

CHAPTER 5

MORPHOPHONEMICS

5.0 Introduction

Burquest (2001:81) states that “when the sounds of morphemes vary as a result of being adjoined to other morphemes, the pattern is referred to as morphophonemics.” Burquest distinguished three types of morphophonemic alternation: phonologically conditioned alternation, lexical alternation, and morphologically conditioned alternation.” In Falam, there may not be a direct correspondence to Burquest’s theories, but there are phonologically conditioned alternations and lexical alternations which will be described in Sections 5.1 and 5.2.

5.1 Phonologically conditioned alternations

Phonologically conditioned alternations in Falam can be divided into two groups: major word classes and minor word classes. The major word classes include the alternations of nouns and verbs. The minor word classes include the alternations of adverbial, possessive, and locative morphemes.

5.1.1 Phonologically conditioned alternations in major word classes

The major word classes in this phonologically conditioned alternations include the alternations of noun stems and primary verb stems.

5.1.1.1 Noun stems

In Falam, any open syllable, whether verb or noun²⁵, is underlyingly (or phonemically) long. There is a process that shortens long vowels. When a common noun syllable that is open becomes the first syllable in a compound word its vowel length becomes short as in (47):

²⁵ Excluding agreement markers (or possessive markers).

(47) /VV/ → /V/___, in a compound word

a. /paa²¹/ 'male'

paa²¹ + tsan⁴⁴ → pa²¹.tsan⁴⁴ 'a man'

male + old

paa²¹ + fiim²³ → pa²¹.fiim²³ 'a clever-man'

male + clever

b. /tii⁴⁴/ 'water'

tii⁴⁴ + waa²³ → ti⁴⁴.waa²³ 'river, stream'

water + go

tii⁴⁴ + k^huu⁵² → ti⁴⁴.k^huu⁵² 'vapor'

water + smoke

c. /fuu²³/ 'sugar cane'

fuu²³ + tsaan²³ → fu⁴⁴.tsaan²³ 'segment of sugar cane'

Sugar cane + step

fuu²³ + muan²¹ → fu⁴⁴.muan²¹ 'sugar cane (farm)'

sugar cane + farm

d. /saa⁵²/ 'animal or meat'

saa⁵² + wom²³ → sa²¹.wom²³ 'bear'

animal + kind

saa⁵² + bek²¹ → sa²¹.bek²¹ 'rabbit'

animal + kind

As an exception, this rule does not apply for some common nouns such as /naa⁴⁴/ 'buffalo', and /tsɔɔ⁴⁴/ 'cow' as in (48):

(48) a. /naa⁴⁴/ 'buffalo'

naa⁴⁴ + saa⁵² → naa⁴⁴.saa⁵² 'buffalo meat'

buffalo + meat

naa⁴⁴ + pii⁴⁴ → naa⁴⁴.pii⁴⁴ 'female buffalo'

buffalo + big

b. /tsɔɔ⁴⁴/ 'cow'

tsɔɔ⁴⁴ + saa⁵² → tsɔɔ⁴⁴.saa⁵² 'cow meat'

cow + meat

tsɔɔ⁴⁴ + paa²¹ → tsɔɔ⁴⁴.paa²¹ 'bull'

cow + male

A common noun with a final diphthong also coalescences when it becomes the first syllable of a compound word as in (49):

(49) a. /rua²³/ 'bamboo'

rua²³ + kuɯŋ⁴⁴ → rɔ⁴⁴.kuɯŋ⁴⁴ 'bamboo tree'

bamboo + tree

kua²¹ 'hole'

kua²¹ + pii⁴⁴ → kɔ²¹.pii⁴⁴ 'big hole'

hole + big

b. /sia²³/ 'mithan'

sia²³ + pii⁴⁴ → sɛ⁴⁴.pii⁴⁴ 'mithan (female)'

mithan + big

The following table displays a summary of lexical alternation of noun stem compounds.

Root syllables			Compound syllables		
Tones	Rhyme structure	Examples	Tones	Phonological alternation	Examples
21	CVV (long vowel)	paa ²¹ 'male'	21	CV (shortening)	pa ²¹ tsaŋ ⁴⁴ 'man'
	CVV (diphthong)	kua ²¹ 'hole'		CV (coalescence)	ko ²¹ pji ⁴⁴ 'big hole'
44	CVV (long vowel)	tii ⁴⁴ 'water'	44	CV (shortening)	fi ⁴⁴ waa ²³ 'river, stream'
23	CVV (diphthong)	rua ²³ 'bamboo'	44	CV (coalescence)	ro ⁴⁴ kuuŋ ⁴⁴ 'bamboo tree'
52	CVV (long vowel)	saa ⁵² 'animal,	21	CV (shortening)	sa ²¹ bek ²¹ 'rabbit'

Table 11. A summary of phonological alternations in noun stem compounds

As in Table 11, phonologically conditioned alternation of noun stems is limited to common nouns that have an open syllable when they occur as the first syllable of a compound word. The vowel length is shortened to a single vowel and the vowel is coalesced if it is a diphthong. There is no alternation of noun stems for closed syllables.

