irregular verbs of English all have monosyllabic roots. A second example is the fact that most of the French irregular verbs that take *-oir* as an infinitive desinence have roots that end in *v* (e.g. *sav-oir* 'know', *pleuv-oir* 'rain'), while *v*-final roots are also found in other inflection classes of verbs, e.g. *viv-re* 'live', *rav-ir* 'ravish', *lav-er* 'wash'. These family resemblances protect irregular lexical items against overgeneralization in child language, and Pinker and Prince speculate that they assist memorization. An open question is the role of syllable structure in these family resemblances.

5. Conclusion

The discussion in *OIS* revolves around an attempt to predict the partitioning of Tashlhiyt CCX verbs into geminating and nongeminating on the basis of the phonological makeup of their roots. We have pointed out serious problems with the root structure proposed in *OIS*: it duplicates independently needed syllable structures, it does not significantly reduce lexical idiosyncrasy, and it makes incorrect predictions concerning an ongoing change in the membership of inflectional classes of verbs. These problems prevent the root-structure hypothesis from being a viable alternative to syllable-based analyses of imperfective gemination.

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