Stress and Syncope in Tobruq Arabic an Eastern Libyan Dialect: A Stratal OT Account

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Abstract

This dissertation studies in detail a number of phonological aspects accounted for through a Stratal OT analysis, in Tobruq Libyan Arabic (TLA), which is a variety that belongs to the set of dialects that are referred to collectively as Eastern Libyan Arabic. As will transpire from this work, TLA differs from Benghazi Arabic, which is always taken to be a representative dialect of Eastern Libyan Arabic.

The study particularly engages in the investigation of the phonology-morphology interface, whose conflicting interactions function as triggers of a number of phonological processes in TLA. Central to our focus will be syllable-structure formations and resyllabifications, stress patterns and their assignment, as well as vowel syncope and the contrasting behaviour of epenthetic vowel insertion. The former processes are shown to be affected by two morphological factors: the type of word class, and the type of morphological ending that attaches to a monomorphemic word. It will also emerge from this study how (inflectional and derivational) allomorphy is very much conditioned by phonology, yet not only in terms of the usual vowel- vs. consonant-initial effects, but also in terms of the stem-form's syllable-structure type and the number of syllables, as well as the number of consonant radicals within the stem.

The work on syncope in this study will reveal yet another property which makes the TLA dialect distinct from the typical characterisation of Eastern Libyan Arabic based on the Benghazi dialect. It will be shown that TLA is a non-differential dialect where both high and low vowels are subject to deletion resulting in effects on the syllable structure, stress assignment, and vowel quality. On the basis of the Stratal OT analysis that is motivated throughout this dissertation, given its effective handling of a number of morphophonological phenomena, through a constraint-based analysis, it is shown how at the stem level, syncope causes onset complexity and low vowel raising, while contrastively, at the word level, no vowel deletion is applied, except the application of other processes such as epenthesis, vowel lengthening, and stress shifting.

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I cannot believe I am actually done, many times I thought that this work would never see the light but it got there in the end. This thesis could not have been completed without the assistance and guidance of my supervisor, Nancy Kula, without her support, this work would have never been completed. I am thankful to my research committee members, Yuni Kim and S J Hannahs.

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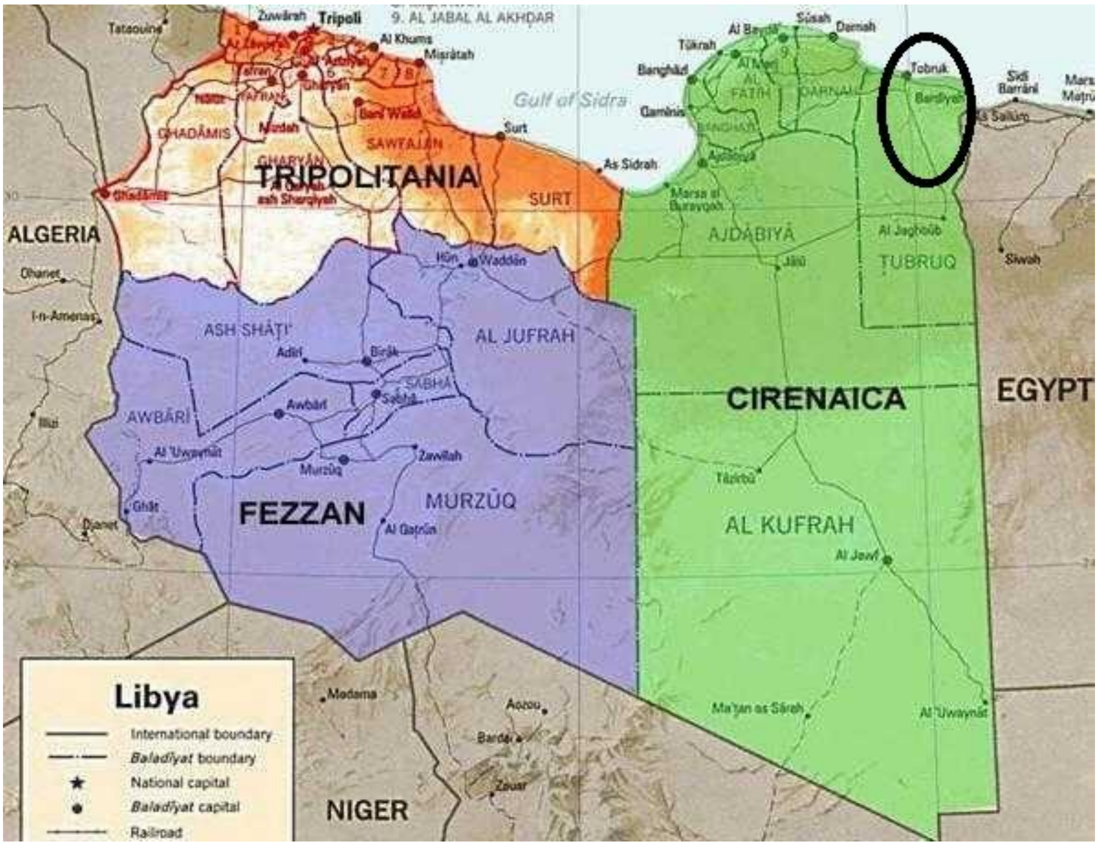
Contents

Chapter One: Introduction

1.1 Introduction

The purpose of this study is to provide a constraint-based approach using Stratal Optimality Theory (Kiparsky, (2000, 2014) Bermúdez-Otero (2003, 2018)) of some phonological processes in Tobruq Libyan Arabic and of main concern in this study will be the processes of syncope and stress. Tobruq is a Libyan coastal city located about 1500km east of the capital Tripoli. The latest population of the city reached 105,434 (Mohammed 2016). The city is located on a peninsula surrounded by the Mediterranean Sea for about 8km, opposite to the Crete from the European side. Tobruq has a big harbour located in a gulf next to the Butnan plateau. The city is about 475km away from the city of Benghazi which is considered as a Libyan centre of the east of the country, as opposed to Tripoli that is the country's capital on the west. The distance between Tobruq and Ajdabiya, a city to the south-west, is about 410km across a desert road. Tobruq is Libya's eastern gateway, just about 150km away from the Egyptian border, as can be seen in map (1) below. The black circle indicates the location of the city of Tobruq, which is the dialect under investigation.



(1) Map of Libya.

The origin of the city name (Tobruq) *Marmaris Peninsula* or *Marmariki territory*, round about this region, referred to by the geographer Claudius Ptolemy is in fact a distortion of the Greek name ‘Antipyrgos’ which corresponds to the name Pyrgos, a city on Crete Panetta (1943).

The city of Tobruq was built before the era of the Greeks’ settlement in Libya. The Greeks then left to another city, called ‘Antperkos’, which is nowadays the area where the Tobruq Oil Refinery is situated. What we know of the ancient civilizations during the time of the Papyrus Queen, following the reign of king Solomon, is that in one of the inscriptions found in the temples in the Nile Valley, the name of a Libyan tribe which ruled Egypt. These tribes had been inhabitants of Tobruq. In the city one also finds many Roman remains as well as Islamic relies from the Ottoman period, as the city exchanged rules, over the course of many centuries.

From 1911 to 1949, Libya was colonialized by Italy. While under the Ottoman Empire, Italy attempted to take control of the region of Tripoli. Italy only succeeded in the thirties, when Italy dominated this part of the Mediterranean region with the excuse that they had came to liberate the Libyans from the Ottoman rule. In 1934, Italy merged the regions of Tripoli and Barqa (Cyrenaica) into one colonial territory under the traditional name of the country, 'Libya', which became the official name of the colony, but there is no traces of contact phenomena between Eastern Libyan Arabic and Italian relevant to the focus of the thesis.

1.2 The Dialect Investigated

Libyan Arabic (henceforth LA) has three main dialect regions: Tripoliania and Fezzan to the West, and Cyrenaica to the East. The dialect under investigation in this study is Tobruq Libyan Arabic, henceforth referred to as (TLA), and belongs to the Cyrenaica region. The Cyrenaican dialect group includes about seven different dialects, spoken in Benghazi, Ajdabiya, Alkofra, Albaydah, Shahhat, Derna and Tobruq. To the best of my knowledge, there is no previous study that has been undertaken on Tobruq Libyan Arabic, especially in relation to the dialect's sound system, its phonological processes or its prosody. The literature lacks more refined distinctions between the different Eastern Libyan dialects. Early studies on Eastern Libyan Arabic, such as Panetta (1943), Mitchell (1952), Owens (1980, 1984) regard Cyrenaican as a culmination of the dialect spoken in Benghazi. This is however not representative of the region's dialect, but Benghazi is merely one dialect spoken in the region. So much so that in the South of Tobruq city itself, (about 30km away), there is a small town where people speak a rural dialect. This is a dialect that is noticeably different from Tobruq. Furthermore, there are also some small villages about 100km East of Tobruq, which are located next to the Egyptian border, where people in these villages speak yet another rural dialect which is itself a mixture of Eastern Libyan and Egyptian Arabic.

1.3 Participants in the study

The dialect under investigation is the researcher's mother tongue, and the participants of this study were 24 speakers from Tobruq, none of whom was born or has lived outside of the city for a long period of time including the researcher's wife and three neighbouring households. In that way, social class was able to be controlled for, with all participants coming from average middle-class families living in the centre of Tobruq. The age of the participants ranged between 18 to 45. 19 of the participants were males, and 5, females.

1.4 Source of Data

The data of the study was collected in Tobruq. Interviews were recorded by using a high-quality digital sound recorder, in various locations, including public places, and in the researcher's home. Two types of data collection technique were employed in this study. The first type included long recordings of spontaneous speech without any suggestions or instructions from the researcher. Such recordings took place in a café, sometimes with two speakers, and sometimes with one. Due to cultural reasons, the researcher did not attend the interviews that involved females, so a female friend was assigned to do the recording on behalf of the researcher.

The second type of data collection made use of a written text containing a list of sentences chosen by the researcher. To make the recording process clear and accurate, the researcher checked the sentences with the participants before actually starting the recording session. The target words were distributed in the different sentences. Every target word was rewritten at the end of every sentence, so that it is repeated by the participants, so as to ensure that the target words are not being affected by their adjacent environments when pronounced in connected speech. Moreover, this gives the opportunity to see if these words are affected, and this, in turn, may shed some interesting light on what is going on.

The target words and phrases were then transcribed by the researcher using the eInternational Phonetic Alphabet (IPA). The focus of the transcription was mainly on the words and phrases that include the phonological processes relevant to this study.[1]

1.5 Literature Review

There have been a number of previous studies related to Arabic phonological processes in general, and Libyan Arabic in particular. The present study is the first one that deals with the phonology of Tobruq. While I will here not do justice to all the work that has been written discussing Arabic phonology, I will be concentrating on the ones that are most relevant to my study of phonological processes.

Al-Ageli (1995) has discussed the Tripolitanian Arabic dialect, focusing on analysing stress and syllable structure, while testing Optimality Theory by comparing it with how it fares with Standard Phonological Theory, with respect to how they can both be used to account for syllable structure. He provides the most important theoretical proposals of stress and metrical structure in general, along with his detailed discussion of Syllable Theory. He traces its development back to Standard Generative proposals, including Kahn's (1976) theory, the Skeletal-Tier Proposal by McCarthy (1979, 1981), CV Phonology by Clements and Keyser (1983), Syllabic Template by Ito (1986), the Timing-Tier proposal by Levin (1985), the Moraic Alternative by Hyman (1985), and Subsyllabic Constituency, up to Optimality Theory by Prince and Smolensky (1993), which was meant to explain universal constraints on syllable structure.

Abumdas (1985) concentrates on the rules that determine syllable pattern changes in Libyan Arabic phonology. His work is based on the dialects of Benghazi and Tripoli. The

[1] The long conversations were not transcribed since the focus was on the words and phrases that carry the phonological processes related to the study. A comparison between continuous and non-continuous speech was made to see whether the targeted words are changed in the two types of recordings.

dialect he chose as a model for his study is the Arabic spoken in Zliten, a city located between Tripoli and Benghazi, which he claims is a dialect that is close to Standard Arabic, and which he thus uses as a standard of measure when comparing other dialects. His study also deals with vowel changes, metathesis, and vowel raising and harmony, as well as syllable pattern changing processes, including syncope and vowel-insertions. The method he uses in order to develop the phonological rules in his work are said to be inspired by Brame (1970), and by the ancient Arab grammarians in their treatment of Arabic phonology.

Aurayieth (1982) investigates the role of phonology in the verb-form formation of Libyan Arabic, more specifically the Eastern dialect. The framework that Aurayieth uses, is generative theory based on the Sound Pattern of English (Chomsky and Halle's (1968)). Harrama (1993) studies the morphology of Libyan Arabic as spoken in the al-Jabal, a dialect in the South-west region of Tripoli. The main focus of his study is the morphological component of the al-Jabal dialect but where he also investigates the phonology of the dialect, including its sound system, the syllable structure, and phonological processes such as syncope, epenthesis, and vowel harmony.

Owens (1980, 1984) reanalyses the syllable structure of the Eastern Libyan dialect. He focuses on the insertion of vowel /ɪ/, which breaks the consonant clusters in Eastern Libyan Arabic as spoken in Benghazi. Owens (1998) further discusses guttural and sonorant epenthesis, short final vowels, stems for example consonant clusters in some Arabic dialects including the Eastern Libyan dialect (of Benghazi).

Elramli (2012) is concerned with the assimilatory processes in Misrata (located in the West of Libya). He discusses types of assimilation, and the degree of directionality between the assimilant and the assimilator. He accounted for such processes from within Optimality Theory framework. Alfozan (1989) also presents a phonological analysis of assimilation as it takes place in Classical Arabic. Aldaihani's (2014) work provides a phonological analysis of

Kuwati Arabic. His study is concerned with assimilations, pharyngealisations and insertions. The framework used for his study is Harmonic Serialism, through which he identifies the main phonological characteristics of the dialect that resulted in such processes and concentrates on the main motivators which cause them. With regard to process of epenthesis in Kuwait Arabic, Aldaihani (2014) essentially examines whether insertion occurs or not. He investigates this through the types of changes that take place in both slow and fast speech.

Albashir (2008) studies vowels in Libyan Arabic, giving a detailed description of their production and perception, and the effects that may occur with the voicing of adjacent consonants.

Rakhieh (2009) investigated the phonology of Ma'ani Arabic, a dialect spoken in Southern Jordan, focusing on some phonological processes, including stress assignment, vowel insertion, vowel deletion, geminates, and the interaction of these processes. The dialect in which he concentrates upon shows two types of epenthesis, depending on their sensitivity to stress. Vowels which are inserted at the beginning of the word are stressed, according to the stress rules. In contrast, vowels that are inserted word-finally do not receive stress. The study also investigates vowel syncope, and vowel shortening.

Alsughayer (1990) compares Jordanian Arabic and Modern Standard Arabic with respect to the phonemic inventory focusing on high vowel alternations, geminations and stress assignment.

Jarrah (1993) studies the Phonology of Madina Hijazi Arabic; a dialect spoken in the North-West of Saudi Arabia, and where he examines the role of syllable structure in some phonological processes of the dialect, including epenthesis, syncope and stress assignment. He also discusses the morphological syllabification of Arabic. The framework used in the study is the auto-segmental framework proposed by McCarthy (1979).

In his comparative study of Syrian and Jordanian Arabic, Al-Omar (2011) focuses on a number of phonological processes within these dialects. The purpose of his study was to illustrate how vowel syncope, for instance, behaves in distinct ways, where it is differential (only high unstressed vowels are subject to deletion) in one dialect and non-differential (both unstressed high and low vowels are subject to deletion) in the other. The study also contrasts the processes of assimilation in place, manner and voicing, in detail. It also investiges the deletion of the pre-consonant glottal stops in the two dialects.