5.1.1.2 Primary verb stems

A primary verb stem formation has a relationship with grammatical conditions, yet it has a relationship with phonological conditions. This section will turn only on phonologically conditioned alternations. The primary verb stem formation will be demonstrated in Section 5.2. Verbs in open syllables also have shortening of their vowel length values and coalescence of diphthongs in connected speech as in (50). Verbs with high tone have no shortened form.

(50) a. /saa²³/ 'to be hot'

a²¹ sa⁴⁴ tuk⁴⁴

be hot very

It's very hot.

b. /sii⁵²/ 'be, it is'

a²¹ si⁴⁴ law²¹

we be neg.

No, it is not.

c. /tii²¹/ 'to say'

a²¹ ti⁴⁴ law²¹

He say neg.

He didn't say.

d. /bia⁵²/ 'to talk, to speak'

ka²¹ be⁴⁴ diŋ⁵²

I talk will

I will talk to....

The following table displays a summary of phonologically conditioned alternations of primary verb stems.

Root Syllables			Syllables in connected speech		
Tones	Rhyme structure	Examples	Tones	Phonological alternation	Examples
21	CVV (long vowel)	tii ²¹ 'to say'	44	CV (shortening)	a ²¹ ji ⁴⁴ law ²¹ He didn't say.
	CVV (diphthong)	tia ²¹ 'same side'		no alternation	wuj ²³ tia ²¹ a ²¹ sii ⁵² It is big as an elephant.
44	CVV (long vowel)	paa ⁴⁴ 'to be thin'		no alternation	a ²¹ paa ⁴⁴ mii ⁵² poo ²³ The thin ones...
	CVV (diphthong)	hua ⁴⁴ 'to hate'			an ⁴⁴ hua ⁴⁴ ɔɔ ⁵² They hate each other.
23	CVV (long vowel)	saa ²³ 'to be hot'	44	CV (shortening)	a ²¹ sa ⁴⁴ law ²¹ It is not hot.
52	CVV (long vowel)	k ^h aa ⁵² 'to be bitter'	44	CV (shortening)	a ²¹ k ^h a ⁴⁴ paam ⁴⁴ It's quite bitter.
	CVV (diphthong)	bia ⁵² 'to talk'		CV (coalescence)	ka ²¹ be ⁴⁴ diŋ ⁵² I will talk to..'

Table 12. A summary of phonologically conditioned alternations in primary verb stems

As shown in Table 12, like noun stems, the phonological alternation of verb stems occurs only with open syllables. The vowel length is shortened and diphthongs are coalesced. This verb stem alternation occurs in primary stem forms in main clause with focus, absolutive, imperative, and declarative when verb finals of these clauses are followed by any syllable in connected speech as in (50). Verbs with closed syllables have no alternate forms of primary stems.

5.1.2 Phonologically conditioned alternations in minor word classes

The minor word classes in phonologically conditioned alternation include the alternations of adverbial, possessive, and locational morphemes.

There are some phonological processes which find their motivation in the notion of syllable structure. This analysis considers the following types of these processes: fortition, linking, deletion, and vowel coalescence.

5.1.2.1 Resyllabification

Minor word classes undergo resyllabification in connected speech, as can be seen in example (52) in which the glides /w/ and /j/ spread to the onset of the following syllable and thereby undergo the rule of conditioned free variation (see Section 2.1.2.2) and may appear as allophones [v] and [z] respectively as in (51):

(51) /law⁴⁴ in²³/ → [law⁴⁴ vin²³]

field from

from the field

/k^huj²³ in²³/ → [k^huj²¹ zin⁴⁴]

where from

where from

In example (51), the second example undergoes rising tone sandhi rule (see Section 4.1.3). In rapid speech the coda the first syllable can be deleted: [la⁴⁴ vin²³]; [k^hu²¹ zin⁴⁴].

5.1.2.3 Deletion

There is another process which has the effect of changing the structure of the syllable itself, that is, deletion²⁶. Falam also has a deletion pattern in which the initial vowel of adverbial, possessive, and locative morphemes.

The adverbial morpheme /in/ is fully pronounced in careful speech, but the segment /i/ of the adverbial morpheme is deleted in connected speech as in (52).

