The Imperfective in Tashlyhit Berber: Form, infixation, and apparent multiple exponence

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1 Introduction

We provide an analysis of verbal forms – the imperfective in particular – in Tashlhiyt, a Berber (Amazigh) language.

1.1 Basics of imperfective form

The verb appears in three forms, which we refer to as the *aorist*, the *perfective*, and the *imperfective*, following a standard descriptive tradition. The first is the typical citation form, and the last is the focus of this paper. To start, the typical shape for Tashlhiyt verbs is CCC. There are several effects to note in the formation of the imperfective:

(1) Three possibilities for CCC

	aorist	**imperfective**	**gloss**	
a.	krz	k͟krz	'plough'	*initial gemination*
	qlb	q͟qlb	'knock out'	
	qrsˤ	q͟qrsˤ	'reopen (wound)'	
	slʁ	s͟slʁ	'cork'	
	smd	s͟smd	'add'	
b.	gʷmr	gʷm͟mr	'hunt'	*medial gemination*
	kʃm	kʃ͟ʃm	'enter'	
	lkm	lk͟km	'arrive'	
	nkr	nk͟kr	'stand up, wake up'	
	mgr	mg͟gr	'harvest'	
c.	lmzˤ	t͟t-lma͟zˤ	'swallow without chewing'	*tt-prefixation+V-augmentation*
	nfd	t͟t-nfa͟d	'be stirred up'	
	rkz	t͟t-rka͟z	'dance'	
	bzˤdˤ	t͟t-bzˤdˤa͟dˤ	'urinate'	
	bzg	t͟t-bza͟g	'swell'	

Questions to be addressed include (but are not limited to):

§2 How is the gemination of imperfectives derived (from syntax to morphology to phonology)? What is the relation between gemination and prefixation?

§3 What properties determine which verbs gemination applies to/does not apply to? What is the target of gemination (its *pivot*)?

§4 What is the nature of the /a/ vowel that occurs before the final consonant of the (1c) imperfectives? How does this element relate to gemination and prefixation?

We will present our current working analyses of these matters and then provide a synthesis with pointers to future directions in §5.

1.2 Structural preliminaries

The imperfective verb form appears with a progressive interpretation; it occurs with the element *ar–* glossed PART for 'particle' here– as seen in (2b):

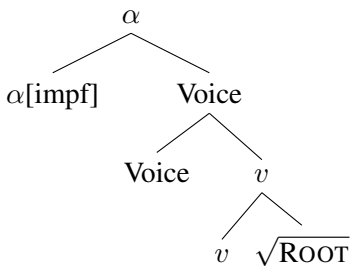
(2) Perfective and imperfective verbs

a. i-bna-t
3s-build.PERF-3s.CL
'He built it.'

b. ar-t i-bnnu
PART-3s.CL 3s-build.IMPF
'He is building it.'

We're going to assume that the imperfective verb forms realize the complex head shown in (3); in addition to typical verbal heads like Voice and v, the head α[impf] creates a kind of deverbal form (something like a participle), though we are avoiding that term):

(3) structure of the imperfective verb



For α here there are connections to Aspect, or to having an Adjectival distribution (so, 'participle-like'). Sometimes we will just use [impf].

2 Morphology of the imperfective: Affixation and Gemination

As we saw in the initial data in (19), gemination occurs in two of the three initial imperfective types:

(4) Imperfectives with gemination

	aorist	imperfective	gloss	
a.	krz	kkrz	'plough'	*initial gemination*
	qlb	qqlb	'knock out'	
	qrsˤ	qqrsˤ	'reopen (wound)'	
	slʁ	sslʁ	'cork'	
	smd	ssmd	'add'	
b.	gʷmr	gʷmmr	'hunt'	*medial gemination*
	kʃm	kʃʃm	'enter'	
	lkm	lkkm	'arrive'	
	nkr	nkkr	'stand up, wake up'	
	mgr	mggr	'harvest'	

There are some generalizations concerning gemination and its relation to *tt-*:

(G1) In CCC verbs, the initial and medial consonants may be geminated; the final consonant C_3 is never geminated.

(G2) Gemination never co-occurs with the prefix *tt-*.

(G1) is stated as specific to CCC verbs for reasons that will become clear when we move to the phonological details of infixation. As a first step in the analysis, we are going to take

- the alternation with the prefix; and
- effects on C_1 or C_2 but **not** C_3

as suggesting a **left-edge** locus for this effect; i.e., where the gemination is in a non-trivial relation to prefixation.

