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► **To cite this version:**

Amazigh Bedar. Even in phonologically conditioned allomorphy, no escape from syntax. *Phonological Externalization*, 2024, 9, pp.113-123. hal-04760506

HAL Id: hal-04760506

<https://hal.science/hal-04760506v1>

Submitted on 30 Oct 2024

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Even in phonologically conditioned allomorphy, no escape from syntax

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ABSTRACT. This paper explores the nature of the phonology-syntax interface from the perspective of the derivational theories of (morpho)phonology and syntax, with a case study of allomorphy in Taqbaylit Berber. It argues that there is no escaping from syntax even in cases of phonologically conditioned allomorphy.

Keywords: syntax, phonology, interface, allomorphy, Taqbaylit Berber

1. Introduction

The central argument of this paper is that allomorphy is sensitive not only to phonological but also to syntactic structure. Key aspects of the relationship between phonology and syntax are discussed, including how the two models interact: which elements of phonological representation can directly interact with syntactic structure and affect allomorphy? How can syntactic structure interact with phonological/syllable structure and influence the derived form? To answer these questions, it is necessary to empirically and theoretically motivate how theoretical frameworks of syntax and phonology interact at an abstract level. This study is based on empirical data from Taqbaylit (Kabyle Berber) and proposes an analysis at the phonology-syntax interface by combining formal phonology and formal syntax.

Taqbaylit exhibits two cases of allomorphy in the verbal domain, as illustrated in (1). The first case is prefix allomorphy, which depends on its right context: derivational (causative) and inflectional (imperfective) prefixes are geminated in a $_CC$ context, and simplex in a $_CV$ context (1.a. i-ii). The second case involves root allomorphy in verbs that exhibit an initial geminate consonant (1.b): the causative forms exhibit a ghost vowel /U/ and a non-geminated first consonant, whereas the imperfective forms do not contain the vowel /U/.

(1)		DERIVATION	INFLECTION		
	VERB	CAUSATIVE-VERB	IMPERFECTIVE-VERB	GLOSS	
a.	i. $_CC$	ssə-jzəm	t st ə-jzəm	‘cut’	
	ii. $_CV$	s-fiq	t ^s -fiq	‘realize’	
b.	$_C_1C_1$	ss-ufəγ	t st ə-ffəγ	*t st -ufəγ	‘go out’
		ttəð	t st ə-ttəð	*t st -uttəð	‘beastfeed’

The data in (1) pertaining to the two types of allomorphy raises three principal questions: (i) Why do the initial-geminated verbs in (1.b) exhibit a ghost vowel /U/ in the causative forms? (ii) What are the factors that govern prefix allomorphy, resulting in either simplex or geminated forms? (iii) Why does the ghost vowel /U/ occur only in derivation (causative), but not in inflection (imperfective)?

This paper is structured to address each of the aforementioned questions in dedicated sections. Section 2 examines the occurrence of the ghost vowel /U/ in initial-geminated verbs. Section 3 analyzes the quantitative allomorphy of the prefixes. Section 4 develops an analysis at the phonology-syntax interface, explaining the restriction of the ghost vowel /U/ to derivational (causative) contexts and its absence in inflectional (imperfective) contexts. Finally, Section 5 concludes the paper.

2. Ghost vowel and syllabification

To explain why initial-geminated verbs exhibit a ghost vowel /U/ with causatives, Jebbour (1993) provided a phonological analysis within an autosegmental framework, based on data from Tashlhiyt Berber. He showed that this class of verbs contains a vowel /U/ in their underlying representation: $/UC_1C_2/ \rightarrow [C_1C_1C_2]$. This vowel can appear not only in causative forms but also in deverbals, as illustrated by Taqbaylit data in (2). In deverbals, the vowel /U/ can be realized either as a vowel [u] or as a glide [w], as shown by the two possible forms of deverbals attested in two different dialects of Taqbaylit.