(52) /kan⁴⁴ jaa²¹ tɛɛ⁴⁴ in²³/ → [kan⁴⁴ .jaa²¹ .tɛɛn⁴⁴]

1Pl. all-Dim. Adv.

all of us

²⁶ In most cases of deletion, the motivation is to preserve or restore a syllable or word pattern which is acceptable within the phonotactics of the language (Burquest 1998:169).

/a²¹ si⁴⁴ naa⁴⁴ in²³/ → [a²¹. si⁴⁴. naan⁴⁴]

it be though Adv.

but/however

/ka²¹ pa⁵² t^hɔɔ⁴⁴ in²³/ → [ka²¹. pa⁵². t^hɔɔn⁴⁴]

1Sg. father with Adv.

with my father

As seen in example (52), not only the segment [i] of the adverbial morpheme is deleted but the segment [n] is also combined with the preceding syllable and the tone of an adverbial morpheme is totally lost.

In possessive morpheme deletion the glottal final of the possessive morpheme /iʔ⁴⁴/ is deleted and the remaining segment [i] may optionally becomes a palatal glide final in connected speech as in (53):

(53) /bɔɔj⁵² paa⁵² iʔ⁴⁴ taa²³/ → [bɔɔj⁵² paa⁵² i⁴⁴ taa²³] ~ [bɔɔj⁵² paa^j⁴⁴ taa²³]

lord man Poss. thing

the Lord's thing (thing of the Lord)

/ka²¹ nuu⁵² iʔ⁴⁴ taa²³/ → [ka²¹ nuu⁵² i⁴⁴ taa²³] ~ [ka²¹ nuu^j⁴⁴ taa²³]

1S mother Poss. thing

my mother's thing (thing of my mother)

/kej⁵²-maɪ²¹ iʔ⁴⁴ taa²³/ → [kej⁵².maɪ²³ i⁴⁴ taa²³] ~ [kej⁵².maa^j²³ taa²³]

I-self Poss. thing

My thing (mine).

The locative morpheme /iʔ⁴⁴/ is fully pronounced in careful speech, but the phoneme /ʔ/ of the locative morpheme is deleted in connected speech as in (54):

(54) /wan²¹ iʔ⁴⁴ sii²¹ in²³/ → [wan²¹. i⁴⁴. siin²³]

heaven Loc. place from

from heaven

/k^huj²³ iŋ⁴⁴ sii²¹ in²³/ → [k^huj²¹.i⁴⁴.siin²³]

where Loc. place from

from where

Sometimes the locative morpheme /iŋ⁴⁴/ and the indicating place morpheme /sii²¹/ in examples (55) can totally be deleted. Thus, the syllable structure becomes simpler as [wan²¹.in²³] ‘from heaven’ and [k^huj²¹.i⁴⁴] ‘from where’ (see rising tone sandhi rule in Section 4.1.3, example 50).

This deletion rule with locative morpheme also occurs when it is preceded by demonstrative pronouns. An initial vowel in the locative morpheme is deleted and loses its syllabic status and the glottal stop is deleted as in (55):

(55) /k^haa⁴⁴ iŋ⁴⁴/ → [k^haaj⁴⁴] ‘that’

that Loc.

/tsuu⁴⁴ iŋ⁴⁴/ → [tsuuj⁴⁴] ‘that (abstract matter)’

that Loc.

Slightly different from (55), the final glide /j/ disappears or even the whole morpheme /iŋ⁴⁴/ disappears in a syllable after deletion if the demonstrative syllable has a front high vowel /i/ as in (56):

(56) /hii⁴⁴ iŋ⁴⁴/ → [hii⁴⁴] ‘this’

this Loc.

/k^hii⁴⁴ iŋ⁴⁴/ → [k^hii⁴⁴] ‘there’

there Loc.

It is assumed that the absence of final /j/ in (56) is conditioned by the vowel-like correspondence of the glide /j/ to the vowel /i/.

However, there is also a pattern that allows one to pronounce /iʔ⁴⁴/ different from the deletion rules mentioned as in (53)-(56). This is a glottalization that only affects vowel length as in (57):

- (57) /bɔɔj⁵²paa⁵²iʔ⁴⁴/ → [bɔɔj⁵²pajʔ⁴⁴] ‘of the Lord’
 /ka²¹nuu⁵²iʔ⁴⁴/ → [ka²¹nunjʔ⁴⁴] ‘of my mother’
 /kej⁵²maʔ²¹iʔ⁴⁴/ → [kej⁵².majʔ⁴⁴] ‘of mine’
 /k^haa⁴⁴iʔ⁴⁴/ → [k^hajʔ⁴⁴] ‘that’
 /tsuu⁴⁴iʔ⁴⁴/ → [tsujʔ⁴⁴] ‘that of unseen’
 /hii⁴⁴iʔ⁴⁴/ → [hiʔ⁴⁴] ‘this’
 /k^hii⁴⁴iʔ⁴⁴/ → [k^hiʔ⁴⁴] ‘there’

Examples in (57) might be because of the difference between a careful and normal speech or one dialect to another.