2.1 Gemination as infixation

The generalization (G1) is typical of infixation: a specific position is targeted, with reference to one edge or the other of a host (for recent discussions with assumptions similar to ours see Kalin 2022). Schematically, the relevant steps are as follows:

(5) Gemination $<$ Infixation, Schematically

a. Input: Structure in (3)
b. Linearization: α[impf]$^\frown$verb
(Omits Voice/v; see below)
c. Vocabulary Insertion: α[impf] $\leftrightarrow$ C *this section*
d. Infixation: C$^\frown$VERB $\longrightarrow$ ve$\langle$**C**$\rangle$rb *section 3*
e. Vowel Augmentation *section 4*

We will have more to say about how precisely the infixation part works later. For now, the question to be asked concerns how the infix represented as C in (5) relates to the prefixal realization *tt-*.

2.2 Two possibilities for the imperfective VI

Putting some details to the side for the moment, (G2) suggests a treatment in which prefixation and gemination are morphologically **the same** (cf. Bensoukas 2001); abstractly:

(6) α[impf] surfaces

a. sometimes as Gemination of C_1 or C_2; and

b. sometimes as *tt-*.

There are at least two different ways that the relation between prefixation and gemination could be accounted for; these differ in terms of where the **representation of exceptionality** takes place, in interesting ways.

Analysis 1: Uniform morphology (one allomorph) One possible treatment has a single VI for α[impf]:

(7) α[impf] $\leftrightarrow$ C

(Along the lines of Bensoukas 2001). The determining factor for this C's form is then situated in the morphophonology; that is

(8) Possibilities in morphophonology

a. C is infixed under certain conditions $\mathsf{K} \Rightarrow$ Gemination

b. C is not infixed $\Rightarrow$ Realization as *tt-*

Analysis 2: Non-uniform morphology (two allomorphs) A second possibility is to treat the prefix and the geminate-inducing segment as distinct; that is

(9) α[impf] $\leftrightarrow$ C/_$\mathbb{K}$
α[impf] $\leftrightarrow$ tt-

The analyses differ in terms of

1. how they divide labor on the 'infixation or not' question, and
2. on the question of whether infixation is a property of an exponent, or something else.

An interesting question here:

$\mathscr{Q}$ How do the hypothesized phonological conditions for indexation K in (7) relate to the hypothesized context $\mathbb{K}$ in (9)?

$\mathscr{A}$ They are basically the same.

Schematically, the division of labor concerns where the contextual conditions associated with infixation (gemination) play a role:

(10) Distribution of labor

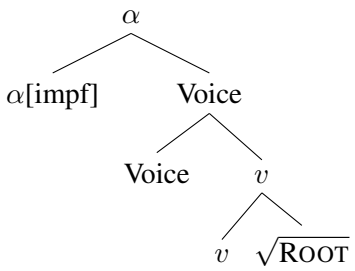
	morphology	**morphophonology**
Analysis 1	One exponent C	Conditions K determine whether infixation applies or not
Analysis 2	Conditions $\mathbb{K}$ determine C or *tt-* allomorph	C allomorph always infixes.

Given what we have seen these analyses produce the same outcomes–though there might be other reasons for favoring one or the other.

2.3 Locality: Intervention of certain prefixes

Our structure for imperfective verbs, repeated in (11), concentrates on the head α[impf], which is outside of Voice/v (as expected for this kind of aspectual head):

(11) structure of the imperfective verb



Tashlhiyt has three types of verbal derivation that involve prefixes in the Voice/v region: for forming passives, reciprocals, and causatives.

- ⋆ Strikingly, **there is no gemination in any of these prefixed forms**, for verbs that geminate otherwise (i.e. when not prefixed).

Some examples; note that the causative (underlyingly /s/) and reciprocal (underlyingly /m/) exponents undergo assimilation and dissimilation respectively; and predictable length alternations.