In her study of Palestinian Arabic phonology, Herzallah (1990) analyses the phenomena of segmental processes of consonant to consonant, and vowel to consonant assimilations. She focuses on the secondary articulator of emphatic consonants. She builds her work within a non-linear, multi-tiered phonological representation of the segmental and supra-segmental levels.

Watson (2002) looks at the phonology and morphology of non-Standard Arabic, concentrating on the syllable structure and phonological processes related to the syllabification in the Cairene (Egyptian) and San'ani (Yemeni) dialects. She discusses four processes in these dialects: epenthesis, glottal stop prosthesis, closed syllable shortening, and syncope. Watson (2007) discusses Kiparsky’s (2003) the so-called CV-dialects and the VC-dialects.

Bakalla (1979) investigates the sound patterns of the Arabic verb, concentrating on the morphophonological component and how derivational and inflectional rules of morphology affect the surface structure.

Cowell (1964), in his grammar of Syrian Arabic dedicates chapters of his book to describe general sound changes, such as assimilations, neutralizations, syncope, and anaptyxis, which take place. Hamid (1984) analyses a number of phonological aspects in

Sudanese colloquial Arabic. He investigates phonological alternations caused through the addition of prefixes and suffixes to the verbal stem. He discusses the process of syncope, epenthesis, vowel shortening, gemination, glottal stop deletion and insertion, and the assimilation of the definite article. Abuabbas (2003) investigates the phonology of Jordanian Arabic, where he investigates phonological phenomena of the dialect within the framework of Optimality Theory. He concludes that in the dialect vowel epenthesis is used to repair consonants clusters, so as to satisfy a constraint against a trimoraic syllable in the language. Aquil (2013) focused on the syllable structure and phonological processes of vowel epenthesis and deletion in Cairene Arabic, which are said to be employed to secure syllable well-formedness. She tests some theories to investigate such phonological processes, and concludes that the best modern phonological theory is Optimality Theory, as it illustrates the phonological phenomena related to the syllable better than other tested theories.

Ibrahim (2012) investigates consonant clusters in word final positions in Iraqi and Kuwaiti Arabic. The study illustrating the differences between the two dialects, especially the different segment distribution across the two dialects.

Davis (1995) concentrates on emphatic phonological spread in Southern and Northern Palestinian Arabic dialects.

In his dissertation, Ali (2014) focuses on the phonological phenomenon of three dialects in Sudanese Arabic. His study provides a synchronic derivational analysis of syncope.

Sheredi (2015) focuses on Libyan phonology, where she compares two dialects, namely Tripolitanian Arabic, and Eastern Libyan Arabic (particularly the dialects of Benghazi, Albaida, Derna and Tobruq). She focuses on three phonological processes: deletion, vowel shortening and epenthesis. The framework she uses is Harmonic Serialism.

Tobruq itself is a city located 500km East of Benghazi, and the dialect spoken there differs from that spoken in Tobruq.

To my knowledge, the latest study on Libyan phonology, is that by Altibuli (2016). Her study focuses on the production and perception of stress in (Tripoli) Libyan Arabic learners of English and uses an optimality theoretic approach as the framework of her study.

1.6 Description of the TLA Sound System

Given that to the best of my knowledge there has been no study that has investigated the phonology of Tobruq Arabic, in the following sections I provide a descriptive characterisation of what needs to be known about the phonology of this particular Eastern Libyan Dialect.

1.6.1 Consonants

There are twenty eight consonants in TLA and classified according to manner, there are eight stops (/b/, /t/, /k/, /d/, /ɡ/, /q/, /tˤ/, /ʔ/), two nasals (/m/, /n/), fourteen fricatives (/f/, /θ/, /ð/, /ðˤ/, /s/, /z/, /sˤ/, /ʃ/, /ʒ/, /χ/, /ʁ/, /h/, /ħ/, /ʕ/), two liquids (/r/, /l/) and two glides (/w/, /j/). Some of these phonemes have allophonic segments which are variable depending on their phonetic environment or as a consequence of some phonological process in which the phoneme is changed. This can be either due to the deletion or insertion of a vowel or a consonant. The focus of this section will be on the three criteria mentioned above and represented in table (1) below. Segments which are in the right side in the cells are voiced, while segments to the left are voiceless.

Table (1): The inventory of consonants in TLA

Place of Articulation	Manner of Articulation				
	Stops	Fricatives	Nasals	Liquids	Glides
Bilabial	b	-----	m	-----	-----
Labiodental	-----	f	-----	-----	-----
Interdental	-----	θ ð	-----	-----	-----
Interdental emphatic	-----	ðˤ	-----	-----	-----
Labio-velar	-----	-----	-----	-----	w
Dent-alveolar	t d	-----	-----	-----	-----
Dent-alveolar emphatic	tˤ	-----	-----	-----	-----
Alveolar	-----	s z	n	r	-----
Alveolar-lateral	-----	-----	-----	l	-----
Alveolar emphatic	-----	sˤ	-----	-----	-----
Post-alveolar	-----	ʃ ʒ	-----	-----	-----
Palatal	-----	-----	-----	-----	j
Velar	k ɡ	-----	-----	-----	-----
Uvular	q	χ ʁ	-----	-----	-----
Glottal	ʔ	h	-----	-----	-----
Pharyngeal	-----	ħ ʕ	-----	-----	-----

TLA has the following stops: /b/, /t/, /k/, /d/, /g/, /q/, /tˤ/ and /ʔ/. Table (2) below illustrates the presence of stop sounds in word-initial positions, within several nominal forms.

Table (2): Stop Consonants in word-initial position in several nominal forms in TLA

Sound	Example	Meaning
/b/	/bɛ:b/	‘door’
/t/	/ta.mər/	‘dates’
/k/	/ka.ləb/	‘dog’
/d/	/da:r/	‘room’
/g/	/gɪ.mar/	‘moon’
/q/	/qa:.ʕɪ.da/	‘base’
/tˤ/	/tˤa:.lɪb/	‘student’
/1ʔ/	/ʔa.sad/	‘lion’

TLA only has two nasal consonants, and both of these are nasal stops: /m/ and /n/. The phoneme /n/ has the allophone [ŋ] when followed by the stop velar /k/, as in /ʔaŋ.ka.bu:t/ ‘spider’, and the voiced counterpart /g/ as in /ŋgu:l/ ‘I say’. Table (3) below illustrates the presence of nasal consonants word initially.

Table (3): Nasal Consonants in TLA

Sound	Example	Meaning
/m/	/mu:s/	‘knife’
/n/	/nɛ:s/	‘people’

TLA also has 14 fricative consonants. The inventory of fricatives in the dialect are /f/, /θ/, /ð/, /ðˤ/, /s/, /z/, /sˤ/, /ʃ/, /ʒ/, /χ/, /ʁ/, /h/, /ħ/ and /ʕ/. Table (4) represents these consonants in word-initial positions in nominal forms.

Table (4): Fricative Consonants in word-initial position in several TLA nominal forms

Sound	Example	Meaning
/f/	/fa:r/	‘mouse’
/θ/	/θə.lɛ:.θa/	‘three’
/ð/	/ði:b/	‘wolf’
/ðˤ/	/ðˤɪlˤ/	‘shadow’
/s/	/sɪk.kər/	‘sugar’
/z/	/ze:t/	‘oil’
/sˤ/	/sˤe:f/	‘summer’
/ʃ/	/ʃta:/	‘winter’
/ʒ/	/ʒad.wal/	‘table’
/χ/	/χɪb.zə/	‘bread’
/ʁ/	/ʁe:m/	‘clouds’
/h/	/ha.di:.jə/	‘gift’
/ħ/	/ħo:ʃ/	‘house’
/ʕ/	/ʕa.wi:l/	‘boys’

TLA also has two liquid segments, namely /r/ and /l/. Examples of liquids in word-initial position are presented in table (5) below:

Table (5): Liquid Consonants in TLA

Sound	Example	Meaning
/r/	/ra:.ʒɪl/	‘man’
/l/	/la.ħam/	‘meat’

The dialect also has two glides: [w], and [j]. These two glides are sometimes called frictionless consonants or semi-vowels. Illustrations of these glides in word-initial position, are provided in table (6) below:

Table (6): Glide Consonants in TLA

Sound	Example	Meaning
/w/	/we:n/	‘where’
/j/	/jo:m/	‘day’

1.6.1.3 Gemination

We here move on to discuss geminates. Consonants in both onset and coda positions can be geminated in TLA. An onset of CC- geminates are a consequence of total assimilation. This process of assimilation takes place when the definite-realising prefix /ɪl-/ ‘the’ is attached to another word such as /ʃɛ:.rɪʕ/ ‘street’ where it becomes /ʃʃɛ:.rɪʕ/.

Geminated coda consonants, while present in the citation form, are lost with a number of morphological changes, including the affixation of suffixes, for instance, which split the geminat with the second consonant acting as an onset of the following newly-added syllable.

An exemplification of this is the case with: /ħagg/ 'he saw' where with the attachment of the suffix /-ak/ '2sgm.Acc', the form becomes /ħag.gak/ 'he saw you (m.sg)'.

Gemination in TLA also comes about as a morphologically-conditioned requirement internal to forms of the adjectival category. Changing the adjectival's form, depending on the number from singular to plural, gemination takes place. This process cuts across both masculine and feminine genders. If we take a CVV.CVC template of a singular masculine adjectival form, two parallel processes take place to express the plural counterpart. First is the doubling of the middle consonant (hence the gemination process); and the second is shift from a long vowel in the initial syllable, to a long vowel in the second syllable. The long vowel gets literally transferred over, as illustrated through the data in table 7. As the initial syllable gets re-syllabified in the plural masculine adjectival template: CVC.CVVC, the short vowel in the first syllable defaults to /ɪ/.

Table (7): Gemination and re-syllabification as (sg.m) adjectives become (pl.m).

CVVCVC sg.m adjectives	CVCCVVC pl.m adjectives
/ʕɛ:.zɪb/ 'bachelor'	/ʕɪz.zɛ:b/ 'bachelors'
/ʃa:.tˤɪr/ 'intelligent'	/ʃɪtˤ.tˤa:r/ 'intelligent'
/ʕɛ:.mɪl/ 'operator'	/ ʕɪm.mɛ:l/ 'operators'
/ʃɛ:.jɪb/ 'old'	/ʃɪj.jɛ:b/ 'old'

Another instance of a morphologically-conditioned gemination comes about in order to build the causative verbal template CVC.CVC. Essentially, the second consonant of the non-causative/basic verbal template CV.CVC gets to be doubled/geminated. The verb-form /rag.gad/ 'he made someone sleep', in the causative template is thus derived via the gemination of /g/ from the basic verb /rɪgad/ 'he slept'.

1.6.2 TLA Vowels

The articulation of vowel sounds involves the air passing freely though the vocal tract, where there is no closure or narrowing through the mouth. The TLA dialect consists of eleven vowels; five short vowels: /ɪ, ə, a, u, ɛ/, and six long ones: /i:, e:, ɛ:, a:, u:, o:/. The chart below represents the inventory of vowels in TLA plotted in the vowel space, showing the degree of backness, height and length.

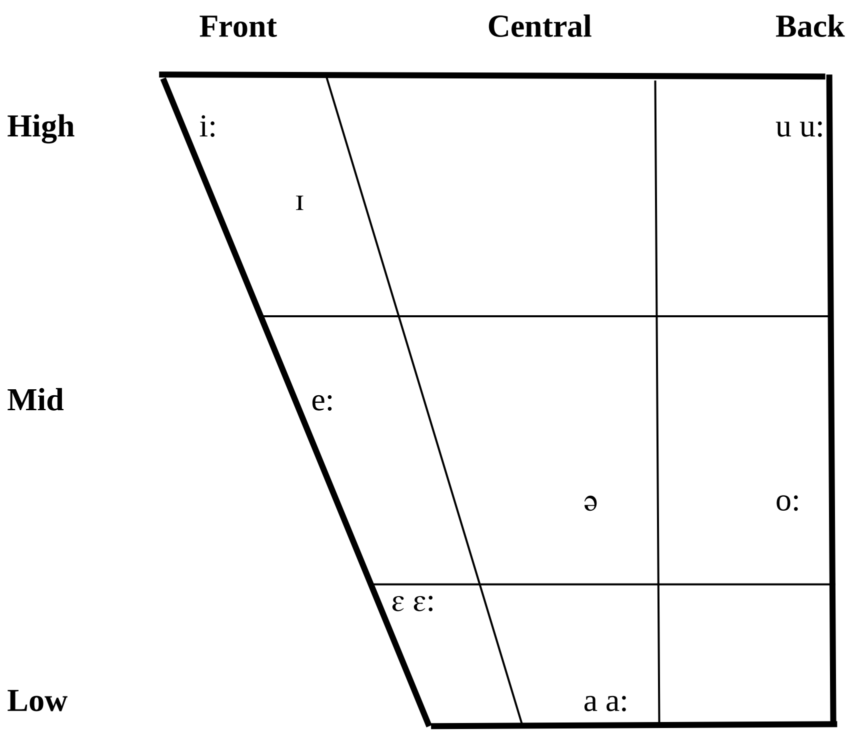


Figure 1: A conventional representation of TLA Vowels.

The vowels are classified according to their position in the oral cavity height, which position can be: high, mid or low. On the backness parameter, these vowels can be: front, central or back. Vowels take a secondary articulator, and that is the lips. The lips position can be rounded or unrounded. The six long vowels in TLA are: [i:], which is high front long unrounded as in: [ri:ħ] 'wind', [u:] which is a high back rounded vowel as in: [ħu:t] 'fish', [e:] which is a mid-central unrounded long vowel as in: [ke:f] 'how', [ɛ:] which is a front long vowel as in : [bɛ:b] ‘door’, [a:] which is a central low long unrounded vowel, as in: [da:r] ‘room’, and [o:] which is a mid-central long rounded vowel as in: [jo:m] ‘day’.

The set of short vowels are: [ɪ] which is front high short unrounded, as in: /bɪ.nɪt/ ‘a girl’, [ə] which is mid-central short unrounded, as in: [mə.kɛ:n] ‘place’, [a] which is low mid-central unrounded, as in: [ħagg] ‘he saw’, [u] which is high back rounded short vowel, as in: [mu.dar.rɪs] ‘teacher. sgm’ and finally [ɛ], is a front short vowel, as in: [mu.dar.rɪ.sɛ] ‘teacher sg f ’.

1.7 Organization of the Study

The organisation of rest the thesis is as follows. Chapter two provides a theoretical background with a review of constraint-based phonology, where I provide a brief introduction to classical Optimality Theory (henceforth OT) and Stratal Optimality Theory (henceforth Stratal OT). Following that I justify the reason why Stratal OT will be chosen over Classical OT and further motivated for the study of TLA phonology.

Chapter three sheds light on the syllable structure of TLA, where I provide an in-depth description of the possible syllable patterns that are permitted in the dialect. This chapter will also discuss and engage with higher prosodic features such as the foot, and mora in TLA. Moreover, the chapter provides the general principles of stress-placement and the role of syllable weight and syllable positions within the TLA syllable.

Chapter four provides an overview of Arabic morphology, followed by an introduction to TLA morphology, where I will discuss both nominal and verbal morphology.

Chapter five defines the stress system in the dialect. This chapter engages in a discussion related to the stressed degenerate foot, weight sensitivity, and coda complexity/extra-metricality. This I will be doing so from within a Stratal (lexical level) perspective. This chapter will also be particularly concerned with the interaction of stress and vowel deletion, and with constraint ranking, as well as morphophonological considerations, when observing the role suffixes play in triggering stress-shift at both stem and word levels.

The phonological process syncope is addressed in chapter six, where I discuss vowel deletion in monosyllabic and multisyllabic words, while additionally taking into consideration the type of deleted vowel in open and closed syllables.