5.1.2.4 Vowel coalescence

Coalescence is a term used to refer to the coming together of linguistic units which were originally distinguishable (Crystal 2003:78) or a pattern of merging two segments to become another distinct segment. This rule is called “vocalic alternations” by Osburne (1975) in her *Zahao* studies and is also called “a diphthong reduction rule” by Chhangte (1989) in her *Mizo syntax*. The pattern of coalescence occurs when diphthongs are followed by another syllable with a consonantal onset²⁶.

Coalescence rule 1: /ua/ → [ɔ]

This rule occurs when:

- (a) a compound noun is composed of a noun + noun sequence as in (58).

- (58) /rua²³kuuŋ⁴⁴/ → [rɔ⁴⁴.kuuŋ⁴⁴] ‘bamboo tree’
 bamboo tree

²⁶ These coalescence patterns mirror the vowel shortening rules in Sections 5.1.1.1 and 5.1.1.2.

(b) a compound noun is composed of a noun + adjective sequence as in (59).

- (59) /k^hua²³ pii⁴⁴/ → [k^hɔ⁴⁴.pii⁴⁴] 'city'
village big

This coalescence rule also occurs when a primary stem with diphthong /ua/ appears in its secondary stem form (see Section 5.2.1.5). (See also vowel shortening rule in Sections 5.1.1.1 and 5.1.1.2).

Coalescence rule 2: /ia/ → [ɛ]

This rule occurs when:

(a) a compound noun is composed of a noun + adjective sequence as in (60).

- (60) /sia²³ pii⁴⁴/ → [sɛ⁴⁴.pii⁴⁴] 'female mithan'
mithan big

This coalescence rule also occurs when a primary stem with diphthong /ia/ appears in its secondary stem form (see Section

5.2.1.5 Vowel coalescence). (See also vowel shortening rules in Section 5.1.1.1).

Coalescence rule 3: /aw/ → [ɔ]. In his generative phonology, Sanford (1973:55) called this type of rule a coalescence of vowel and consonant. This rule occurs when a negative word is followed by an adverbial particle as in (61). This can be said to be a combination of coalescence and deletion because the /aw/ in a negation word is reduced and the phoneme /i/ in adverbial suffix is deleted.

- (61) /t^hɛj²¹ law²¹ in²³/ → [t^hɛj²¹ lɔn²³] 'not knowing'
know Neg. Adv.

Besides, this rule mainly occurs when a primary stem with /aw/ appears in its secondary stem form (see Section 5.2.1.5).

5.2 Lexically conditioned alternations

In order to study lexically conditioned alternations, it is necessary to know that Falam verbs have two stems, like other Chin languages such as Zahao (Osburn 1975, Yip 2003), Lai (Hyman and Van Bik 2002), Tiddim (Henderson 1965), Daai (Hartman-So 1989), and K'Cho (Kee Shein Mang 2006). Nouns do not have two stems. This analysis will use the terms “primary” and “secondary” to refer to the two different verb stems. Out of 200 verb stems 115 verb stems (57.5%) have their secondary stem forms. The primary verb stem form is found primarily in topic focus (Osburne 1975), independent (Chhangte 1993) or main clauses and the secondary verb stem form is found in non-focus (Osburne 1975), dependent (Chhangte 1993) or subordinate clauses. In an independent clause, a predicate with an absolutive subject is realized as primary stem as in (62) and a predicate with an ergative subject is realized as secondary stem as in (63) as also described in Lai by Kathol and Vanbik (2002).

- (62) ka²¹ nuu⁵² tsuu⁴⁴ rɔɔl²³ a²¹ suan⁴⁴ (primary)

my-mother-Abs- food-3S- cook

My mother cooks/is cooking food.

- (63) ka²¹ nuu⁵² in⁵² rɔɔl²³ a⁴⁴ suan²¹ (secondary)

my -mother-Erg.-food-3S-cook

My mother cooks food.