(12) Imperfective forms of prefixed verbs

a. causative

	aor	**impf**	**aor-caus**	**impf-caus**
a.	hrʃ	hhrʃ	ʃ-hrʃ	ʃʃ-hraʃ
b.	nkr	nkkr	ss-nkr	ss-nkar
c.	bzg	tt-bzag	zz-bzg	zz-bzag

b. reciprocal

	aor	**impf**	**aor-recip**	**impf-recip**
a.	sˤrdˤ	ssˤrdˤ	m-sˤiridˤ	tt-m-sˤiridˤ
b.	kti	ktti	mm-kti	tt-mm-kti
c.	fhm	tt-fham	n-fihim	tt-n-fihim

c. passive

	aor	**impf**	**aor-pass**	**impf-pass**
a.	krz	kkrz	tt-u-kraz	tt-u-kraz
b.	bdr	bddr	tt-u-bdar	tt-u-bdar
c.	fhm	tt-fham	tt-u-fham	tt-u-fham

Basic point:

- No infixation when [impf] does not immediately precede the verb (possibly different things to say about this on the analyses of [impf] form above).

The causative forms in (12a) show another effect of interest; the imperfective prefix is not realized in these. We account for this by positing a second Vocabulary Item for [impf] that is sensitive to causative v with /s/:

(13) impf $\leftrightarrow$ Ø/__ [v,s]
impf $\leftrightarrow$ C

A further effect illustrates an extension to this part of the analysis; there are two scenarios to consider, with two Voice/v-related heads:

(14) Multiple prefixes

a. impf $>$ caus $>$ recip *causative of reciprocal*
b. impf $>$ recip $>$ caus *reciprocal of causative*

The prediction here is that (given the revised Vocabulary), the former should show a *Ø-* imperfective, while the latter should revert to the default *tt-*. This is confirmed:

(15) Multiple prefixes

verb	**impf**	**caus>recip**	**recip>caus**
knu	knnu	Ø-s-mm-knaw	-
rwi	rwwi	Ø-s-mm-rwaj	-
fhm	tt-fham	Ø-s-n-fihim	tt-m-s-fihim
ħʃʃm	tt-ħʃʃam	Ø-s-n-ħiʃʃim	tt-m-s-ħiʃʃim

2.4 Interim conclusions

We are treating the gemination of C_1 or C_2 as the **infixation** of a morpheme that is initially linearized as a **prefix**.

- The absence of C_3 gemination supports this general picture (=orientation to the left edge).
- The intervention of prefixes between [impf] and the verb– resulting in the absence of gemination/realization of *tt-*– provides further support for this analysis:
  - Verbs that are geminated typically are **not** geminated when prefixed; and
  - *tt-* (or *Ø-*) surfaces instead.

  I.e., action on the left-edge precludes infixation.

As noted above, there are possible analyses with a single VI that surfaces as either *tt-* or C, or with two VIs for each of these. What we have analyzed to this point appears to be compatible with either.

3 Morphophonology of gemination

The two (closely linked) questions then are as follows:

1. Which verbs does infixation apply to/not apply to?
2. When it does apply, what is the *pivot*?

There are analytical tensions here that revolve around *exceptional* behavior, one of the core components of morphophonology;

- ⋆ In all verbs that show gemination in the imperfective, there is a phonological generalization specifying which consonant geminates; BUT, it looks as if not all verbs that meet the phonological criterion geminate.

Part of what we'll elaborate on is the 'looks like' part– in the light of different ways of thinking about phonological generalizations.

3.1 Background/On syllabification

We're going to adopt part of what DE do with syllables, but with a modification. We'll argue that there are two steps of Syllabification in Tashlhiyt; one that creates syllables (among vowleless verbs) with a Sonorant nucleus, and one that applies later to deal with 'left-over' material (which might be extensive...):

(16) Steps in the (morpho)phonology

a. Syllabification 1 — *create (C)S(C)*
   ⇒ Only Sonorants are nuclei
b. Infixation — *infix C to onset if present*
c. Syllabification 2 — *syllabify remaining material*

We'll look at Syllabification 2 later; for now, we illustrate the role of Syllabification 1 in (17):

(17) Steps illustrated

	krz	lkm
Syll 1	(krz	l(km
Infix	(kCrz	l(kCm
Spreading	(kkrz	l(kkm

Here we indicate only a Left boundary (for Onsets, and are neutral with respect to what happens with post-nuclear material; see §4).

3.2 Which verbs does infixation apply to?

Are the verbs that undergo gemination lexically specified to do so? Dell and Elmedlaoui (various works):

- Geminating verbs are marked with a privative feature [G]– other verbs will default to non-gemination (2013:14).