Finally, chapter seven provides a summary of the main points discussed in the thesis, with the aim that this dissertation will have served as an introductory contribution to TLA phonology, while exploring further our current knowledge of Eastern Libyan Arabic, and Libyan Areas of further research are additionally suggested.

Chapter Two: Theoretical background

2.1 Introduction

This chapter gives a background overview of Optimality Theory (OT), and then explains and motivates the reasons as to why Stratal Optimality Theory will be used as the framework for this study, rather than Classical OT. The core principle of OT is that Universal Grammar (UG) comprises of "a set of constraints on representational well-formedness, out of which individual grammars are constructed" (Prince and Smolensky 1993:2). The chapter focuses on the constraints relevant to the analysis of TLA more than on how OT works, in other words, it focuses on what factors in the phonology of TLA must be taken into account in an OT analysis of the dialect.

The chapter is organised as follows: Section 2 introduces OT in general. Section 3 introduces Stratal Optimality Theory, and later on a motivation in favour of Strata OT, and the need for levels, over the parallel version. Finally, section 4 concludes the chapter on the theoretical background.

2.2 Classical Optimality Theory

Optimality theory (OT) is the result of a collaboration between Alan Prince and Paul Smolensky in 1993. It evolved as a new and systematic method of phonological analysis based on a universal set of constraints which belong to all languages rather than being language specific constraints. In (McCarthy 2007:4) words, OT addresses how constraints on the output of the grammar are satisfied, and the relation between such constraints and the operations that transform inputs into outputs. McCarthy also considers vital the relationship between what may be considered universal and what is language specific, and the role that constraints play in distinguishing one language from another.

OT is different from other phonological theories because it makes use of a serial mapping from the underlying form to the surface form that is not achieved by specific phonological rules. Rather this is achieved by fundamental components of OT. OT establishes an essential difference between two grammatical components: the operational component known as Generator (GEN), and the constraint component Evaluator (EVAL). GEN produces an infinite number of different outputs (candidates), and EVAL then evaluates these outputs using a set of constraints that are ranked in a hierarchy resulting in the choice of an optimal candidate among all outputs (Kager, 1999). The relationship between GEN and EVAL is shown in the flowchart in (1) below.

(1) Input-Output mapping:

Input → **GEN** → **Candidates** → **Eval** → **Output**

The candidates are generated by GEN and evaluated by EVAL. To get the optimal candidate, another component, called CONSTRAINT (CON), is needed. CON refers to a set of universal constraints that are ranked differently across languages. This means that different languages have different rankings of CON (McCarthy 2006). In other words, the optimal candidate can be violated by some constraints in a certain language and satisfied by the same constraints in another language. Another component is also included in the grammar, namely a 'Lexicon' from which all the GEN inputs are selected. The Lexicon makes use of a non-restrictive number of these inputs. This is what is linguistically called *richness of the base* (ROTB), (McCarthy 2002:70), which is defined in (2).

(2) Richness of Base (Kager, 1999:19):

No constraints hold at the level of underlying forms.

ROTB is at the core of how OT operates, and where it is indeed the ranking of the constraints that distinguishes languages. The constraints' interaction has a significant role in representing the structural generalisations at the output level. At the input level, this interaction has no role. For a number of years, in the pre-OT era, there were restrictions on the input. For example, given the lack of bilabial voiceless stop /p/ in Arabic absence of this sound segment in the language was interpreted as forcing limitations on the input. In contrast, OT accounts for the lack of this sound segment in a language by interpreting it as the interaction of constraints at the output level.

2.2.1 Constraints in OT

The purpose of constraints in OT is to allow an evaluation of different candidates in order to select the best candidate. Two assumptions are central to the OT constraints – they are universal and violable. This means that all languages have the same constraints and languages differ only in their constraint rankings.

The assumption of violability, on the other hand, does not necessarily mean that the constraints can be violated in all languages, but rather that some constraints may be violated in one language, but not in another. For example, in TLA, clusters of two consonants in initial position are allowed, despite the fact that these clusters may violate the sonority scale, which OT captures through the Sonority Sequencing Principles (SSP) constraint, which requires sonority sequencing to be obeyed. The sonority scale is given in figure (3) below.

(3) Sonority Scale: (Clements 1992)

obstruents > nasals > liquids > glides > vowels

TLA violates SSP with onset clusters in examples such as (4a-c) below. (4d), on the other hand is illustrative of a cluster that doesn't violate the SSP. What data such as (4a-c) illustrate is that the SSP constraint in TLA is not very high ranked.

(4) A representative sub-set of TLA initial consonant clusters

a) [stop > liquid] /br-/ as in /bra:k/ 'Libyan dish'
b) [nasal > fricative] /mħ-/ as in /mħɛ:ʃ/ 'since'
c) [liquid > stop] /rb-/ as in /rba:tˤ/ 'cord'

Another example illustration of a violable constraint, is the No Coda constraint. While a number of languages lack codas, a high number of languages allow them, and TLA is of these. In these languages then, the No Coda constraint is not as highly ranked as it is in languages like Hawaiian and Mba (a Niger-Congo Language), where the canonical syllable structure is CV.

OT constraints are classified into two types: faithfulness constraints and markedness constraints. There is an inherent conflict between these two constraints. The linguistic form of markedness constraints can be in either marked or unmarked patterns. These patterns refer to the presence or absence of a certain linguistic element in a language. The markedness constraints can be activated at segmental levels, as well as prosodic or supra-segmental levels. Below are some examples of segmental and supra-segmental markedness constraints:

(5) **Segmental markedness constraints**:

a) *VORAL N

No oral vowel may precede a nasal consonant.

b) *[ŋ

No word –initial velar nasals.

c) *V NASAL

Vowels must not be nasal.

(6) **Supra-segmental markedness constraints**:

a) ONSET

Syllables must have onsets.

b) NO-CODA

Syllables are open.

c) *COMPLEX

Codas are simple.

d) *CLASH

No adjacent stressed syllables

Faithfulness constraints, on the other hand strive to preserve the degree of similarity between the input and output forms in a language. Two types of faithfulness constraints are identified: Maximality (MAX), which ban any segment of the input to be deleted from the input form, and Dependence (DEP), which prohibits inserting any segment to the input. These two constraints require that the input must have a correspondence in the output. Faithfulness constraints are important to ensure that the lexical similarity and differences present in the underlying form are present in the surface form (Kager, 1999:5).

Another set of constraints that play a central role in OT are Alignment constraints. These constraints sometimes require the right edges of the word to be the same; other times not. For example, the constraint specified as: ALIGN (foot, word, right) requires the stressed foot to be aligned with the right edge of the word, while the constraint ALIGN (foot, word, left) requires the alignment to be with the left edge (McCarthy 2002). The general alignment constraints on syllables are given below (Kager, 1999) are given below in (7) and (8).

(7) ALIGN-R

The right edge of a Grammatical Word coincides with the right edge of a syllable.

(8) ALIGN-L

The left edge of a Grammatical Word coincides with the left edge of a syllable.

With that we conclude our short overview of constraints in OT with the central points being their violability, and the different ranking in different languages, and the feet that these are two main types of constraints – Markedness and Faithfulness constraints, which compete against each other.

2.3 Stratal Phonology

2.3.1 Stratal Optimality Theory

Stratal Optimality Theory (Stratal OT) is a version of OT that integrates the visions of lexical phonology and morphology models, with Classical OT. Stratal OT differs from Classical OT discussed in section 3, in that the mapping from the input to output is not a serial one, but rather one that involves several such mapping. Figure (9) shows the Stratal OT input to output mappings.

(9) Stratal OT (Kager, 1999:382)

Input

↓

Stratum 1 Gen$_1$ Eval$_1$

↓

Stratum 2 Gen$_n$ Eval$_n$

↓

Output

The output of every stratum represented in figure (9) works as an input to the next. The mapping from the new input to its output employs a constraint hierarchy that differs from the previous one. Even though Stratal Optimality Theory reserves some basic concepts of Lexical Phonology, such as levels and cyclicity, it rejects the concepts of Structure

Preservation and Strict Cyclicity, which are regarded as main principles of Lexical Phonology. Structure Preservation is rejected by Stratal OT because it violates the principle of the Richness of the Base (ROTB). i.e, "… such a theory contains constraints on the well-formedness of representations in general, but no specific constraints on underlying forms" (Martian 2012:177). The issue of Structure Preservation, where the constraints have no place in the underlying form is also mentioned in Bermúdez-Otero & McMahon (2006), as follows:

Structure Preservation: Bermúdez-Otero & McMahon, (2006:12)

The application of stem-level phonological rules must not violate morpheme structure constraints.

2.3.1.1 Number of Strata

Kiparsky (2003) argues that the output of the stem-level in Stratal OT is the first stratum, which is the stratum that works as an input to be word-level stratum. The output of the word-level becomes the input of the post-lexical stratum. He lists four main elements, key to Stratal OT:

· Stems, words, and sentences are characterized by distinct constraint systems;

· These constraint systems are serially related;

· Morphology and phonology are cyclically interleaved in each domain;

· Input/Output constraints are the only type of correspondence constraints.

Kiparsky (2014) additionally emphasises that Stratal OT enhances the input-output representation of grammar at the phonological and morphological levels in terms of the following three principles:

(10) Kiparsky (2014:4)

> **a. Stratification:** phonology and morphology are organized into STRATA, with each constituting a parallel constraint system;
> **b. Level-ordering:** each of the cross-categorial domains such as stem, word, and phrase, corresponds to a morpho-syntactic and phonological stratum;
> **c. Cyclicity:** Stems and words must satisfy the applicable stem and word constraints at every stage.

In Stratal OT, levels are presented in a different parallel system. The stem level constraint hierarchy is different from the word one, and the post-lexical level constraint hierarchy is different from both the ranking in the stem and word levels. The exemplified tableaus in (11)-(13) below illustrate how these levels work in Stratal OT.

(11) Stem Level

	CON1	CON2	CON3
a. ☞ Can1			*
b. Can2	*!		
c. Can3		*!	

(12) Word Level

	CON3	CON1	CON2
a. ☞ Can1			*
b. Can2		*!	
c. Can3	*!		

(13) Post-lexical Level

	CON2	CON1	CON3
a. ☞Can1			*
b. Can2		*!	
c. Can3	*!		

The phonological domains and the number of strata in Lexical Phonology and Morphology (LPM) and Stratal OT agree in terms of the construction of the morphosyntactic categories. In Kiparsky's version of Stratal OT (2000, 2003a, and 2014), as well as Bermudez-Otero (2018), there are three grammatical categories, namely: 'Stem', 'Word', and 'Phrase', and each of these corresponds to the phonological domains.

2.3.2 Motivation for Levels

In the literature of Stratal Phonology, levels are ordered by adding certain suffixes to a base or a bare stem. For instance, in his study of the phonology of Ma'ani Arabic, a Jordanian dialect, Rakhieh (2009) adopts Kiparsky's (2000, 2003) Stratal OT model. In this model, some morphological endings such as the subject suffixes are analysed as consistently belonging to the stem level, whereas possessive and object suffixes belong to the word level. However, this division between different types of affixal attachments cannot be applicable in TLA since the distinction between the stem and word levels differs from the behaviours observed by the above-mentioned morphological endings in Ma'ani Arabic.

2.3.3 Evidence for the ordering of levels in TLA

This section develops a different ordering of levels for the TLA grammar. The interaction of the phonology and morphology in the dialect play important roles as is what causes some phonological processes in the dialect. While we will observe that the behaviour of the morphological endings matter, in TLA, the stem level and word level suffixes, and ordering of levels proposed for TLA will differ from the ones are given for in Ma'ani Arabic (Rakhieh, 2009), or Kiparsky (2000, 2003).

2.3.3.1 The TLA Lexical Level

For TLA, I propose that the dual suffix /-e:n/, the singular feminine marker /-a(ə)/, and subject suffixes belong to the stem level. On the other hand, the object suffixes, possessive suffixes and the plural suffix /-ɛ:t/ belong to the word level. The property of lexical strata is based on the combination of such affixes. This combination must occur in a sequence. In other words, the input is a bare stem (without morphological endings), which is then followed by one of the assumed stem level suffixes followed by one of the word level suffixes. To support the TLA level ordering being proposed here, the interaction of phonology and morphology will require to show two types of phonological processes. Some of these processes can be triggered by (and be undergone by) stem level affixes, and not by word level affixes. Table (1) below illustrates two examples of suffixes ordering in TLA.

Table (1) Levels Ordering in TLA

Bare Stem	**Stem Level Affix**	**Stem Level Output**	**Word Level Affix**	**Word Level Output**
a. /sə.tˤar/ 'stole'	Subject -at '3sgf'	/ˈstˤa.rat/ 'steal.pfv-3sgf'	Object -na '1pl.acc'	sətˤ.ˈrat.na 'steal.pfv-33sgf-1pl.acc'
b. mudarrıs 'teacher sgm'	Dual -e:n 'Du'	/mu.ˈdar.rı.se:n/ 'teacher-Du'	Plural -i:n 'pl'	/mu.dar.rı.ˈse:n/ 'teacher-plm'

Table (1) above, thus illustrates how in example (1a), the stem level subject suffix /-at/ '3sgf' and the word level object suffix /-na/ '1pl.acc' are attached to the bare stem /sə.tˤar/ 'stole', and the word /sətˤ.ˈrat.na/, 'she stole us' respectively. The process goes as in (14) below.

(14) Deletion Processes at Lexical Level:

a. First Stratum:

Input (Bare Stem)	**Stem Level Suffix**	**Output**
/sə.tˁar/ ‘stole’	-at ‘3sgf’	ˈstˁa.r-at ‘steal.pfv-3sgf’
		Deletion is applied at Stem level

b. Second Stratum:

Input (Stem Level)	**Word Level Suffix**	**Output**
/ˈstˁa.rat/ ‘steal.pfv-3sgf’	-na ‘1pl.acc’	sətˁ.ˈr-at.-na
		‘steal.pfv-3sgf-1pl.acc’
		**No deletion at the Word level but instead, an epenthetic [ə] is inserted.* s → sˁ at the Post-lexical level [2]

As shown in (14.a) above, the initial vowel of the bare stem undergoes vowel deletion at the stem level. At the word level, in (14b), an epenthetic vowel is inserted between the initial two consonants of the stem level output.

Example (1b) in Table (1) above, also shows that the stem level dual suffix /-e:n/ and the word level plural suffix /i:n/ phonologically share the same vowel length, yet the word level plural suffix attracts stress, while the stem level dual suffix does not. Consider the varied behaviour observed in (15) below.

[2] The emphasis spread s → sˁ is left for further discussion in the post lexical discussion in §4.3.2.

(15) Stress Shifting Processes at the Lexical Level:

a. First Stratum:

Input (Bare Stem)	**Stem Level Suffix**	**Output**
/mudarrɪs/ 'teacher sgm'	-e:n 'du'	mu.ˈdar.rɪ.s-e:n 'teacher-du'
		Stress Shifting is blocked at the Stem level

b. Second Stratum:

Input (Stem Level)	**Word Level Suffix**	**Output**
/mudarrɪs/ 'teacher sgm'	-i:n 'pl'	mu.dar.rɪ.ˈs-i:n 'teacher-pl'
		Stress Shifting is applied at the Word level

From a Stratal OT perspective, the order of the suffixes in the above contrastive examples help us to establish that the stem level suffixes cannot be outside the word level suffixes. More importantly, the division of the affixes in TLA is in line with the behaviour they display phonologically at the stem and word levels. In the case of example (15a) /mu.ˈdar.rɪ.s-e:n/ 'teacher-du', stress does not shift onto the stem level suffix, even though it is the rightmost heavier syllable. Contrastingly, in (15b), in the example /mu.dar.rɪ.ˈs-i:n/ 'teacher pl'. Accordingly, we get set to observe the expected behaviour in line with stress-placement and syllable weight interaction, therefore, The constraint WSP claims that stress should go to the heavy syllable whereas the constraint bans keeps stress to be on the bare stem. The definition of both constraints is in (16), and (17), respectively. Consider the tableau (34) below.