The relative clause marker /mii⁵²/ other suffixes such as nominalizer /naak⁵²/, causatives /tɛr²³/, benefactive /sak²¹/, associative /pii²³/ and other compound verb suffixes require the secondary verb stem as in (64):

- (64) muu⁵² (primary) /muʔ²¹ (secondary) ‘to see’

ka²¹-muʔ⁴⁴-mii⁵² ‘what I saw’ (relative clause)

1S-see-one

hua⁴⁴ (primary)/ huat⁵² (primary) 'to hate'

huat⁵²-ɔɔk⁵²-naak⁵² 'mutual hatred' (nominalized verb)

hate-ref-nom.

tlaa⁵² (primary)/tlaak⁵² (secondary) 'to fall'

tlaak⁵²ter²³ 'cause to fall' (causative clause)

fall-cause

suan⁴⁴ (primary)/suan²¹ (secondary) 'to cook'

suan²¹sak²¹ 'cook for somebody' (benefactive clause)

cook-for

it²¹ (primary)/ iʔ²¹ (secondary) 'to sleep'

iʔ²¹.piɪ²³ 'sleep along with' (associative clause)

sleep-with

The secondary verb structures are also found before adverbial particles, /lee⁵²/ 'if', /puu⁴⁴.aʔ²¹/ 'after', /jan²¹.aʔ²¹/ 'before', /weɛk⁵².in²³/ 'since', /ɾaŋ²¹.aʔ⁴⁴/ 'because', and /tik.aʔ²¹/ 'when' in subordinate clauses, as in (65):

(65) raa²³ (primary) - rat²¹ (secondary) 'to come'

na²¹-rat⁴⁴-law²¹ lee⁵² ka⁴⁴-t^hin²¹ a²¹-heɛŋ⁵²-jet²¹-ɗiŋ⁵²

you-come-neg. if my-heart-it-angry-very-fut

If you don't come, I'll be very angry.

suan⁴⁴ (primary) - suan²¹ (secondary) 'to cook'

ɾɔɔl²³ a⁴⁴-suan²¹-jan²¹-aʔ²¹ puan⁴⁴ a²¹ soɔp⁵²

food he-cook-before, clothes he-wash

He did laundry before he cooked (dinner).

The secondary verb stem is also found in a passive sentence as in (66):

(66) suan⁴⁴ (primary) - suan²¹ (secondary) 'to cook'

ɾɔɔl²³ tsuu⁴⁴ suan²¹ a²¹ sii⁵²

food Ab. cook it be

Food is cooked (by someone).

The following table provides a summary of the Falam verb stems, primary and secondary.

Clause Type	Primary Stem	Secondary Stem
Main Clause	Focus	Non-focus
	Clause with absolutive	Clause with ergative
	Imperative clause	Clause with causative
	Declarative clause	Clause with associative
	Clause with Y/N question	Clause with benefactive
		Passive sentence
Subordinate clause		Sentence with indirect object
		Relative clause
		Nominalized clause
		Adverbial clause
		Indirect object

Table 13. Primary and secondary verb stem distribution

The occurrence of these stems is governed by grammatical conditions, yet they are phonologically related; this relationship is not fully researched here as the focus of this thesis is phonological. The two sets of stems are always phonologically related, and regular patterns of alternations are observed. In the Falam verb stems, some stems remain unalternated with only their pitch pattern alternating in the secondary stems. According to this analysis, low tone syllables ending in sonorants alternate when they appear in a secondary stem but other tone syllables ending in sonorants do not alternate. Rising tone syllables with final stops never alternate in secondary stem form. A primary stem with falling tone that has a short nucleus and ends with a sonorant never alternates in secondary stem form.

As the Falam primary and secondary verb stem formation is already stated above, the following section will discuss segmental alternation in secondary stems and

tone alternations in secondary stems. Unlike other Chin languages, Falam has tertiary²⁷ verb stems.

5.2.1 Segmental alternations in secondary verb stems

This section presents segmental alternations in secondary stems including nasal alternation, stop alternation, glottalization, vowel shortening, and vowel coalescence.

5.2.1.1 Nasal alternation

This alternation is between a final velar nasal with the primary stem and an alveolar nasal with the secondary stem. This is called nasal assimilation by Connie Champeon²⁸ (2005:9) in her resolution and data of Falam orthography as in (67). She asserts, “when the root ends in /ŋ/ the ending changes to /n/ when it is followed by a suffix beginning with a nasal (m, n) that requires a rule: /ŋ/→/n/ __m, n.”

²⁷ The tertiary verb stem occurs when there is an indirect object in a subordinate clause. This form normally occurs with verb stems with closed syllables with diphthongs, /ua/ and /ia/, and the diphthongs are coalesced as follows (see also Appendix V):

suaŋ⁴⁴ (primary) - suan²¹/son⁵² (secondary) ‘to cook’

rɔɔl²³ na⁴⁴ suan²¹ law²¹ lɛɛ⁵²

my you cook not if

If you don’t cook food,.....

ka²¹ nuu⁵² rɔɔl²³ na²¹ son⁵² law²¹ lɛɛ⁵²

my mother food you cook not if

If you don’t cook food (for my mother),.....

²⁸ Connie Champeon is one of the Bible consultants who have been helping the preparation of Falam writer’s handbook.