For an analysis with a feature like [G] or its equivalent, the question:

- Is a generalization missed if the verbs that possess [G] (/do not possess [G]) show shared phonological properties?

Put slightly differently, how much work does [G] do?

3.2.1 Phonological effects

It turns out that:

- CCC verbs are typically the ones that undergo gemination.
- They all contain at least one sonorant (S). Is it pure coincidence that they possess [G]?
- CCC verbs lacking a sonorant resist gemination. This may actually be why they resist gemination.
- Verbs like *bzg* 'inflate' and *bdg* 'be wet' **lack an onset** according to our analysis in 3.1. Thus, it is not the case that they resist gemination because they do not possess [G].
- Some other verbs that do not undergo gemination in the impf already contain a lexical geminate (e.g. *sllm* 'greet', *qqn* 'lock').

3.2.2 Vocabulary effects: [+arabic] verbs

- Many CCC verbs do not undergo gemination for no particular reason, except that they are borrowed from Arabic.
- In some Tashlhiyt varieties, these loanwords undergo gemination (e.g. *xdm* → *xddm* in the variety spoken in the Atlas mountains north of Ouarzazate).

3.2.3 Non-CCC Verbs

- CC verbs also undergo gemination; they further display a full vowel in the medial or final position (e.g. *ls* → *lssa* 'get dressed', *gn* → *ggan* 'sleep'). There is evidence suggesting that the additional vowel occupies an underlying empty position (see Iazzi 1995, DE 1991, Lahrouchi 2008, 2010: 268).
- All other verbs resist gemination. These are verbs that contain a full vowel, typically /a/, in the initial or medial position (e.g. *awk* 'pull', *gawr* 'sit down', *mun* 'be picked up').
- CCV verbs (where V = i or u) all undergo gemination (e.g. *gru* → *grru* 'pick up', *rwi* → *rwwi* 'to dirty'). Morphological alternations suggest that their final segment is an underlying glide that surfaces as a high vowel when adjacent to a consonant: *gru* / *agraw* 'assembly', *rwi* / *irwwajn* 'mess, disorder' (see Guerssel 1986, Lahrouchi 2013, Lahrouchi and Ridouane 2024).
- **Open question:** Could the full vowel be responsible for gemination not occurring in the verbs of the type just mentioned?

3.3 Current working analysis: Illustrations

We posit a second stage of Syllabification (*Syll2*) that occurs after the action (infixation + spreading) that produces gemination. This stage allows 'atypical' nuclei.

(18) Steps illustrated

	krz	lkm	bzg
Syll 1	(krz	l(km	bzg
Infix	(kCrz	l(kCm	– –
Spreading	(kkrz	l(kkm	– –
Syll 2	(kkrz	l(kkm	(bzg

For e.g. *bzg*, which does not geminate, instead of using a privative feature [G] that non-geminating verbs idiosyncratically lack, our analysis says that these verbs behave this way because they do not provide the phonological context necessary for C infixation (to the exception of the borrowed verbs).

Speculation:

- Full vowels are phonologically long in Tashlhiyt (see Lahrouchi 2001, 2008, Lahrouchi and Ségéral 2010) → VCV, CVC, CVCC verbs and the like display long vowels.
- C infixation is sensitive to the quantity of the neighboring segments, i.e. it takes place between singleton segments.
- Verbs with a full vowel do not provide the required context as they contain a long vowel adjacent to the infixation target. We're working on a representational solution that may account for this apparent blocking context.

4 Vowel Augmentation

One may ask why the verb base needs to be augmented, especially when a prefix is already being used. The data in (1c) are repeated below.

(19) Prefixation and vowel augmentation

aorist	**imperfective**	**gloss**
lmzˤ	tt-lmazˤ	'swallow without chewing'
nfd	tt-nfad	'be stirred up'
rkz	tt-rkaz	'dance'
bzˤdˤ	tt-bzˤdˤadˤ	'urinate'
bzg	tt-bzag	'swell'

⋆ Why isn't a form like *[tt-rkz] good enough to mark the imperfective of *krz*?

4.1 In the imperfective

Previous works analyze vowel augmentation (AUG) as an imperfectivizing mechanism, which may operate either alone (e.g. skr → skar 'do') or in conjunction with gemination and tt-prefixation (e.g. gn → ggan 'sleep', ʁndf → tt-ʁndaf 'swindle'). Unlike the latter two, which are mutually exclusive.