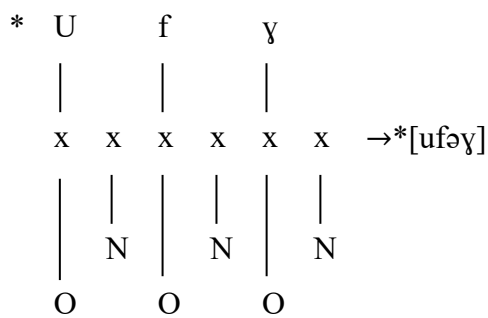
(2)	UR	VERB	CAUSATIVE	DEVERBAL (1)	DEVERBAL (2)	VERB GLOSS
	Ufɣ	ffəɣ	ss-ufəɣ	θufɣa	θawafɣa	'go out'
	Uṭḍ	tṭəḍ	ss-uṭəḍ	θuṭḍa	θawatḍa	'beastfeed'
	Uqs	qqəs	*	θuqsa	θawaqsa	'sting'
	Uṣr	ṣṣər	*	θuṣra	θawaṣra	'cover'

To explain the contexts in which this vowel /U/ can appear, Jebbour adopted for Berber a hypothesis regarding phonological length proposed by Lowenstamm (1991) for Moroccan Arabic. This hypothesis posits that vowels are phonologically long, occupying two positions at the skeletal tier, unlike consonants, which occupy only one position, as illustrated in (3).

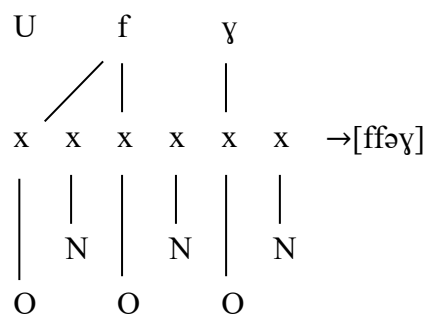
(3)		a. Consonant	b. Vowel
	Skeletal tier	x	x x
			\ /
	Segmental tier	C	V

The ghost vowel /U/ cannot be realized in initial-geminated verbs in (1.b) because it requires two vocalic positions at the skeletal tier. The underlying form /Ufɣ/ cannot be realized with the vowel /U/ because the verbal template does not provide enough skeletal material for this vowel to span two positions, as shown in (4.a). Therefore, the initial consonant /f/ spreads to the first onset of the verbal template, surfacing as geminate in (4.b).

(4) a.

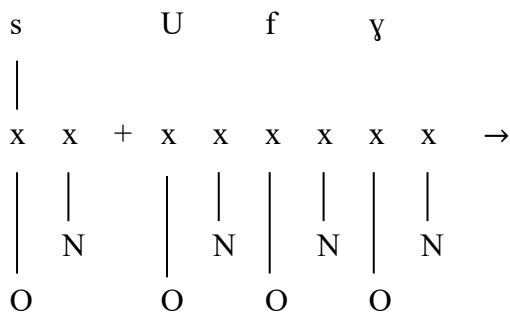


b.

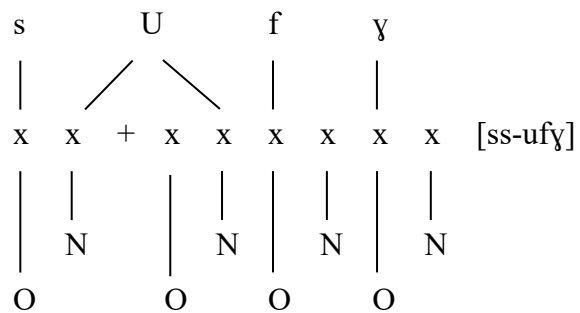


When the causative prefix /s-/ is attached to the verb, as in (5.a), the vowel /U/ appears in both nucleus position of the prefix and the first nucleus position of the verbal template, as illustrated in (5.b). Therefore, the underlying vowel can be realized in the causative form.

(5) a. CAUSATIVE



b. ASSOCIATION



(Jebbour 1993 :13)

Jebbour's (1993) hypothesis provides a straightforward account of the appearance of the ghost vowel /U/, but it does not explain the gemination of the prefix /s-/ observed in (5.b). This issue will be explored further in the subsequent section.

3. Prefix allomorphy: a phonological analysis

Quantitative allomorphy of the causative prefix is based on its right context. It is realized as a geminate [ss] in a $_CC$ and $_VC$ contexts (6.i-ii), and as a simplex [s] in a $_CV$ context (6.iii).