(16) FAITH-STRESS: (Hyde 2012b)

A stress in the input occurs on the same syllable in the output.

(17) Weight-to-Stress Principle (WSP)

Heavy syllables must be stressed. (If heavy, then stressed.)

(18) Stem Level: FAITH-STRESS >> WSP

/mu.ˈdar.rɪs + -e:n	FAITH-STRESS	WSP
a. mu.dar.rɪ.ˈse:n	*!	
b. ☞mu.ˈdar.rɪ.se:n		*

Tableau (18) shows that candidate (a) incurs a fatal violation mark by the constraint FAITH-STRESS. Candidate (b) is the winner, and is favoured over candidate (a) since it violates the low ranked constraint WSP.

At the stem level, on the other hand, the constraint FAITH-STRESS outranks WSP. The stem level dual suffix /-e:n/ is heavy, and has the same vowel quality as the word level plural suffix /-i:n/, yet it fails to attract the stress from the base. Accordingly, at the word level then, the WSP constraint is expected to outrank FAITH-STRESS. To establish that, the word level plural suffix /-i:n/ will be added to the stem level optimal candidate. Consider the tableau in (19) below.

(19) Word Level: WSP >> FAITH-STRESS

/mu.ˈdar.rɪs + -i:n	WSP	FAITH-STRESS
a. ☞mu.dar.rɪ.ˈsi:n		*
b. mu.ˈdar.rɪ.si:n	*!	

Tableau (19) shows that candidate (b) fatally violates the constraint FAITH-STRESS. The winner candidate is (a) since the stressed syllable is the rightmost heavy one. Consequently, the constraint WSP outranks FAITH-STRESS at the word level.

Another piece of evidence in favour of the behaviour observed by distinct stem and word suffixes, is their combinational property of syncope. Syncope is only applied at the stem level. When attaching a word level suffix to the stem level output, syncope is blocked. Example (1a) given in table (1) /sə.t^{ʕ}ar/, is illustrative of this behaviour. To illustrate how this works out with respect to the constraints employed, in (20)-(25) I provide a definition of the constraints present in the tableau in (26).

(20) FT-BIN

Feet are binary under moraic or syllabic analysis.

(21) *Light$_{-σ}$#

A violation mark for more than one word final light syllables.

(22) Onset

Syllables must have an onset.

(23) NONHEAD(ə) (Cohn & McCarthy 1994)

Schwa syllables cannot be heads of feet

(24) MAX

Every segment of the input has a correspondent in the output

(25) DEP

Every element of S2 has a correspondent in S1 (No epenthesis).

(26) Stem Level:

/ˈsə.tˤar/ + -at	Onset	*Light-σ#	FAITH-STRESS	NONHEAD(ə)	FT-BIN	MAX
a. (sə.ˈtˤar).at	*!		*			
b. (ˈsə.tˤa).rat		*!		*		
c. (sə.ˈtˤa).rat			*!			
d. ☞ (ˈstˤə).rat				*	*	*

At the stem level, the tableau in (26) shows that the 3sgf subject suffix /-at/ which belongs to the stem level causes vowel deletion to take place, within the optimal output, which is candidate (d). Another noticeable phonological phenomenon is that stress does not shift out of the bare stem or the stem level domain.[3] Moreover, the shwa can be the head of the prosodic word at the stem level. Accordingly, the constraints MAX, NONHEAD(ə), and FT-BIN are ranked low at the stem level. (27) illustrates the constraints hierarchy as applicable at the stem level.

(27) Stem Level Constraints Hierarchy:

Onset >> *Light-σ# >> FAITH-STRESS >> NONHEAD(ə) , FT-BIN , MAX

At the word level, the optimal candidate of (26) above will be added as the input at the next stratum, i.e. the word level with the TLA proposed word level (1pl.acc) object suffix /-na/. Consider the tableau in (28) below.

[3] See chapter five, for a discussion on stress in the stem cyclic domain.

(28) Word Level:

/ˈstˤa.rat/ + -na	Onset	*Light-σ#	FT-BIN	NONHEAD(ə)	FAITH-STRESS	DEP
a. (sə.ˈtˤar).at.na	*!					*
b. (ˈsə).tˤa.rat.na		*!	*	*	*	*
c. (ˈstˤə).rat.na			*!	*	*	
d. (ˈsətˤ.rat).na				*!	*	*
e. ☞(sətˤ.ˈrat).na					*	*

Tableau (28) shows that the winner candidate violates the stem level's high ranked constraint FAITH-STRESS. The word level object suffix /-na/ succeeds in changing the stem level hierarchy of constraints. Apart from the dialect's undominated constraints, which are ONSET and *Light-σ#, the rest of the constraints operate exactly the same, but their effect is different as their ranking is different from the stem level constraints. The Word level constraint hierarchy is summarised in (29) below:

(29) Word Level Constraints Hierarchy:

Onset >> *Light-σ# , FT-BIN >> NONHEAD (ə) >> FAITH-STRESS , DEP

So far, we have thus seen that the lexical level distinguishes two processes: one at the stem level, which is vowel deletion, and the other at the word level, which is vowel epenthesis. These lexical rules introduce a strong enough evidence with which to establish that the phonological processes of TLA that are problematic for standard OT can be handled at the lexical level by Stratal OT.

At the post lexical level, on the other hand, an unexpected phonological process is applied when the underlying form has a cluster of three consonants. In this situation, stress is occupied by the epenthetic vowel which the dialect uses as a re-syllabification process to avoid such complex codas. The section below discusses some such post lexical processes, including the stressing of the epenthetic vowel, and the change of alveolar fricative [s] to an emphatic alveolar fricative [sˤ].

2.3.3.2 Post Lexical Level Processes

In the previous section I have spelled out the distinction between the stem and word lexical levels illustrating that a process such as vowel deletion is applied at the stem level whereas the process of epenthetic vowel is applied at the word level to get rid of the complex onset that results at the stem level.[4] The distinction between lexical and post lexical levels presents itself as another interesting phonological phenomenon in TLA. The process of lexical level rules that have been presented in (14), in § 2.4.3.1, are here repeated in (30) so as to bring out a comparison with the processes that take place at the post-lexical level.

(30) Deletion Processes at Lexical Level:

a. First Stratum:

Input (Bare Stem)	**Stem Level Suffix**	**Output**
/sə.tˤar/ ‘stole’	-at ‘3sgf’	ˈstˤa.r-at ‘steal.pfv-3sgf’
		Deletion is applied at Stem level

b. Second Stratum:

Input (Stem Level)	**Word Level Suffix**	**Output**
/ˈstˤa.rat/ ‘steal.pfv-3sgf’	-na ‘1pl.acc’	sətˤ.ˈr-at.-na ‘steal.pfv-3sgf-1pl.acc’

The above two processes in (30) are applied in the mapping from the stem level input to the word level output, both of which apply at the lexical level. At the post-lexical level, further

[4] The epenthetic vowel never gets stressed at the lexical level, but can get stressed post-lexically, as we will see.

changes to the initial consonantal sound of the preceding stratum or strata takes place. This serial change is explained in (31) below.

(31) Post Lexical Level:		**Consonantal Sound Change**		
Bare Stem	sa.tˤar	s	tˤ	r
Stem level:	ˈstˤa.r-at	s	tˤ	r
Word Level:	sətˤ.ˈr-at-na	s	tˤ	r
Post Lexical level:	sˤətˤ.r-at-nal.ˈbɪ.nɪt	sˤ	tˤ	r
	‘the girl stole us’			

In the example in (31), the alveolar fricative [s] changes into an emphatic alveolar [sˤ]. Essentially, both [sˤ] and [s] occur as part of the inventory of consonantal sounds minimal pairs, as in [se:f] ‘sword’ and [sˤe:f] ‘summer’. However, at the post lexical level, specifically in this situation, this velarized [sˤ] functions as an allophone of the phoneme [s] given how the change does not result in any change meaning.

To account for this post lexical segmental change, I have modified the faithfulness constraint IDENT(Place), (McCarthy 2008:80), to IDENT(Place)$^{[+EMPHATIC]}$, and IDENT(Place)$^{[-EMPHATIC]}$, with the purpose to be able to distinguish between the lexical and post lexical rules. The constraint IDENT(Place)$^{[-EMPHATIC]}$ demands that the input consonantal features, in this case of word level [s], be the same in the output form. On the other hand, the constraint IDENT(Place)$^{[+EMPHATIC]}$ outranks IDENT(Place)$^{[-EMPHATIC]}$ at the post lexical level. (32)-(33) define these two new constraints being used at the post lexical level. The contrast in the employments across the word level and post lexical level, is provided through the tableau in (34)-(35).

(32) IDENT(Place)[-EMPHATIC]: (ID-Place[-EMPH])

The consonantal feature in the input must have a correspondent in the output (no emphatic [s] in the output)

(33) IDENT(Place)[+EMPHATIC]: (ID-Place[+EMPH])

The emphatic consonant in the input must have a correspondent in the output.

(34) Word Level: ONSET >> IDENT(Place)[-EMPHATIC] >> IDENT(Place)[+EMPHATIC]

sətˤ.ˈrat.na	ONSET	ID-Place[-EMPH]	ID-Place[+EMPH]
a.☞ sətˤ.ˈrat.na			*
b. sˤətˤ.ˈrat.na		*!	
c. stˤar.at.ˈna	*!		*

At the word level, candidates (b) and (c) are ruled out of the competition because they incur fatal violation marks by the constraints ONSET and IDENT(Place)[-EMPHATIC]. The winner candidate is (a), given that the violation of the IDENT(Place)[+EMPHATIC] constraint, does not matter much, since it is ranked low at the word level.

At the post lexical level, the word level output /sətˤ.ˈrat.na/ and /al.bɪ.nɪt/ ‘the girl’ constitute the phrase /sətˤ.ˈrat.na-.al.bɪ.nɪt/, and the above faithfulness constraints are expected to be reranked. The markedness constraint ONSET remains undominated, however. This behaviour is represented in tableau (35) below.

(35) Post-Lexical Level: ONSET >> IDENT(Place)[+EMPHATIC] >> IDENT(Place)[-EMPHATIC].

sətˤ.ˈrat.na- al.bɪ.nɪt	ONSET	ID-Place[+EMPH]	ID-Place[-EMPH]
a.☞ sˤətˤ.rat.nal.ˈbɪ.nɪt			*
b. sətˤ.ˈrat.nal.bɪ.nɪt		*!	
c. sətˤ.rat.ˈna al.bɪ.nɪt	*!	*	*

As shown in tableau (35), the faithfulness constraint IDENT(Place)[+EMPHATIC] rules out the other faithfulness constraint IDENT(Place)[-EMPHATIC]. The underlying representation of both word level and post lexical level is /sə.tˤar/ and not /sˤə.tˤar/. Accordingly, the emphatic change of the alveolar [s] to [sˤ] is a post lexical process, and it fails to apply at the lexical level, given how the underlying representation does not constitute a phrase at the stem and word levels.

The last evidence in favour of the need for distinct lexical and post lexical levels in TLA phonology, is the opaque stressed epenthetic vowel. Crucially, clusters of three consonants are not allowed in TLA. Moreover, two consonants in coda position are also not permitted. A cluster of two consonants on the onset position, as in CCVC is allowed in the dialect. Accordingly, an epenthetic vowel is only inserted in the case of a CCC clusters or a cluster of two consonants at a coda position, as in CVCC. The epenthetic vowel repairs the CCC into a CCvC syllable, but not a CvCC one. This epenthetic vowel can be stressed, when inserted at the post lexical level. Consider the example in (36) below

(36) Opaque Stress in TLA

Input:	**Output A**	**Output B**
/ˈCV.CV**C-C-C**V	ˈCV.CV**CC.vC**V	CVC.ˈ**C**ɪ.**CC**V
/ˈʒɪ.bɪt/-l-ha/ ‘bring. Pfv-1sg-da1-3sgf’	*ˈʒɪ.bɪtlɪha	ʒɪb.ˈtɪ.lha

The options in (36) show that output A is not accepted in the TLA phonological system for two reasons. The first is because it results in two consonants in a coda position which is otherwise not allowed, and the second reason is that it results in an onsetless syllable. Output B has no such problems except that the epenthetic vowel gets to be stressed. To account for the opaque stress observed in (36), in output B, the intermediate level word level, is required, which can be represented in the above input (36) without the presence of the final suffix [-ha] ‘3sgf’, i.e. /ˈʒɪ.bɪt/-l ‘I brought for’. In such an instance, the constraints HEAD-DEP(O/I), DEP, FAITH-STRESS, and MAX are needed to establish the morphophonological conflict that arises of having a CCC consonant cluster, and a stressed epenthetic vowel in the lexical and post lexical levels, respectively. Before illustrating the respective tableaus in (39) and (40), once again I provide a definition of the constraints being introduces, in (37)-(38).

(37) HEAD-DEP(O/I) (Kager 1999b)

Every vowel in the output prosodic head has a correspondent as in the input.

(38) FAITH-STRESS: (Hyde 2012)

A stress in the input occurs on the same syllable in the output.

Basically, the underlying representation of the word level is (ˈʒɪ.bɪt)+l ‘I brought for’. In order to realise the true vowels at the lexical and post lexical levels, the constraint DEP, which bans any insertion, and the constraint MAX are expected to be violated by the winner candidate at the word level. This is because of the fact that the attached consonant causes the formation of a complex coda. At the word level, the above constraints are ranked as follows in tableau (39).

(39) Word Level: *-CC >> HEAD-DEP(O/I) , FAITH-STRESS >> MAX >> DEP

(ˈʒɪ.bɪt)+l	*-cc	HEAD-DEP(O/I)	FAITH-STRESS	MAX	DEP
a. (ˈʒɪ.bɪtl)	*!				
b. ʒɪ.(bɪ.ˈtɪl)		*!	*		
c. ʒɪ.(ˈbɪ.tɪl)			*!		
d. ☞ (ˈʒɪb.tɪl)				*	*

At the word level, the epenthetic vowel never gets stressed due to the high ranking of the constraint HEAD-DEP(O/I). The constraints DEP and MAX, more specifically DEP, are violable.

The same constraints used at the word level will be employed at the post lexical level, expect that they take a distinct ranking. On the basis of this ordering, the optimal candidate (d) from the word level (in tableau 39) will be used as an input to the post lexical level with the attached suffix /-ha/ '3sgf.acc'. Consider the tableau in (40) below:

(40) Post Lexical Level: *-CC >> DEP , MAX >> FAITH-STRESS , HEAD-DEP(O/I).

(ˈʒɪb). tɪl + ha	*-cc	DEP	MAX	FAITH-STRESS	HEAD-DEP(O/I)
a. (ˈʒɪ.bɪtl).ha	*!	*			
b. (ʒɪ.ˈbɪ).tɪl.ha		*!		*	
c. (ˈʒɪb.tɪl).h			*!		
d. ☞ ʒɪb.(ˈtɪl.ha)				*	*

The above tableau in (40) shows that the additional suffix /-ha/ '3sgf.acc' to the lexical level output /ˈʒɪb.tɪl/-ha does not affect the syllabification at the post lexical level, given that the winner candidate satisfies the faithfulness constraints MAX and DEP. The application of stress to the epenthetic vowel is blocked at the word level and preserved to appear at the post lexical level. Accordingly, the post lexical undominated constraints FAITH-STRESS and HEAD-DEP(O/I) are outranked by MAX and DEP.

In this way we have thus seen how the essential properties of the TLA phonology are characterized with three different constraints hierarchies, namely, Stem, Word and Post lexical.