- Dell and Elmedlaoui (1991: 87 et seq.) refer to it as a 'chameleon vowel' because its quality is the same as the preceding vowel, if there is one (e.g. ddukkl → tt-dukkul 'be a friend', skkiws → tt-skkiwis 'sit'); otherwise, it is "a".
- AUG is governed by phonological rules, the key one being that the base must end in CC or CHV.
- There is also a morphological condition: AUG occurs in derived forms, even when the corresponding "primary" forms undergo gemination (e.g. lkm → lkkm 'arrive' / ss-lkm → ss-lkam 'Causative-arrive').

⋆ Why isn't *[sslkkm] well-formed?

4.2 In other environments

AUG occurs in the same phonological environment in many other verbal and nominal forms (which share no feature with the imperf):

(20) AUG in other derivatives.

Base		Derived form	
krz	'plough'	tt-u-kraz	'plough-passive'
ak^{w}r	'steal'	tt-j-akar	'steal-passive'
frg	'enclose'	afrag	'closing'
bri	'crush (seeds)'	abraj	'crushing'
gzzr	'cut (meat)'	agzzar	'butcher'
zdʁ	'live'	amzdaʁ	'inhabitant'

A working hypothesis is that these environments exhibit a prosodic requirement that is manifested on the **right** edge of the word.

4.3 Prosodic requirement/effect?

Since AUG operates in several morpho-syntactically unrelated derivations, this suggests that there is some morpho-phonological (prosodic or syllabic) constraint at work.

An example from German German past participles show two effects:

1. Suffixation with either *-en* or *-(e)t* (the latter the default); and
2. in many but not all cases, an initial *ge-*.

So, for example, *spielen* 'to play' has *ge-spiel-t*. While the suffix shows Root-conditioned allomorphy, the prefixal element is **subject to phonological conditioning**; cf. Wiese (1996:89ff.)

(21) Phonological conditions on *ge-*:

a. Appears with:

i. Monosyllabic stems σ
e.g. *spiel-en*, *ge-spiel-t*

ii. Polysyllabic stems with initial stress $\acute{\sigma}\sigma$...;
e.g. *árbeiten* 'to work', *ge-arbeit-et*

b. Does not appear with:

i. Polysyllabic verbs with non-inital stress $\sigma...\acute{\sigma}...$
e.g. *diskutiéren* 'discuss', *diskutier-t*, **ge-diskutier-t*

ii. Verbs with an inseparable prefix (these are not stressed) pr-σ
e.g. *ver-bríngen* 'spend time', *ver-brach-t* (cp. *bring-en* 'bring', *ge-brach-t*).

Wiese's take on this (internal to his analysis of German more broadly) is that the distribution of *ge-* is metrical: "...words containing only one foot receive the prefix, words with more than one foot do not." This assumes a particular approach to feet in the language; abstractly, though, the point is that the generalization is not about stress per se, but rather prosodic structure (1996:93).

- German marks the left edge of the word with ge-, Tashlhiyt augments the right edge with a full vowel.
- AUG could be driven by a syllabic constraint that prevents derived forms from ending with CC (why would derived forms behave so?).
- AUG could also be used to ensure that the derived form's base displays a LH iamb (e.g. ttu-kraz, a-frag, ttj-akar, etc.).
- This pattern is also found in Semitic: "In Arabic, the productive plural and diminutive are expressed by imposing a LH iambic foot on the singular noun base." (McCarthy and Prince 1994: 345, see also McCarthy and Prince 1990).

(22) Iambic plurals in Arabic

SG	PL	DIM	
nafs	nufu:s	nufajs	'soul'
kalb	kila:b	kulajb	'dog'
ʔasad	ʔusu:d	ʔusajd	'lion'
raʒul	riʒa:l	ruʒajl	'man'

*Note that C# is extrametrical according to McCarthy and Prince (1990).

- Tashlhiyt and Arabic illustrate infixation creating an iamb.
- In other languages, infixation can target an existing iamb, i.e. the iamb serves as a *pivot* (Yu 2007, Kalin 2022) or *circumscribed domain* (McCarthy and Prince 1990, 1994 et seq.). In Ulwa, a Misumalpan language, possessive /-ka/ is suffixed to the leftmost iambic foot (Mccarthy and Prince 1994: 341).