(6)	RIGHT CONTEXT	VERB	CAUSATIVE	GLOSS
i.	_CC	jzəm	ss ^ə -jzəm	'cut'
ii.	_VC	ali	ss-ali	'go up'
iii.	_CV	fiq	s-fiq	'realize'

The data in (6) bring us back to the second question posed in the introduction, which is: what are the factors that govern the prefix allomorphy, resulting in either simplex or geminate forms? To account for the quantitative allomorphy of the causative prefix, I rely on a phonological analysis proposed by Bedar (2022; 2023). This analysis assumes that the syllable structure allows two abstract morphemes at the left-edge of the stem/verb, which serve as hosts of voice markers. These abstract morphemes are represented by two empty CV units, labeled I1 and I2, as illustrated in (7) with the verb *jzəm* 'to cut'.

(7) Two initial CVs at the left-edge of the verb

I1	I2								
C	V	C	V	C	V	C	V	C	V
				j		z	ə	m	

The following empirical and theoretical elements support the hypothesis of the presence of two abstract morphemes at the left-edge:

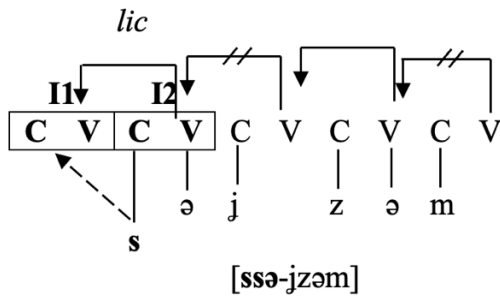
- No more than two voice prefixes can be combined (Sadiqi & Ennaji 2004; Jebbour 1992; Bedar, Bendjaballah & Haiden, to appear; a.o.).
- When two prefixes are combined, both are simplex regardless of their right context.
- A prefix can be geminated only if an empty CV unit is present at its right, requiring licensing for identification through prefix propagation.

In his analysis, Bedar (2022; 2023) proposes that prefix allomorphy in Taqbaylit is governed by phonological licensing. If the CV unit on the far left is licensed, it can be exploited by propagating the prefix initially hosted by the adjacent CV, allowing its gemination. If this CV unit is not licensed, the prefix is realized as simplex only in its initial position.

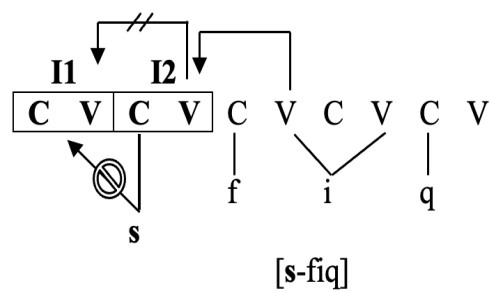
The representations in (8) below illustrate the derivation of the two allomorphs, geminate or simplex, of the causative prefix /s-/: (8.a) where the causative prefixes a root beginning with a CC sequence, and (8.b) where it prefixes a root beginning with a CV sequence. In (8.a), the prefix /s-/ occupies initially CV-I2, close to the root. The V position of this site is not properly governed and can therefore be interpreted as a schwa [ə]. Therefore, it *licenses* CV-I1. The latter is exploited by the propagation of /s-/, which surfaces as a geminate [ss]. In (8.b), on the other hand, the V position of CV-I2 is properly governed by the root vowel.

Accordingly, it cannot be realized, and it cannot *license* CV-I1 either. As a result, /s-/ is unable to spread to C-I1, so it is realized as a simplex [s].

(8) a. GEMINATE /s/



b. SIMPLEX /s/



The analysis proposed by Bedar (2022; 2023), initially applied to the allomorphy of the anticausative prefix /n-/, accounts for the allomorphy of the causative prefix /s-/. This is achieved by combining a syllable/skeletal property with a phonological operation/condition. The first entails the presence of two abstract morphemes, represented by two CV units, at the left periphery of the stem. The second is phonological licensing. This analysis, based on phonological structure, requires a direct link with syntactic structure to account for root allomorphy, as will be elaborated in the following section.

4. Root allomorphy: no escape from syntax

The phenomenon of root allomorphy mentioned in (1.b) is reproduced in (9): initial-geminated verbs exhibit a ghost vowel that appears in causative forms but not in imperfective forms.