2.4 Conclusion

In this chapter, a theoretical background of constraint-based phonology has been provided. The purpose of this chapter was to analyse some of the phonological processes of the dialect under investigation by examining a constraint-based theories; namely Stratal Optimality Theory in order to provide a justification as to why Stratal OT will be employed to analyse phonological processes in the rest of this dissertation. As we will discuss later in chapter five how Classical OT is unable to capture the stress in TLA, because the constraints are not satisfied in a one serial input to output system. The integration of OT and lexical phonology captures such a complicated phonological situation with ease, given how in Stratal OT the stem and word (lexical) levels constitute constraint hierarchies that are different from the post lexical constraint hierarchy. In TLA, it was shown how vowel deletion and insertion are lexical processes, since they are activated and triggered by certain morphological endings. On the other hand, whereas processes such as sound changes and the stressing of the epenthetic vowel, were shown to both be instances of post lexical processes.

Chapter Three: Syllable Structure

3.1 Introduction

This chapter deals with the syllable structure of TLA. The first part gives a detailed description of what the syllable constituents are in TLA, along with syllable patterns it allows for, taking into consideration issues that have to do with complex onset, complex codas and coda weight. The weight of the closed syllable in both word initial, internal and final position will also be discussed. The second part of this chapter describes a unit of syllable weight, and that is the mora. The third part of this chapter I discuss foot types in general, and investigate the foot type in TLA. After giving a comprehensive discussion of each part, a constraint-based account using Optimality Theory will be developed for the syllable structure of TLA.

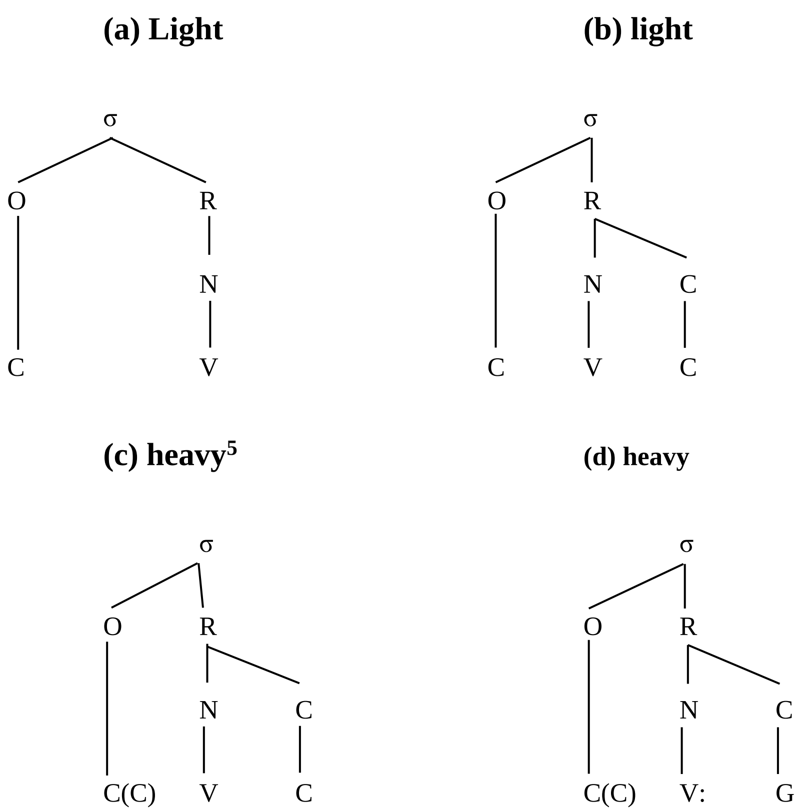
3.2 Syllable in TLA

A syllable contains of an onset (O), nucleus (N) and coda (C). The onset in TLA syllables is obligatory, and may contain one or two consonants. The coda of monosyllabic words contains one or two consonants. If the coda has two consonants, they must be geminates. The coda of multisyllabic words may contain two consonants. This cluster of consonants emerges only when /ma-/, which is the NEG- expressing prefix, and /-ʃ/, the Neg- expressing suffix are attached to a word, for example: /ga:l/ ‘say. Pfv.3sgm’ /ma.galʃ/ ‘neg-say.pfv.3sgm-neg’.

3.2.1 Syllable weight

Weight sensitive stress is the most common diagnostic of syllable weight. This essential phonological parameter distinguishes weight sensitive languages from weight insensitive ones. The syllable patterns will firstly be explained according to their weight, i.e whether they are light or heavy, showing the number of the segments in the rhyme, and whether the syllable is closed or open. The division into light or heavy is accounted for by a moraic approach, since the rhyme is responsible for the weight, while the onset does not count for syllable weight. Stress is always attracted by heavy syllables in the case of quantity sensitive languages. For TLA, weight is not always an important factor for assigning stress, given how in many cases we find that the light syllable attracts stress in the presence of the heavy one. Figure (1) below shows syllable branching by weight:

Figure (1) Syllable weight in the dialect:



Due to the dialect's bimoraic minimum word constraint, the CV pattern does not occur in monosyllabic words. A syllable that contains one short vowel without a coda is light, no matter how the onset of the same syllable, branches, as in: /nɪ.**fas**/ 'breathe' (CV.**CVC**).[6] A heavy syllable may contain a long vowel, as in /ʒa:/ 'come. Pfv.3sgm' (CVV), or it may contain a short vowel followed by a consonant, as in the initial syllable in: /ʒat-na/ 'come. Pfv-3sg-1pl.acc' (**CVC**.CV). A word internal super-heavy syllable may contain a long vowel followed by one consonant, as in /bɛ:b/ 'door' (CVVC) or a long vowel followed by a

[5] The C(C)VC type of heavy syllable must be word internal.
[6] By using boldface, I will be indicating stress placement.

geminate, as in /ga:bb/ ‘dry.sgm’ (CVVG). Table (1) below illustrates all the syllable patterns in the dialect:

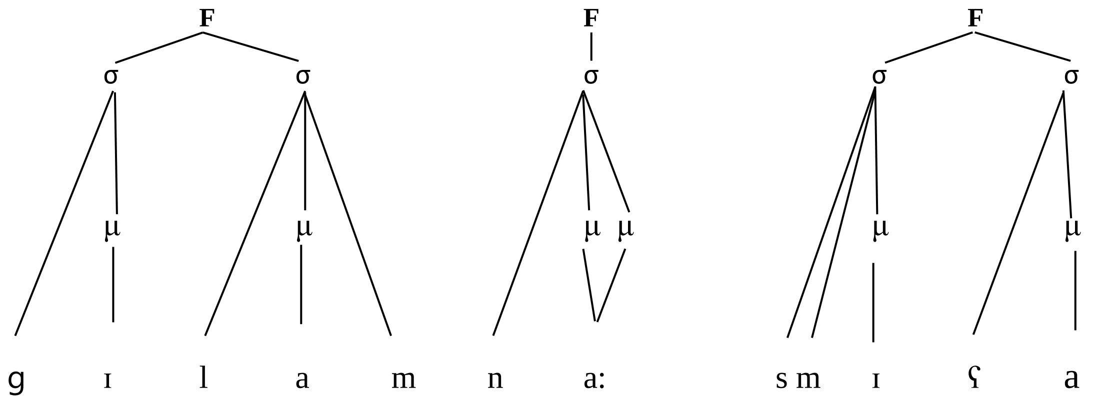
Table (1) The inventory of syllable patterns in TLA

Syllable types	Shape	Pattern	Example	Meaning
Light	Open	CV[7]	/**gɪ**.lam/	‘pencil’
		CCV	/**smɪ**.ʕa/	‘he heard him’
	Closed	CVC	/nɪ.**fas**/[8]	‘breath’
		CCVC	/grɪb/	‘he came closer’
Heavy	Open	CVV	/na:/	‘me M/F’
		CCVV	/ʃta:/	‘Winter’
	Closed	CVC	/**mɪs**.tɪ.ka/	‘chewing gum’
		CVG	/damm/	‘blood’
	Closed	CVVC	/bɛ:b/	‘door’
		CCVVC	/tra:b/	‘soil’
		CVVG	/ga:bb/	‘dry. sgm’

The syllable in TLA can be open or closed. Open syllables have three forms: CV, CVV and CCV. Syllables of the CV and CCV type have one mora; the CVV syllable has two moras. The three figures below show these types of open syllable:

[7] The CV cannot be a word-form by itself.
[8] The syllable CVC is light in word final position.

Figure (2) Open Syllable structures:



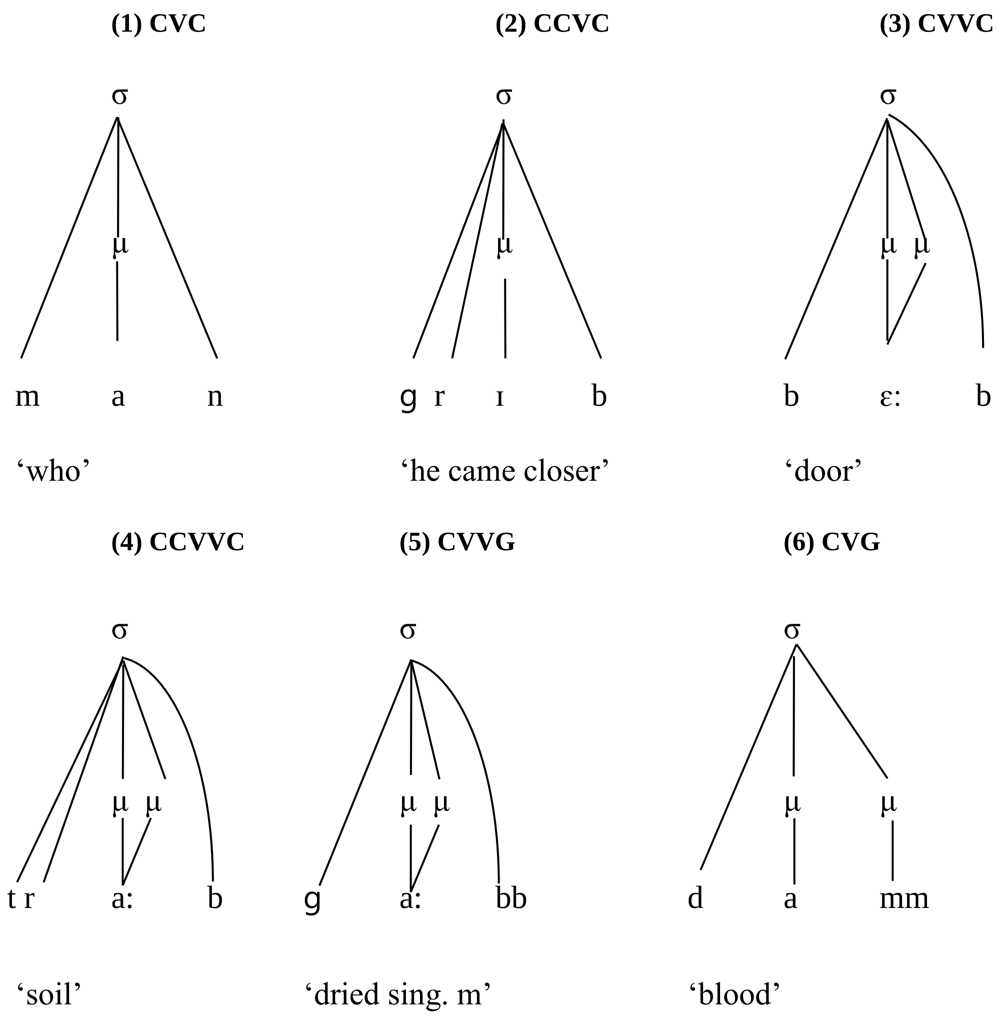
‘pencil’ ‘me f/m’ ‘he heard him’

(1) CV **(2) CVV** **(3) CCV**

The open light syllable CV is not found in the dialect as an isolated content word, but it may be found as an inflectional suffix or prefix. The syllable pattern CVV can be found as an isolated monosyllabic content word as in /ʒa:/ ‘come .pfv.3sgm’. However, the form of this syllable pattern may be changed to CVC when a suffix is attached as in /ʒat/ ‘come .pfv.3sgf’. The syllable pattern CCV cannot be found as an isolated content or function word. Rather, it must be attached to another syllable as in /smɪ.ʕna/ ‘hear. Pfv-1pl’.

Closed syllables are of six types in TLA: CVC, CVG, CCVC, CVVC, CVVG and CCVVC. Figures in (3) below illustrate the six types of closed syllable.

Figure (3) Closed Syllable forms:



As can be shown through the figures above, the onset contains at least of one consonant, and the maximum initial consonant clusters involves two Cs. The closed syllable pattern CVVC occurs in monosyllabic content words as in /kɛ:n/ 'be. Pfv.3sgm'. As shown in figure (3.6) none of the singleton codas project a mora only the nasal geminate [m] project a mora due to the phonological fact that trimoraic syllable does not occur in the dialect. In other words, if the preceded vowel is bimoraic, then the followed consonant is none moraic. Coda consonant clusters have the form of any consonant, plus the negative suffix /-ʃ/, as in: /ma.ɡalʃ/ 'neg-say.pfv.3sgm-neg' (CV.**CVCC**).

3.2.2 Syllable structure types within the words

In TLA words may contain one, two, three or more syllables. Monosyllabic words can be changed to words involving two or more syllables, depending on the morphological changes that take place with respect to the word. In general, the TLA syllable structure system bans two or more sequential light syllables, that is there is no *CV.CV or *CV.CV.CV word-forms. Moreover, two sequential syllables of long vowel are not permitted either. If a word ends with a heavy syllable, where a long suffix vowel is involved that happens to follow a long vowel in the stem, it is either the stem vowel or the vowel in the word final syllable that is shortened. This is in order to avoid a *CVV.CVV word-form (See chapter five for more detail). Table (2) below illustrates all the available syllable types of monosyllabic words in TLA.

Table (2) Monosyllabic Words

Syllable structure	**Examples**	**Meaning**
CVV	/la:/	‘no’
CVC	/man/	‘whom’
CVG	/madd/	‘he passed something’
CVVC	/nɛ:s/	‘people’
CCVC	/smɪn/	‘he became fat’
CCVV	/ʃta:/	‘Winter’
CCVVC	/ħma:r/	‘donkey’

Words of two syllables may either be basic morphological forms, i.e without involving any affixes, while other bisyllabic word-forms can be the result of a derivation from a monosyllabic word plus a prefix or suffix. The following table illustrates examples of TLA disyllabic words.