(67) tsiinj²³ (primary)- tsiin²¹ (secondary) 'to grow'

waaj²¹ nim⁴⁴ ka⁴⁴ tsiin²¹ mii⁵² a²¹ taw²¹

maize I grow one it springs out

The maize I grow springs out.

waaj²¹ nim⁴⁴ ka⁴⁴ tsiin²¹-naak⁵² lej⁴⁴ lung⁴⁴ a⁴⁴ t^haa²¹

maize I grow-nom. soil be good

The soil of the maize I grow is good.

As shown in example (67), Falam may seem to have nasal assimilation in a predictable environment but there are still more examples of complex environments of this nasal alternation that contradict the nasal assimilation rule proposed by Champeon, as in (68):

(68) tsiinj²³ (primary) – tsiin²¹ (secondary) 'to grow'

waaj²¹ nim⁴⁴ nan⁴⁴ tsiinj²³ moɔ²¹ (primary)

maize you (Pl) grow Qp

Do you grow maize?

waaj²¹ nim⁴⁴ kan⁴⁴ tsiinj²³ naan⁴⁴ (primary)

maize we grow but

we grow maize but....

waaj²¹ nim⁴⁴ na⁴⁴ tsiin²¹ k^hal²¹ lee⁵² (secondary)

maize you grow even if

even if you grow maize...

waaj²¹ nim⁴⁴ na⁴⁴ tsiin²¹ huam²¹ tik⁴⁴ a^{ʔ21} (secondary)

maize you grow want time at

when you want to grow maize....

Thus, it can be concluded that Falam has no predictable nasal assimilation pattern but only has stem alternation. More examples of nasal alternation are provided in (69):

(69)	Primary stem	Secondary stem	Gloss
	m̄aŋ ²³	m̄an ²¹	'to use, to spend'
	siaŋ ²³	sian ²¹	'to allow'
	jaaŋ ⁴⁴	jaan ²¹	'to run'
	suaŋ ⁴⁴	suan ²¹	'to cook'

As seen in (69) this nasal alternation is associated with rising tone and high tone but not low tone and falling tone.

5.2.1.2 Stop alternation

Moira Yip (2003:18), in her *Phonological markedness and allomorph selection in Zahao*, one of the dialects related to Falam, states that "all vowel final primary stems add a final /-t/ in the secondary stem". Falam also has final addition, although some verb stems, /sii⁵²/ 'it be', /t̄ii²¹/ 'to say' have no addition of final stops, and /-k/ also appears in secondary stems. These stop alternations are called Epenthesis²⁹ in Osburne's (1975) analysis of Zahao. Final /-t/ additions are shown in (70):

(70)	Primary stem	Secondary stem	Gloss
	t ^h aa ²¹	t ^h at ²¹	'to be good'
	tia ²¹	t̄iat ⁵²	'to put on the same side'
	t ^h ii ²³	t ^h iit ⁵²	'to sew, to marry'
	raa ²³	rat ²¹	'to come'
	hua ⁴⁴	huat ⁵²	'to hate'
	paa ⁴⁴	paat ⁵²	'to be thin'

²⁹ Burquest (1998) states that epenthesis is most common with vowels, where a vowel is inserted to break up a consonant cluster, specifically by placing the clustering consonants into different syllables.

As seen above, the final /-t/ addition is related to low, high, and rising tones, but the final /-k/ addition is related to falling tone as in (71):

(71)	Primary stem	Secondary stem	Gloss
	wua ⁵²	wuak ⁵²	'to beat'
	bia ⁵²	biak ⁵²	'to speak'
	maa ⁵²	maak ⁵²	'to divorce'
	ruu ⁵²	ruuk ⁵²	'to steal'
	pɛɛ ⁵²	pɛɛk ⁵²	'to give'

Also a primary verb with vowel final can instead have a glottal stop in its secondary stem form as in (72):

(72)	Primary stem	Secondary stem	Gloss
	tʰii ²³	tʰiʔ ²¹	'to die'
	ɲii ²³	ɲiʔ ²¹	'to laugh'
	m̥uu ⁵²	m̥uʔ ²¹	'to see'

The primary verb stems with final stops /p, t, k/ also alternate with a glottal stop in their secondary stem forms as in (73):

(73)	Primary stem	Secondary stem	Gloss
	tʰat ²¹	tʰaʔ ²¹	'to kill'
	tʰɔk ²¹	tʰɔʔ ²¹	'to start, to begin'
	kaap ⁵²	kaʔ ²¹	'to shoot'
	luut ⁵²	luʔ ²¹	'to enter'
	pʰiat ⁵²	pʰiaʔ ²¹	'to erase, to rub out, to sweep'
	suak ⁵²	suaʔ ²¹	'to come out'