(9)	DERIVATION	INFLECTION	
VERB	CAUSATIVE-VERB	IMPERFECTIVE-VERB	GLOSS
ffəy	ss- uf əy	t st ə-ffəy	*t st - uf əy
ttəð	ss- u ttəð	t st ə-ttəð	*t st - u ttəð
			‘go out’
			‘beastfeed’

The question here is why the ghost vowel /U/ occurs only in causative forms, but not in imperfective ones? I assume that the root allomorphy is not solely phonologically conditioned, and I develop an analysis combining phonological conditions and syntactic operations – different from Bendjaballah (2007) and Lahrouchi (2013), who have defended a solely phonology-based analysis. I begin by briefly presenting these two previous phonological analyses and their limitations in subsection 4.1. Next, I will develop the theoretical tools necessary for an analysis at the phonology-syntax interface in subsection 4.2. Lastly, I address the analysis of the root allomorphy phenomenon in 4.3.

4.1. Previous analyses

The objective of this subsection is to highlight the limitations of analyses based solely on phonology. Specifically, I summarize the main ideas from Bendjaballah (2007) and Lahrouchi (2013) couched in autosegmental phonology. Both analyses argue that co-occurrence restrictions occur when multiple morphemes compete for a single CV unit. This phenomenon of co-occurrence restriction is illustrated by the data in (10): the imperfective morpheme /t^s-/ can combine with a bare verb (10.a), but not with a derived causative verb (10.b).

(10)	Aorist	IMPERFECTIVE
a. VERB	jzəm	t ^s t ^s -jzam
b. CAUSATIVE	ss ^ə -jzəm	*t ^s -s ^ə -jzam / ss ^ə -jzam

Following the *Initial CV* hypothesis, initially proposed by Lowenstamm (1999):

- Lahrouchi (2013) argues that the causative /s-/ and the imperfective /t^s-/ do not surface together because they are both in competition for the same CV unit.
- Bendjaballah (2007) argues that the causative /s-/ and the imperfective /t^s-/ are in complementary distribution and are realized on the same CV site.

Three counterarguments challenge these two analyses. A first counterargument, which is theoretical in nature, concerns the initial CV: nothing prevents it from hosting the ghost vowel /U/ when it carries the causative /s-/ or the imperfective /t^s-/ if these two segments occupy the same position, as illustrated in (11). However, the vowel /U/ appears only with the causative: *s-ufəy* ‘CAUSATIVE-GO OUT’ vs **t^s-ufəy* ‘IMPERFECTIVE-GO OUT’.

(11)	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>C</td><td>V</td></tr></table> C V C V C V	C	V	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>C</td><td>V</td></tr></table> C V C V C V	C	V
C	V					
C	V					
	s U f ə y	* t ^s U f ə y				

A second counterargument, which is empirical in nature, concerns the possibility of co-occurrence of a (derivational) voice morpheme with the imperfective morpheme. This is illustrated by the data in (12) with the reciprocal and imperfective prefixes and shows that there can be more than one CV unit at the left-edge of the verb.

(12)	jzəm	mj^ə -jzam	t^st^s-mj^ə -jzam
	‘cut’	‘REC-cut’	‘IMPF-REC-cut’

A third counterargument, which is also empirical in nature, concerns the possibility of co-occurrence of the anticausative/reflexive /n-/ with the imperfective /t^s-/, as illustrated in (13).

- (13) $jzəm$ $nn^ə-jzəm$ $t^s-n^ə-jzəm$
 ‘cut’ ‘ANTICAUS-cut’ ‘IMPF-ANTICAUS-cut’

These three counterarguments demonstrate that previous phonology-based analyses relying on the *initial CV hypothesis* cannot account for the root allomorphy observed in (9). In the next subsection, I discuss the theoretical tools, combining formal phonology and formal syntax, which allow for proposing an analysis at the phonology-syntax interface.

4.2. Theoretical tools for an analysis at the phonology-syntax interface

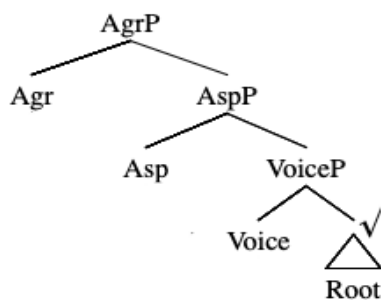
In this study, I propose an analysis that establishes a direct link between syntax and phonology to account for the root allomorphy. This analysis is couched within *minimalist syntax* (Chomsky 1993, 1995; a.o.) and *Strict CV phonology* (Lowenstamm 1996, 1999; Szigetvári 1999; Scheer 2004; among others), providing an approach that maps syntactic terminals to skeletal/phonological units (CV units).