Table (3): Disyllabic syllable structure

Syllables structure	**Examples**	**Meaning**
CV.CVC	/mə.ˈtˤar/	'rain'
CV.CVV	/sɪ.ˈma:/	'sky'
CV.CVCC	/ma-ˈɡal-ʃ/	'he did not say'
CV.CVVC	/ʒɪ.ˈdi:d/	'new.sgm'
CCV.CV	/ˈʃbɪ.kə/	'net'
CVC.CV	/ˈnɪħ.nə/	'we'
CVC.CVC	/ˈʔaz.raɡ/	'blue'
CVC.CVVC	/mɪf.ˈtɛ:ħ/	'key'
CVV.CV	/ˈʁa:.b-o/	'absent-plm'
CVV.CVC	/ˈsˤa:ħɪb/	'friend.sgm'
CV.CVVC	/bɪ.ˈbɛ:n/	'doors'
CVVC.CV	/ˈbɛ:b-na/	'door-1pl.gen'
CVV.CVC	/ˈħo:.ʃ-ak/	'house-2sgm.gen'
CCV.CV	/ˈħrə.ka/	'movement'
CCVV.CV	/ˈħma:.r-a/	'donkey-3sgm.gen'
CCVC.CV	/ˈsmɪʕ-t-a/	'I heard him'
CCVVC.CV	/ˈdja:r-ha/	'room.pl-3sgf.gen'
CCVVC.CVC	/ˈħma:r.-kam/	'donkey-2plm.gen'

Words with three syllables, are also available. Some of these TLA examples involve morphologically complex structure, as shown in table (4) below:

Table (4): Trisyllabic syllable structure

Syllable structure	Examples	Meaning
CVC.CV.CV	/ˈmak.tə.bə/	‘library’
CV.CVC.CV	/tə.ˈʕaʃ.ʃ-o/	‘have.dinner. pfv-3plm’
CV.CVV.CV	/sˤa.ˈla:.tˤa/	‘lettuce’
CV.CVVC.CV	/mə.ˈkɛ:n.na/	‘place-1pl.gen’
CV.CVVC.CVC	/lə.ˈɡe:-t.t-ɪn/	‘find.pfv-1sg-3plf.acc’
CV.CVC.CVC	/ˈnə-.ʕɪr.f-ak/	‘1sg-know.imp-2sgm.acc’
CVC.CV.CV	/ˈməs.tə.ka/	‘gum’
CVC.CV.CVVC	/mos.ta.ˈħi:l/	‘impossible’
CVC.CVC.CV	/ˈmak.tab.-na/	‘office-1pl.gen’
CVC.CVC.CVC	wəs.ˈl-at-kam	‘arrive. Pfv-3sgf-2plm.acc’
CVC.CVVC.CV	/sˤaj.ˈja:r.-tɪ/	‘car.sgf-1sg.gen’
CVC.CVV.CVC	/ɡɪd.ˈda:.m-ak/	‘in.front.of -2sgm.gen’
CVC.CVVC.CVC	/məf.ˈtɛ:ħ.-kam/	‘key-2plm.gen’
CVV.CV.CV	/ˈʕa:.rə.k-a/	‘speak.strictly.pfv.3sgm-3sgm.acc’
CCV.CVC.CV	/ˈʃbɪ.kət.-na/	‘net.sgf-1pl.gen’
CCV.CVC.CVC	/tˤmə.ˈrat.-tɪn/	‘hide.pfv-3sgf-3pls.acc’

TLA also contains words with four syllables, as shown in the table below:

Table (5): Quardisyllabic syllable structure

Syllables structure	Examples	Meaning
CV.CVC.CVC.CV	/ˈma.dər.sət.-na/	‘school. Sgf-1pl.gen’
CVC.CV.CVVC.CV	/sˤaj.ja.r-ˈa:t.-na/	‘car-plf-1pl.gen’
CVC.CV.CVC.CVC	/daw.ˈwa.rɪ-t.-kam/	‘look.for.pfv-1sg-2plm.acc’

The dialect also contains penta-syllabic words, i.e words of five syllables, as illustrated in the table below:

Table (6): Penta-syllabic syllable structure

Syllable structure	Examples	Meaning
CVC.CVC.CV.CVVC.CV	/mos.taʃ.fa.j-ˈaːt.-na/	‘hospital-plf-1pl.gen’
CV.CVV.CV.CVC.CV	/tɪ.gaː.sɪ.m-ˈan.-ha	‘divided.pfv-3plf-3sgf.acc’

From the above set of examples illustrating the set of TLA syllable structures, we here highlight a number of phonological facts that are connected with the number of syllables that a word-form contains. These facts are summarised below:

- The syllable CV pattern does not occur in monosyllabic words, but occurs as a part of disyllabic words, as in /ha.ðɪk/ ‘dem.sgf’.
- Codas with two consonant clusters must be either a geminated consonant, or any consonant followed by the negative suffix /-ʃ/, as in the disyllabic CV.CVCC word-form: /ma.kanʃ/ ‘neg-be.pfv.3sgm-neg’
- If the prosodic word contains more than one syllable, an onset involving a CC- cluster can occur word initially. Onsets of two consonant clusters may occur word internally as a result of a re-syllabification processes (which I will be considering to be as a stratal process in chapter six)
- CVC syllables occur in all positions of the prosodic word.
- If the word has the same weight of CV.CV or CVC.CVC forms, and the same vowel quality, the first syllable is stressed. Differences in syllable weight are not always a parameter for TLA stress assignment. The heavier syllable is not always subject to stress.
- The light CCV syllable does not occur in monosyllabic words, while the heavy CCVV does, as in /stˤaː/ ‘expert.sgm’

3.2.3 Syllable structure and sonority

In general, the syllable and its distribution of segments depend on the degree of sonority of the consonants that clusters adjacent around the peak, or the vowel of every syllable. The Sonority Sequencing Principle (SSP) or Sonority Sequencing Generalization (SSG) is agreed by many to be dealing with sonority and syllable structure, as in the works of De Lacy (2002), Clements (1990), Kiparsky (1979), Parker (2002), Hooper (1976) and Selkirk (1984).

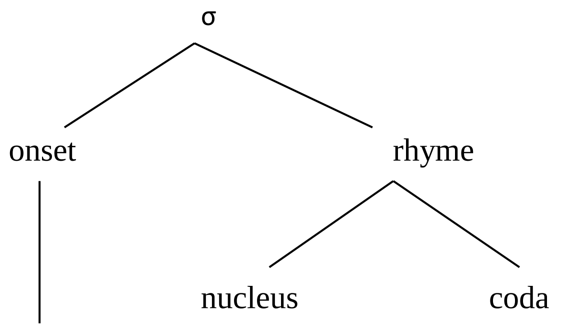
The universal sonority scale that we will be using is taken from Clements (1990) illustrated through figure (4).

Figure: (4) Universal Scale: (Clements 1990)

obstruents > nasals > liquids > glides > vowel

TLA syllables are composed of an onset, and a rhyme (nucleus and coda). As shown earlier, the onset may contain one or two consonants, depending on what consonantal sequences are allowed to form the onset. The distribution of the possible types of consonant clusters in syllable initial or final positions in TLA, is represented in figure (5) below:

Figure: (5) TLA sonority and onset complexity



[C+nasal] /ħm/ V [one consonant]

[C+liquid] /tr/ [geminate]

[C+semivowel] /bw/ [C+/-ʃ/]

[C+fricative] /mf/

[C+stop] /ft/

As we see through figure (5), there are more possible initial consonant clusters types in an onset position, than in coda positions, where we can only get a geminated set of consonants, or any consonant plus the negative expressing suffix /-ʃ/.

The initial clusters /tr-/ as in the words /tra:b/ ‘soil’, /tri:d/ ‘want’, and /tri:h/ ‘become.lost’ is available in TLA, yet the /rt-/ cluster is not available in a stem or a content word without any affixes. However, this cluster becomes available once re-syllabification takes place in words that start with a glottal stop as in /ʔɪr.tɪ.b-at/ → /rtɪb.tˤ-at/ ‘be.engaged.pfv-3sgf’. The sonority violation that results through the availability of the /rt/ cluster is the result of what happens to the phonology once attaching a suffix like the perfective 3sgf suffix: *-at*, as shown through the process in (6) below.

(6) Sonority sequencing violation in TLA:

Input:	**/ʔɪr.tɪ.batˤ-at/**		
(a) Glottal stop deletion:	**ʔɪr.tɪ.batˤ-at**	→	**ɪr.tɪ.batˤ-at**
(b) Onset	**ɪr.tɪ.ba.tˤat**	→	**rtɪ.ba.tˤat**
(c) No LLL:	**rtɪ.ba.tˤat**	→	**rtɪb.tˤat**
Output:	**rtɪb.tˤat**		

The violation of sonority sequencing in TLA results from the following processes: Firstly, the glottal stop is deleted, and as a consequence, the syllable is without an onset: /ɪr.tɪ.batˤ-at/. Consequently, the initial high vowel [ɪ] is also deleted in order to comply with the requirement for onsets in TLA, resulting in the form /rtɪ.ba.tˤat/. As the dialect does not like three light syllables (no LLL), the vowel /a/ of the middle light syllable [ba] is deleted, resulting in the optimal output: /rtɪb.tˤat/, which is what results in the onset cluster. In this way, therefore, the dialect comes to allow violations of the sonority scale. Two more examples below demonstrate further sonority sequencing violations involving some morphological factors:

(7) The sonority sequence in the word /ŋgab.bɪl/ ‘I go/will go to the South’**:**

6……..vowels……………………………a…………………ɪ…………

5……..glides……………………………………………………………..

4……..liquids…………………………………………………………..

3……..nasals…………ŋ………………………………………………..

2……..fricatives……………………………………b.b……………………

1……. stops……..…………g…………………………………………l….

(8) The sonority in the word /mfat.tɪh/ ‘he is clever’**:**

6……..vowels……………………………a…………………ɪ…………..

5……..glides……………………………………………………………

4……..liquids……………………………………………………………

3……..nasals…………m…………………………………………………

2……..fricatives………………f………………………………………h……

1……..stops………………… ……………………t.t………..………………

The sequences of the examples including the clusters /mf/ (nasal > fricative), and /ŋg/ (nasal > stop) provided above, have morphological factors as they refer to ‘I’ and ‘he’, violate the Sonority Sequencing Principle. Adherence to sonority sequencing is therefore low ranked in the TLA in both onset and coda position.

3.2.4 Complex onsets and consonant cluster alternations

In this section I concentrate on consonant clusters where I will describe and discuss examples showing the possible sequence of such clusters in both initial and final positions. By dealing deep into an account of the syllable structure of TLA, we can say that the possible set of consonants forming a cluster at the onset is two. The same follows for the set of possible consonants in the clusters at the coda. However, the cluster of two consonants in the final position must constitute either geminate consonants, or any consonant plus the neg suffix /-ʃ/. As already mentioned in the previous section, TLA permits an initial sequence of consonants that are in violation of the Sonority Sequencing Principle. If however we are to combine both fricatives and stops into the category of obstruents, we will then have no violation of the Sonority Sequence Principle. For example, the cluster [st] as in the word sta:d 'teacher. sgm', would be accepted without being considered a violation of the SSP, since we would have ignored /s/ and /t/ as being two separate categories, i.e a fricative and a stop, and stick with the broader category of OBSTRUENTS.

3.2.4.1 Onset clusters and the SSP

As mentioned earlier, a cluster of two consonants is allowed at the word initial position in TLA. The ordering of the consonants internal to the cluster does not follow the Sonority Sequencing Principle, necessarily. The onset may contain a cluster of two consonant segments that violate the SSP. There is no place of articulation restrictions of the onset complexity in TLA. Unlike English, where it is only the fricative /s/, which violates the SSP, as in the word *speak* /spi:k/, for example, TLA has other sequences of initial clusters that violate the SSP. In the following sub-sections I characterise the different cluster types available on the basis of the manner of articulation.

3.2.4.1.1 fricative > stop

TLA contains a series of initial clusters of including a fricative followed by a stop as in: ʃbɪ.ka 'net', ʃta: 'winter', ħbɛ:l 'ropes', ʒbe:la 'neighbourhood', stˤa: 'expert.sgm', /sˤdɪɡat/ 'she was right', ʃtˤɪ.ba 'he deleted him/it'.

3.2.4.1.2. nasal > fricative

Another set of clusters available at the onset, and which violate the SSP, have a nasal such as /m/ or /n/ as a first consonant, followed by on of the fricatives: /ʕ/, /f/, /s/, /ʃ/, /sˤ/, /ʁ/ as in nsi:-na ‘forget.2pl’, nʃu:f ‘see.1sgm’, nsˤi:m ‘fast.1sgm’, mʕatˤ.tˤɪl ‘he is in vacation’, mfat.tɪħ ‘he is clever’, msak.kɪr ‘close.sgm’, mʃe:j.jətˤ ‘burnt.sgm’ msˤaχ.χan ‘hot.sgm’, and mʁar.rɪb ‘west side’.

3.2.4.1.3. nasal > stop

In parallel to the nasal stop plus fricative clusters is the availability of a cluster that involves the nasal phonemes /m/, /n/ (and its allophone /ŋ/) followed by set of stops: /k/, /b/, /d/, /tˤ/, /t/, /g/, as in ŋgu:l ‘I say’, mkas.sɪd ‘bored.sgm’ mbak.kɪr ‘early rises’, ndɪss ‘I hide’, ntˤab.bɪs ‘I lower my head’, mte:.ʕɪ ‘mine. sgm’

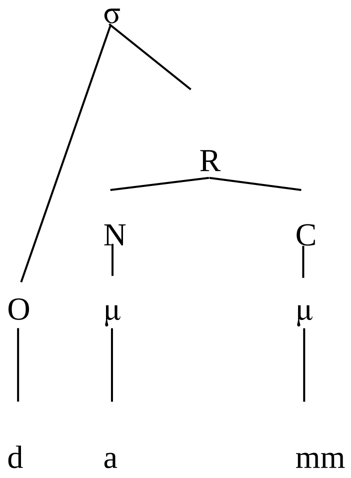
3.2.5 Complex Codas

As mentioned in section 3.2.3 above, there are only two consonant clusters available in the final syllable position in TLA. These clusters are made up of two consonants, which can either be a geminated consonant, or any consonant, followed by the negative suffix /-ʃ/. Other cluster types at the coda, are not allowed.

3.2.5.1 Geminate consonants in the coda

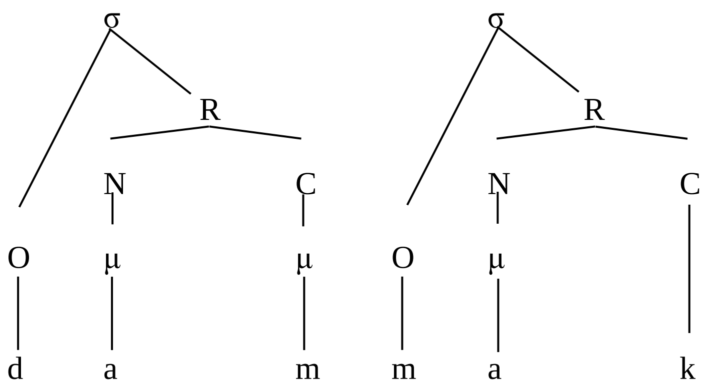
The set of geminated clusters allowed depends on the syllable type as well as the syllable’s function in relation to the word-form. Monosyllabic words that take a geminated consonant cluster at the end of the word, are preceded by a short vowel, as in the words: /damm/ ‘blood’, /radd/ ‘he replied/, /laff/ ‘he wrapped’. This syllable pattern is bimoraic. Figure (9) below shows the geminated consonants with a monomoraic nucleus.

(9) Monosyllable of isolated moraic coda



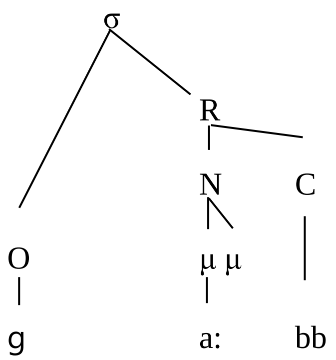
If the suffix /-ak/ '2sgm.gen' is attached to syllable with the pattern given in example (9), the syllable form of the geminated consonant /mm/ is separated, such as that the first of the geminate functions as a coda of the first syllable, while the second one functions as an onset to the second syllable, resulting in the word-form with the syllable patterns: /dam.mak/ 'your blood', involving two light syllables, as illustrated in (10) below:

(10) Re-syllabification of /damm-ak/



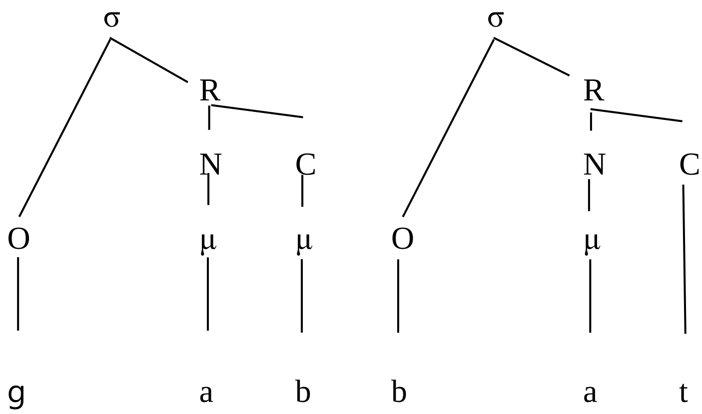
The other type of monosyllabic words may consist of a long vowel, and is hence bimoraic, along with a geminate coda. This includes word-forms such as /ga:bb/ 'dried.sgm'. The coda in this type of syllable does not share the mora with the preceding nucleus. Consider the diagram in (11) below.