To say that Falam has final epenthesis means there has to be a consistent rule. But the insertion of final /-t/ or /-k/ or /ʔ/ is not clearly predictable. Looking at all examples, (70), (71), (72), and (73) show that Falam has no consistent epenthesis rule but has only stop alternations. The simplest generalization is that a falling tone syllable with vowel final allows the final /k/ addition, while high and rising adds a final /t/, and low sometimes adds /t/, sometimes /ʔ/. Besides, vowel length in primary stems becomes short when the glottal stop is added or when syllable finals are glottalized in the secondary stem forms. However, primary verb stems with diphthongs can survive without alternating their vowel qualities in secondary stems. The glottal final addition and the final glottalization (see below) in secondary stem occurs with primary verb stems that have low and falling tones.

5.2.1.3 Glottalization

Glottalization is a general term for any articulation involving a simultaneous glottal constriction, especially a glottal stop. In Falam, a primary verb stem with low tone that ends with a sonorant final /w, j, r, l/ is glottalized in its secondary stem form as in (74):

(74)	Primary stem	Secondary stem	Gloss
	daaj ²¹	dajʔ ²¹	'to be cold'
	kaaw ²¹	kawʔ ²¹	'to be wide'
	baal ²¹	balʔ ²¹	'to be dirty'
	taar ²¹	tarʔ ²¹	'to be trapped, to be stuck'

As seen in (74), glottalization never allows a long nucleus in secondary stem forms. Also glottalization is associated with low tone syllables with non-nasal sonorant finals. Rising tone syllables (/sar²³/ 'to pick up'), falling tone syllable (/bal⁵²/ 'to destroy'), and high tone syllable (/lej⁴⁴/ 'to buy') are not glottalized in their secondary stem forms.

5.2.1.4 Vowel shortening

As seen already in 5.2.1.2, all of the secondary verb stems affected by glottalization also undergo vowel shortening. Another rule of shortening vowels occurs when a low tone syllable with a nasal final that has a long nucleus in primary stem appears in the secondary stem form as in (75):

(75)	Primary stem	Secondary stem	Gloss
	tsuum ²¹	tsum ⁵²	'to pound, to beat'
	baaŋ ²¹	baŋ ⁵²	'to be tired'
	baan ²¹	ban ⁵²	'to reach'

As seen above, vowel shortening in secondary stem is associated only with low tone because no other tones have any alternations as in (76):

(76)	Primary stem	Secondary stem	Gloss
	t̚laaw ²³	t̚laaw ²¹	'to be lost, to drop'
	sɔɔm ²³	sɔɔm ²¹	'to invite'
	saaw ⁴⁴	saaw ²¹	'to be long'
	fiiɾ ⁴⁴	fiiɾ ²¹	'to steal, to rob'

5.2.1.5 Vowel coalescence

Primary verb stems with diphthongs, nasal finals and low tones are coalesced in their secondary stem forms as in (77):

(77)	Primary stem	Secondary stem	Gloss
	lian ²¹	len ⁵²	'to be wealthy'
	nuam ²¹	nɔm ⁵²	'to enjoy, to have fun'
	fiaŋ ²¹	fɛŋ ⁵²	'to give way'

As shown above, vowel coalescence rule occurs only with low tone. Other tones with diphthongs never have coalesced forms as in (78):

(78)	Primary stem	Secondary stem	Gloss
	jua ²³	jua ²¹	'to roll up'
	tuam ⁴⁴	tuam ²¹	'to scrap'
	suak ⁵²	sua ²¹	'to get out'

Primary stem					Secondary stem				
Tones	Rhyme structure	Types of nucleus and codas	Examples	Tones	Rhyme structure	Types of nucleus and codas	Phonological alternation	Examples	
Low [21]	VV	long vowel	t ^h aa ²¹ 'to be good'	no alternation	VC	short vowel, stop final	vowel shortening, stop insertion	t ^h aa ²¹ 'to be good'	
	VV	diphthong	tia ²¹ 'same side'	Falling [52]	VVC	diphthong	no alternation	tia ²¹ 'same side'	
	V(V)C	short/diphthong, [+nasal] final	jum ²¹ 'to believe'	Falling [52]	VC	short vowel [+nasal final]	vowel shortening /coalescence	jum ²¹ 'to believe'	
	V(V)C	short/long vowel, [+sonorant] final	nej ²¹ 'to have'	no alternation	VC?	short vowel, [+sonorant]+ glottal final	vowel shortening, glottalization	nej ²¹ 'to have'	
	VC	short vowel, [+obstruent] final	tsak ²¹ 'to be strong'	no alternation	V?	short vowel, ? final	glottal insertion	tsak ²¹ 'to be strong'	
	V(V)?	short vowel /diphthong, glottal final	feɿ ²¹ 'to go'	no alternation	V(V)?	short vowel /diphthong	no alternation	feɿ ²¹ 'to go'	
High [44]	VV	long vowel /diphthong	laa ⁴⁴ 'to be far'	Falling [52]	VVC	long vowel, stop final	stop insertion	laa ⁴⁴ 'to be far'	
	V(V)C	[-sonorant] final	ɲok ⁴⁴ 'to snore'	Low [21]	V(V)C	long vowel, stop final	no alternation	ɲok ⁴⁴ 'to snore'	
	V(V)C	short/long vowel, [+sonorant] final	raɲ ⁴⁴ 'to be fast'	Low [21]	V(V)C	short/long vowel, nasal final	nasal alternation	raɲ ⁴⁴ 'to be fast'	
	VC	short vowel, [+son, -nasal] final	teɿ ⁴⁴ 'to participate'	Low [21]	VC	short vowel, [+son, -nasal] final	no alternation	teɿ ⁴⁴ 'to participate'	