The necessary elements to establish the structure of the verbal domain are: (a) subject agreement always precedes aspect marker, so AgrP is on (high) AspP; (b) voice markers are closer to the root than aspect markers. These elements are illustrated with the example in (14).

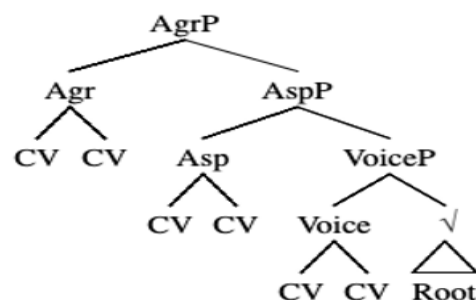
- (14) $jə-t^s-nə-ʒβað$
 3SG.M-IPFV-REF-pull
 ‘He stretches.’ (Lit. ‘He pulls himself’)

The combination of these elements yields the structure given in (15.a). To establish a direct link between syntax and phonology, I propose that each syntactic head is complex and is spelled by two phonological CV units, as illustrated in (15.b).

- (15) a. syntactic structure



- b. syntactic structure & syllable structure



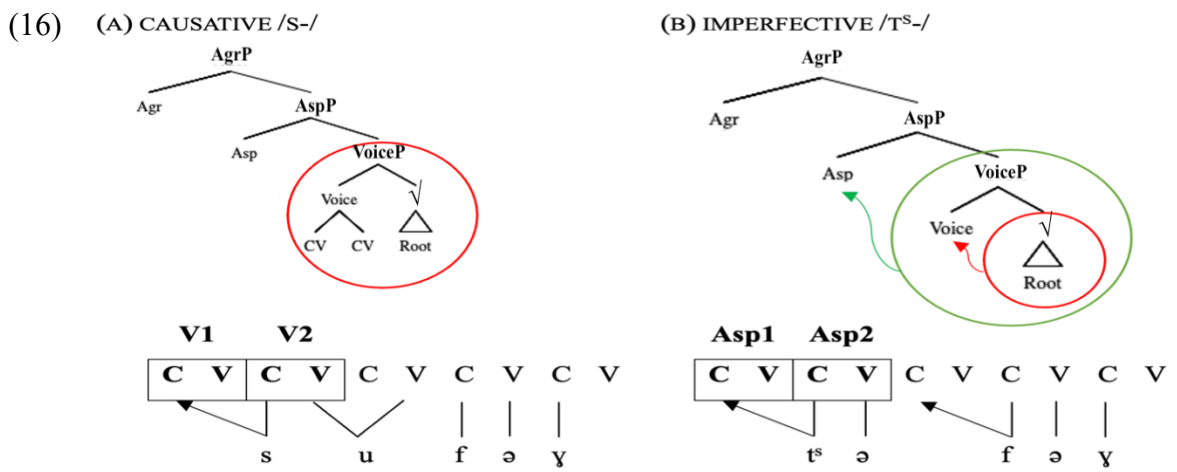
In this framework at the phonology-syntax interface, the skeleton should not be considered as a linear sequence of CV units, but rather these units are directly linked to the syntactic structure. This approach has two theoretical implications: (i) the CV sites hosting voice morphemes differ from those hosting aspect or subject agreement morphemes; (ii) when a syntactic head is

unmarked, its CV units are absent in the skeleton, and conversely. Within this approach, I assume that the CV units hosting the causative /s-/ are different from the one hosting the imperfective /t^s-/: the causative /s-/ is hosted on the CV sites of VoiceP, but the imperfective /t^s-/ is hosted on the CV sites of AspP.

4.3. Analysis

To answer the question of why the ghost vowel /U/ appears in the causative but not in the imperfective, I assume that Root and Voice constitute a single domain. This aligns with the proposals of Wood & Tyler (to appear) and Workneh (2020), albeit using different terminology. I propose that roots merge with morphemes through cyclic leftward movement.