(11) Monosyllable of shared moraic coda



In this heavy closed syllable CVVG /ga:bb/ 'dried.sgm' the coda does not share a mora with the bimoraic nucleus, given that a trimoraic monosyllable is not permitted. When attaching a suffix to this form, vowel shortening applies, and this then gives the coda a separate mora, as illustrated in (12).

(12) Monosyllable of separated moraic coda



The above example shows the application of vowel shortening, which is what gives the vowel /a/, one mora. This re-syllabification process is applied after a suffix such as /-at/ '2sgf.gen' is attached, in order to avoid the creation of a super-heavy syllable.

3.2.5.2 Consonant plus /-ʃ/ in coda position

The other case of coda clusters are clusters formed by any consonant along with the suffix

/-ʃ/. This type of cluster occurs when changing the verb-form from a positive polarity to a negative one. An example illustration is: the word /ga:l/ 'he said' which changes to /ma.galʃ/ 'he did not say' after addition of the prefix /ma-/ and the suffix /-ʃ/ to the same verb /ga:l/ 'he said', which combine together to render a negative form. This bipartite system of the expression of negation via the affixes /ma-/ and /-ʃ/ can be applied to the verbal forms as well as noun forms in TLA. Another example is the positive form /hag.gak/ 'he saw you (m)', which changes to /ma.hag.gakʃ/.

3.2.5.3 Complex Codas and the SSP

According to Clements's (1990) universal sonority scale where obstruents > nasals > liquids > glides > vowel display an increase in sonority, the coda cluster involving any consonant plus /-ʃ/ consistently violate the SSP only when a stop precedes the stop > fricative /-ʃ/. Coda consonant clusters of nasal > fricative as in /ma.kɛn-ʃ/ 'he was not' does not violate the SSP, since nasals are more sonorous than fricatives. The same follows for clusters involving a glides or liquids followed by the fricative /-ʃ/. These too do not violate the SSP. This can be seen through: /ma.gal-ʃ/ 'he did not say', /ma.tˤar-ʃ/ 'it did not fly. The same true when it is stops that precedes /-ʃ/, as in /ma-tra:b-ʃ/ ' not soil'. *See tableau (18) below.*

3.2.6 The Syllable in Optimality Theory

In general, the syllable is one of the most descriptive explanation in the universal constitute structure, based on the conflict that arises between markedness and faithfulness constraints in OT where CV is the basic acceptable syllable.

3.2.6.1 Syllable structure in OT

The OT illustration of the syllable patterns that occur in all languages is derived out of the interaction between markedness and faithfulness constraints. Prince & Smolensky (1993,

2004) present three types of markedness constraints that are possible for considerations related to the syllable structure. These are provided in (13).

(13) Markedness constraints (Prince &Smolensky, 2004)

(a) **Onset:**

Syllables must have onsets

(b) **No coda:**

Syllables must not have a coda

(c) **NUC:**
Syllables must have nuclei

The onset constraint in (13a) requires that the syllable must start with a consonant. The constraint No Coda in (13b) requires the syllable to be open, such that no syllable is to end with a coda. The constraint NUC in (13c) states that a nucleus is essential in every syllable.

The application of the above markedness constraints satisfies only one syllable type, out of the four basic syllable structures represented in (14) below:

(14) Basic syllable types:

	Onset	**NUC**	**No Coda**
(a) V	**no**	**yes**	**yes**
(b) CV	**yes**	**yes**	**yes**
(c) CVC	**yes**	**yes**	**no**
(d) VC	**no**	**yes**	**no**

The above markedness constraints are satisfied only by the syllable type in (14b). This characterises the CV syllable as universal, thus implying that it is a syllable that every language should have. Since CV is the universal syllable, then faithfulness constraints must be introduced in order to allow for other syllable types to exist across languages. Faithfulness constraints interact with markedness constraints and re-syllabify the CV structure in order to get to the optimal syllable form. The constraint MAX, which prohibits deletion, and DEP, which prohibits insertion, interact with the above markedness constraints.

(15) Faithfulness Constraints

(a) MAX (no deletion):

An input segment has a correspondent segment in the output.

(b) DEP (no insertion):

An output segment has a correspondent segment in the input.

To capture the typical syllable pattern via an interaction between markedness and faithful constraints, another two markedness constraints related to the syllable edges, namely, *COMPLEX onset and *COMPLEX coda, are needed. What these constraints are about, is stated in (16).

(16) Complexity in OT

(a) *COMPLEX onset:

Syllables must not have more than one onset segment

(b) *COMPLEX coda:

Syllables must not have more than one coda segment.

3.2.6.1.1 Onset Complexity in TLA

As mentioned in the beginning of this chapter, an onset is obligatory in TLA, given how onsetless syllables are not allowed. The markedness constraint Onset is highly ranked, and cannot be violated in the grammar of TLA. Complex onsets are also additionally allowed in the dialect, and this is a result of the low ranked constraint DEP, which is responsible for the vowel insertion process. Thus, the constraint Onset is undominated in the dialect, and the constraint DEP dominates the *COMPLEX onset constraint. The interaction between these constraints is represented in the tableau (17) below.

(17) /tra:b/ ‘soil’

/tra:b/	Onset	DEP	*COMPLEX onset
a. it.ra:b	*!		
b. ta.ra:b		*!	
c. ☞ tra:b			*

Tableau (17) shows how candidate (c) wins the competition, since it just violates the low ranked constraint *COMPLEX onset. Candidate (a) loses due to the fatal violation of the high ranked Onset constraint. Candidate (b) also loses, given how it fatally violates the constraint DEP.

3.2.6.1.2 Coda Complexity in TLA

Complex codas are in TLA only ever allowed in one case. This is when as a consequence of the expression of neg in TLA, while is bipartite, considering of the case of the affixes: /ma-…-ʃ/, the suffix /-ʃ/ (located word finally) creates/forms a complex coda with final consonant of the host, as a result of the clusters of consonants that is formed. The constraints Onset, *COMPLEX coda and DEP interact together to render the desired output. Consider the input noun /ma-tra:b-ʃ/ ‘ not soil’ as tableau in (18) below.

(18) Complex coda is allowed

/ma-tra:b-ʃ/	Onset	DEP	*COMPLEX coda
a. ☞ ma.trabʃ			*
b. ma.tra.bɪʃ		*!	
a. ma.tra:b.ɪʃ	*!	*	

Tableau (18) shows that candidate (a) wins over candidates (b) and (c), since candidate (c) violates the high ranked constraint Onset and candidate (b) violates the constraint DEP.

The constraint *COMPLEX coda is ranked low, given how morphological suffixation, such as the attachment of the negation suffix marker /-ʃ/ needs to take place. Coda complexity is prohibited in the grammar if it is only phonological applications, devoid of any morphological considerations and/or applications that are taking place. This would be the case when we have a stem domain that ends with two consonants that are not negation suffix. In this case, the constraint *COMPLEX coda is high ranked. Consider the tableau (19)

(19) The prohibition of a complex coda

1. /ʒɪb-t/	Onset	*COMPLEX coda	DEP
a. ɪʒɪbɪt	*!		*
b. ʒɪbt		*!	
c.☞ ʒɪbɪt			*
2. /ma.sak-t/	Onset	*COMPLEX coda	DEP
a. ama.sakɪt	*!		
b. ma.sa.kt		*!	
c.☞ ma.sa.kɪt			*
3. /masˤraf-k/	Onset	*COMPLEX coda	DEP
a. masˤ.raf.ak	*!		
b. masˤ.rafk		*!	
c.☞ masˤ.ra.fak			*

Tableau (19) shows how the constraint hierarchy works differently from the one in (18). This is due to the fact that in the case of (19) the attached affixes are not negation ones since the dialect allows complex coda in a such neg /ma-STEM-ʃ/ affixes only. The winning candidates are the (c) candidate. The other candidates are ruled out. The (a) candidates fatally incur violations of the constraint Onset. Candidates (b) are ruled out since they fatally violate the highly ranked constraint *COMPLEX coda. From the above two tableaux, it can be concluded that coda complexity is morphologically conditioned, since it is allowed only in the case of the negation suffix /-ʃ/. The two different constraint hierarchies employed in within distinct levels are summarized in (20)-(21) below.

(20) Complex coda without negation suffix: **Onset , *COMPLEX coda >> DEP.**

(21) Complex coda with negation affix: **Onset >> DEP >> *COMPLEX coda.**

The difference in the two constraint hierarchies given in (20) and (21) is what motivates a stratal approach to the phonology of TLA that will be pursued later in the chapter. The weight of the coda in TLA is what we consider in the following subsection.

3.2.6.1.3 Coda weight in final closed syllable

The criteria of coda weight in TLA cannot be predicted, since the final closed syllable weight is variable. The application of Weight-by-Position, for example, where one considers where the coda is internal to the word-form, also fails to predict the weight of the coda in the dialect.

The only straightforward Prediction that can be made from the TLA data, is that the final coda gains weight just in the case of verbs, and some nouns, which take a CV.CVC syllable pattern. Contrastively, the coda is weightless in the case of CV.CVC adjectives, and some nouns[9]. The issue of whether the coda is included in syllable weight is language specific, and is left for a detailed discussion when we consider the stem and word lexical levels in TLA (See chapter five).

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[9] TLA CV.CVC nouns are divided in two, based on the location of stress which can either be initial or final. The details related to this will be discussed in chapter five.

The discussion of coda weight requires us to introduce two additional types of constraints that are related to syllable weight: (1) the coda of final CVC syllable is moraic, but yet extrametrical, depending on the lexical item involved; and (2) the coda of final CVC syllables is extrametrical, but lexically-dependent moraic. Accordingly, coda weight in a constraint based framework must be accomplished by virtue of a conflict between a constraint that bans codas from being moraic, and a constraint that demands a mora for codas. The constraint *Final-C-μ demands codas to be weightless, and the constraint MORAICCODA demands the coda to be moraic. Their definition is provided in (22)-(23).

(22) *Final-C-μ (Hayes 1989)

Word-final coda is weightless.

(23) MORAICCODA (Broselow 1997)

All coda consonants must be dominated by a mora.

(24) Heavy final closed CVC

CVC	MORAICCODA	*Final-C-μ
a.☞ $CV_{\mu}C_{\mu}$		*
b. $CV_{\mu}C$	*!	

Tableau (24) shows that the coda consonant of the winning candidate (a), contributes to syllable weight, since the constraint MORAICCODA out-ranks *Final-C-μ. In contrast, candidate (b) is ruled out because the coda consonant does not contribute to syllable weight.

TLA would require an opposite ranking to remove the mora from the coda consonant. The different ranking satisfies the lexically-dependent weight of the final CVC of CV.CVC adjectives and some nouns. Consider tableau (25) below:

(25) Light final closed CVC

CVC	*Final-C-μ	MORAICCODA
a. $CV_{\mu}C_{\mu}$	*!	
b.☞ $CV_{\mu}C$		*

In the above tableau, candidate (b) wins the competition because it satisfies the constraint *Final-C-μ. In other words, the constraint *Final-C-μ in tableau (25) outranks MORAICCODA. The hierarchies of the two CVC syllable weights discussed in (24) and (25) above, are as in (26) and (27) below:

(26) Light final CVC syllable: *Final-C-μ >> MORAICCODA.

(27) Heavy final CVC syllable: MORAICCODA >> *Final-C-μ.

The issue is that both the above constraint hierarchies are in fact acceptable in TLA, given how (26) works for the lexical nature of CV.CVC verbs and some nouns, while (27) works for CV.CVC adjectives and some nouns. For this reason, we will maintain the use of both these hierarchies by assuming a Stratal OT approach, to be developed further in chapter five.

3.3 The mora in TLA

The possible syllable patterns given in (26)-(27) above show some important points that are useful for this study, especially if we are to understand stress placement in TLA. The number of vowels, along with vowel length are two important properties for the representation of mora, since short vowels account for one mora, while long vowels account for two moras. In this section, the mora, as a lower prosodic level of the syllable will be discussed in detail.

3.3.1 The mora in the stem domain

In terms of the number of moras in a syllable, Hyman's (1985) phonological theory of weight, later developed by Hayes (1989, 1995), divides syllables as being either monomoraic, i.e having one weight unit, or a bimoraic, having two weight units. This typology is illustrated in (28).

(28) Mora and Syllable weight typology

(a) light: σ(μ)

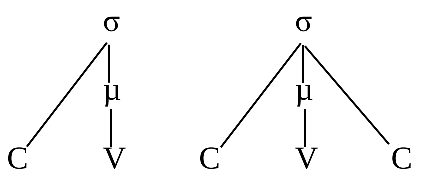
(b) heavy: σ(μμ)

The light syllable in (28a) above represents a CV pattern; (28b) characterises CVV as a heavy syllable. Hayes (1995) also adds that CVC syllable types could be optionally heavy, depending on the language specific characteristics of how codas behave in some languages and how many moras they are assigned.

In TLA, the light syllable consists of either a CV or CVC pattern. Both assign one mora, as light syllables. CVC syllables are light only in word-final positions. The coda of a CVC takes a mora and hence the whole syllable becomes heavier due to its bimoraic nature, when in word-internal or word final positions.

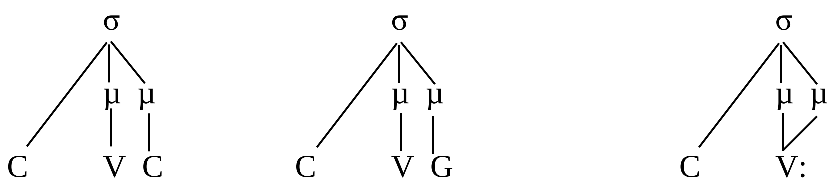
(29) Monomoraic light syllables CV and CVC patterns

(a) (b)



(30) Bimoraic heavy syllables in TLA

(a) (b)

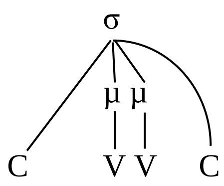


The difference between CVCs as represented in (29b), and (30a), is that the coda of the CVC syllable in (30a), is the one present in word internal positions, whereas in (29b), we observe a

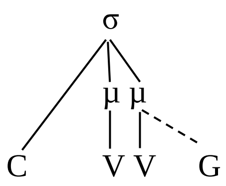
CVC syllable as present in word final positions where it is weightless. In TLA, the maximum number of moras with in a syllable is two. Hence the syllable patterns CVVC, CVG and CVVG are bimoraic. Consider the schematic examples in (31) below.

(31) Bimoraic stem (long vowel) heavy syllable.