Table 14. A summary of morphophonemic alternations in verb stems

Primary stem			Secondary stem					
Rising [23]	VV	long vowel	tʰiː ²³ 'to sew'	Falling [52]:	VVC	long vowel, stop final	stop insertion	tʰiː ⁵² 'to sew'
	V(V)C	long vowel sonorant [-]	suup ²³ 'to reduce'	Low [21]	VVC	no alternation	no alternation	suup ²¹ 'to reduce'
	V(V)C	[+nasal] final	keŋ ²³ 'to bring'	Low [21]	V(V)C		nasal alternation	keŋ ²¹ 'to bring'
	V(V)C [j, w, l, r]		kaw ²³ 'to call'	No alternation	no alternation	no alternation	no alternation	kaw ²³ 'to call'
Falling [52]	VV	long vowel /diphthong	kʰaa ⁵² 'to be bitter'	No alternation	VVC	long vowel /diphthong	stop insertion	kʰaa ⁵² 'to be bitter'
	VV	long V	muu ⁵² 'to see'	Low [21]	V?	short vowel, glottal final	glottal insertion, vowel shortening	muʔ ²¹ 'to see'
	V(V)C	long vowel/ diphthong [obstruent] final	waak ⁵² 'to crawl'	Low [21]	V?	short vowel /diphthong, glottal final	vowel shortening, glottal insertion	waʔ 'to crawl'
	VVC	long vowel, [obstruent] final	kɔk ⁵² 'to scold'	no alternation	VVC	long vowel, [obstruent] final	no alternation	kɔk ⁵² 'to scold'
	VC	short vowel, [+nasal] final	tʰeŋ ⁵² 'to exchange'	no alternation	VC	short vowel, [+nasal] final	no alternation	tʰeŋ ⁵² 'to exchange'

Table 14. A summary of morphophonemic alternations in verb stems (cont.)

As shown in Table 14, the following generalization can be summarized. Falam has no predictable nasal assimilation pattern but has nasal alternation. Nasal alternation is associated with rising tone and low tone but not low tone and falling tone as in (69). Falam also has final /-t/ and final /-k/ additions in secondary stems. Final /-t/ addition is related to low, high, and rising tones as (70). Final /-k/ addition is related to falling tone as in (71). Also a primary verb with vowel final can instead have a glottal stop in its secondary stem form as in (72).

In Falam, a primary verb stem that ends with a sonorant final /w, j, r, l/ is glottalized in its secondary stem form. The primary verb stems with final stops /p, t, k/ are also alternated to the glottal stop in their secondary stem forms. Glottalization never occurs with a long nucleus in secondary stem forms but may occur with a diphthong. Also glottalization is associated with low tone syllables with sonorant finals (but not nasals) (74) and with falling tone syllables with stop /p, t, k/ finals as seen in Section 6.2, example (88). Most of vowel shortening rules in secondary verb stems are associated with glottalization (see Section 5.2.1.3). Another rule of shortening vowels occurs when a low tone syllable with a nasal final that has long nucleus appears in the secondary stem form as in (75). Primary verb stems with diphthongs and nasal finals are coalesced in their secondary stem forms. The vowel coalescence rule is related only to low tone as in (77). Besides secondary stem formation, Falam has verb stems that require two forms in their secondary stem forms, the second of which is called “tertiary”³⁰, in this thesis.

³⁰ There are not many stems that have two forms but few. This stem alternation happens to a syllable with a diphthong closed with velar final that has high tone or rising tone. Diphthongs in the syllables are coalesced and velar nasals alternate to alveolar nasals in secondary stem forms (see Appendix V).