The representations in (16) below illustrate the derivation of the causative and imperfective forms of initial-geminated verbs: (16.a) where the ghost vowel appears in the causative, and (16.b) where it is absent in the imperfective. The ghost vowel /U/ appears in the causative form because Voice and Root together act as a single domain, so the vowel /U/ can be realized on the V position of the CV sites of VoiceP and on the V position of the root's first syllable. By contrast, the ghost vowel /U/ doesn't appear in the imperfective form in (16.b) because Aspect head occurs above Voice head. In this case, the root first merges with VoiceP, then with AspP. Since VoiceP is empty in the first movement, /U/ cannot be realized because it requires two V positions. In this way, the first consonant of the root spreads to the left position and is realized as a geminated consonant.

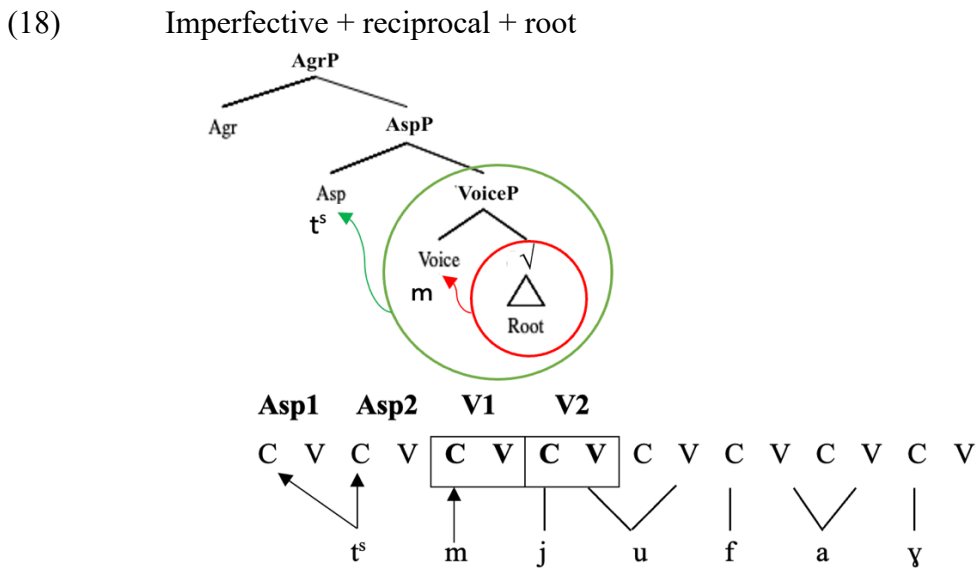


Two additional arguments support this hypothesis. The first comes from the combination of the reciprocal morpheme and the imperfective /t^s-/. Since ‘reciprocal’ is a voice marker, we expect the ghost vowel /U/ to be realized because Root and Voice constitute a single domain. This is

exactly what happens, as shown by the data in (17) with the appearance of the ghost vowel. This data also shows that the Aspect head occurs above the Voice head.

- (17) /t^s-m-Ufɣ/ => tsttst-mj-ufay
'IMPF-RECP-go out'

The derivation of the form in (17) is illustrated in (18) below. The root first merges with VoiceP, then with AspP. By combining with Voice, the ghost vowel /U/ can be realized on the V positions of CV units of both Voice and Root since they act as a single domain. The second movement involves the combination of the aspect constituent above VoiceP. The quantitative allomorphy (geminate or simple) of the aspectual prefix /t^s-/ is similar to that of the causative /s-/ described in Section 3, as AspP involves two CV units.



The second argument comes from the combination of subject agreement and the root. Since AgrP occurs above AspP and VoiceP, we expect the ghost vowel /U/ not to be realized. This is because there are no voice markers: as the two CV units of VoiceP, which form a single domain with the root, are absent, the vowel /U/ cannot be realized. This assumption is confirmed by empirical data. The underlying form *Ufəɣ* 'go out' in (19), inflected with third-person feminine subject, does not contain the vowel /U/ in the surface form, but the first consonant geminates.

- (19) /θ-Ufɣ/ => [θə-ffəɣ]

The derivation of the inflected verb in (19) is illustrated in (20) below. The root first merges with VoiceP, then with AspP, and finally with AgrP. Since VoiceP is empty, the underlying vowel /U/ cannot be realized.

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