(a)



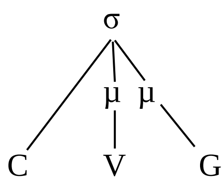
(b)



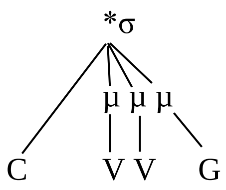
Coda weight in (31a) is shown to be extrametrical, because trimoraic syllables do not exist in TLA. The pattern in (31b) occurs either word-finally, or in monosyllabic words. In (31b), the geminate coda shares the mora with the preceding nucleus in the case of a long vowel. Otherwise, it takes an independent mora, in the case of a short vowel nucleus, but not when a long vowel is involved, as we see in (32) below:

(32) Moraic stem: A heavy syllable with a short vowel

(a)



(b)



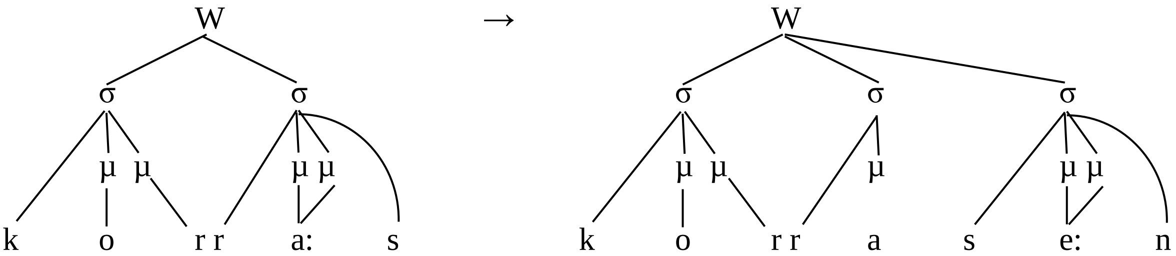
Example (32a) shows the correct representation of a moraic coda, represented with a short vowel nucleus. Examples such as (32b) are impossible, given how the geminated coda fails to share the coda with the preceding bimoraic nucleus.

3.3.2 Bimoraic Suffixes

TLA has some suffixes that start with a long vowel, and are hence instances of bimoraic suffixes. Attaching these suffixes to a stem of a bimoraic nucleus causes the onset of simultaneous phonological processes, namely: stem vowel shortening and stress shifting. This is how the phonological system in TLA amends upon what would otherwise be a violation of two heavy syllables of long vowels in a sequence.[10] With the exception of the dual suffix /-e:n/, stress shifts onto the bimoraic suffix. Consider the examples in (33) below.

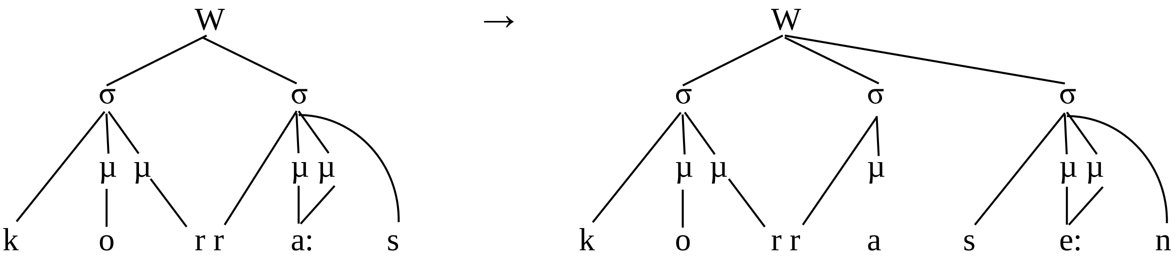
(33) Bimoraic suffixes (-ɛ:t, -e:n)

(a) dual suffix /-e:n/



/kor.ˈra:s/ 'book' + /-e:n/ → /kor.ˈra.se:n/ 'two books'[11]

(b) plural suffix -ɛ:t



/kor.ˈra:s/ 'book' + /-ɛ:t/ → /kor.ra.ˈɛ:t/ 'books'[12]

The process of long stem vowel shortening is applied in the change observed in (33). Yet the different bimoraic suffixes have contrasting phonological behaviour. In the case of the du suffix in (33a) stress remains within the stem domain, while in (33b), stress shifts outside the stem domain to the bimoraic plural suffix /-ɛ:t/. These instances require a Stratal OT approach to account for them.

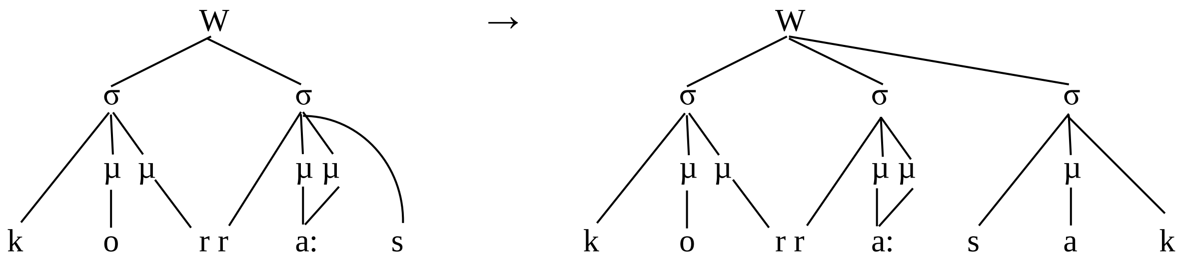
[10] The constraint *σv:.σv: which bans two heavy syllables involving long vowels in a sequence is developed in chapter five, where we account for right this behaviour.

3.3.3 Monomoraic Suffixes

The monomoraic suffix in general is formed by any short vowel, or a /-v/ short vowel followed by a consonant /-vc/, or a consonant followed by a short vowel /-cv/. These are normally attached to the right edge of the stem. Unlike bimoraic suffixes, monomoraic suffixes are neither stress bearers in TLA, nor the cause of long vowel shortening at the stem domain. For convenience the same stems as in (30) above will be used, this time with the attachment of the monomoraic vowel suffix /-ak/ ‘2sgm.gen’ and /-na/ ‘1pl.gen’ in (34) below:

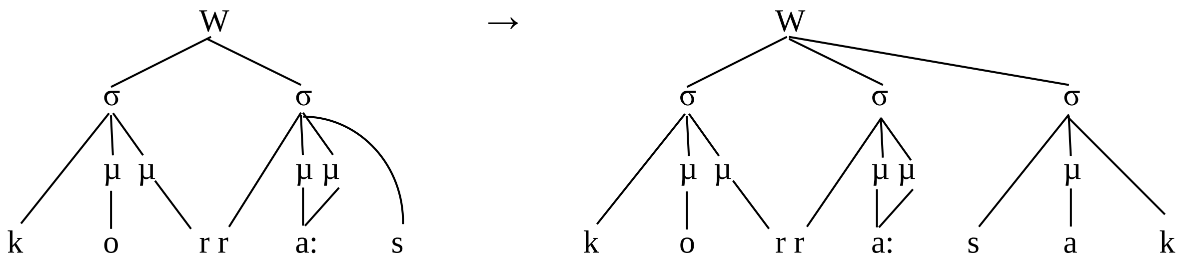
(34) Monomoraic suffixes (-ak, -na)

(a) The possessive suffix/-ak/



/kor.ˈra:s/ ‘book’ + /-ak/ ‘2sgm.gen’ → /kor.ˈra:.sak/ ‘book-2sgm.gen’

(b) The possessive suffix/-na/



/kor.ˈra:s/ ‘book’ + /-na/ ‘1pl.gen’ → /kor.ˈra:.sna/ ‘book-1pl.gen’

The examples in (34a) and (34b) show that there are no phonological changes to the stem once monomoraic suffixes are attached. However, this preservation of the stress on the stem domain is morphologically only applicable in the presence of some monomoraic suffixes. The phonological puzzle that some bimoraic suffixes attract stress and others repel stress is thus due to interesting complexities that pertain to the morphophonological interface, which is where phonology and morphology interact. Phonologically, the mora is the core of the syllable's weight, and weight is an essential factor for stress, in languages which are weight sensitive. In TLA morphology, certain suffixes attract stress while others do not. This is what motivates the Stratal OT analysis that will be developed in the coming chapters.

3.4 The foot in TLA

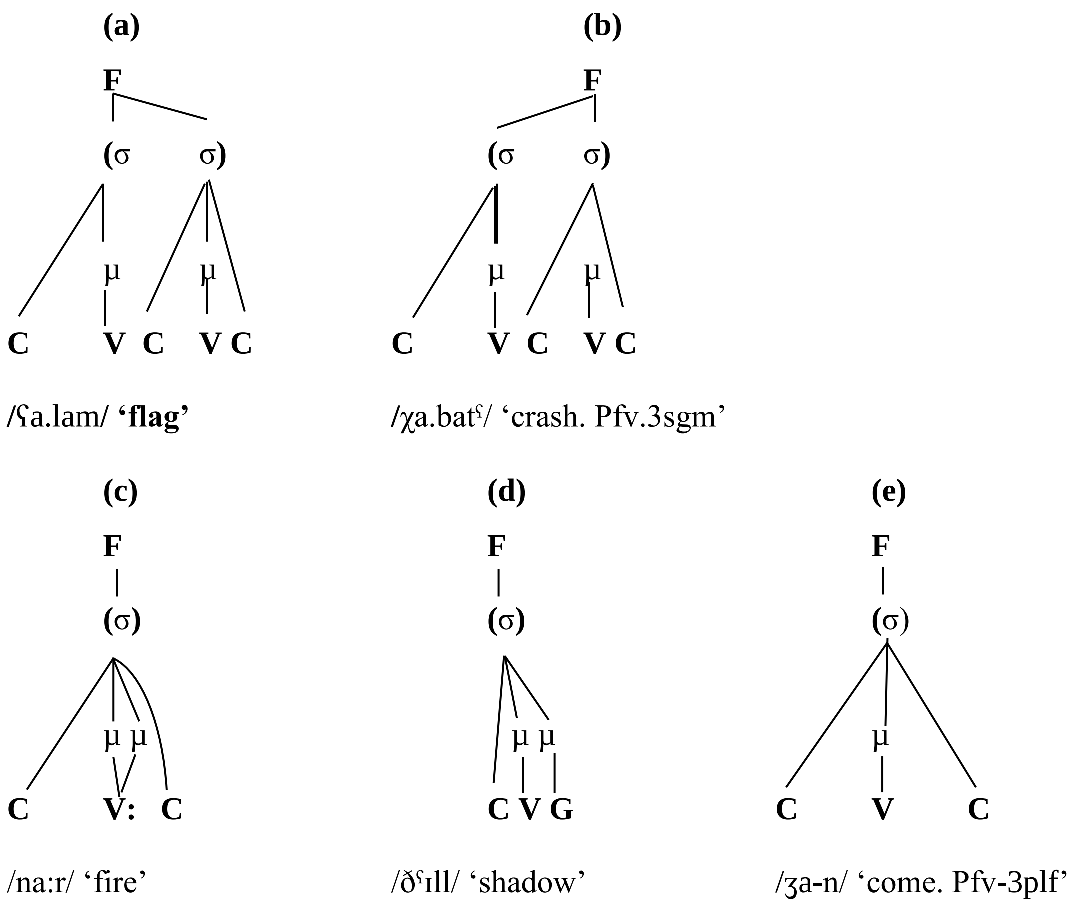
Identifying the type of stress, in general, is directly related to foot and syllable tiers. A foot construction is based on: *foot directionality*, which precedes from Left-to-Right or Right-to-Left, and *foot headiness*, where we get either on iambic (right-headed) or trochaic (left-headed) feature. Another parameter that is also related to foot size, has to do with the number of syllables, or the number of moras that form a foot. Parsing feet into binary syllabic feet is different from parsing feet into binary moraic feet, since one syllable could contain two or sometimes three moras. In TLA, a light (i.e monomoraic) syllable can be stressed in different positions, in a prosodic word. This could result in a stressed DEGENERATE FOOT. The validity of this assumption will be discussed in § 3.4.1, after identifying the foot directionality system in TLA, which precedes either from left-to right, or right-to-left.

The parametric strategy that will be used to construct feet in TLA is based on stress position. This is for two reasons: firstly, the dialect allows one stress for every prosodic word. Secondly, the minimal word weight can be formed by one CVC as a monomoraic foot. This means that in the cases of stressing a light syllable in a prosodic word, the foot could be formed by one CV light syllable, given that both ternary and degenerate feet violate the foot binarity constraint.

It is not possible to find a monosyllabic word what takes CV or CCV pattern, but patterns like CVC /hal/ 'family', CVVC /no:m/ 'sleeping', CCVVC /tra:b/ 'soil', CVG

/damm/ ‘blood’, and CVVG /ra:dd/ ‘coming back’, are allowed in the dialect. The foot in TLA either comprises two syllables with two moras (a mora for each syllable); one bimoraic syllable; a monomoraic syllable; or a degenerate foot, constructed from one light syllable as part of a prosodic word. Consider the schematic examples of the isolated words in (35) below.

(35) TLA feet types



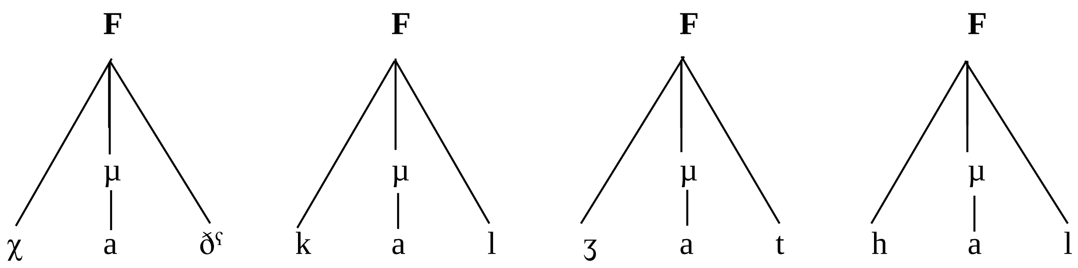
The foot in (35a) is left-headed, and constructed out of two monomoraic syllables. This syllable pattern, CV.CVC, is represented by adjectives and some nouns, where stress is always on the penultimate. The foot in (35b) is also constructed with two monomoraic syllables, but it is right-headed. That in (35c) is constructed of one bimoraic syllable. The foot in (35d) is also constructed by one bimoraic syllable whose coda is geminated, so it takes its own separate mora. The foot in (35e) is the minimal foot allowed in TLA, and comes about as a consequence of re-syllabification processes. The word /ʒan/ ‘come. Pfv-3plf’ undergoes re-syllabification as the perfective /3plf/ suffix /-n/ attached to the stem /ʒa:/.

3.4.1 Degenerate foot in TLA

The dialect allows content words of isolated CVC syllables as in /χaðˤ/ ‘took’, /ʒat/ ‘she came’, /hal/ ‘family’, /kal/ ‘he ate’, etc. The foot of these examples is monomoraic, since the coda in word final position is weightless. The prosodic shape of these given words cannot be identified as an instance of a good foot, since these words’ forms comprise of one short vowel followed by an extrametrical coda.

(36) Foot of CVC stem

(a) **(b)** **(c)** **(d)**



/χaðˤ/ ‘took’ /kal/ ‘ate’ /ʒat/ ‘she came’ /hal/ ‘family’

3.4.2 An OT account for the foot in TLA

As the study of TLA phonology is synchronic, the analysis of the processes in (36) above will be handled through on OT approach in one tableau. A hypothetical example involving a CV.CV.CV structure will be used as an input to get the optimal form that results in TLA, which takes a CVC structure. To do so, reference is made to four constraints which are needed for deciding whether the degenerate foot is permitted in TLA or not. These are: ONSET, *Light$_{-\sigma}$# and FT-BIN. The constraint Onset requires that syllables must have a consonant in onset position. The language specific constraint *Light$_{-\sigma}$# bans three consecutive light syllables. Constraint FT-BIN requires feet the be binary.

(37) *Light-σ#

A violation mark for more than one final light syllable.

(38) FT-BIN (McCarthy and Prince 1993, Kager 1999)

Feet are binary under moraic or syllabic analysis.

(39) CVC degenerate foot

CV.CV.CV /ʔa.χa.ðˤa/	ONSET	*Light-σ#	MAX-IO	FT-BIN
CVC a.☞(χaðˤ)			***	*
CV.CV.CV b. (ʔa.χa).ðˤa/		*!		
VCV.CV c. a.(χa.ðˤa)	*!	*	*	

The above tableau shows that candidate (b) is ruled out because it incurs a fatal violation of the constraint *Light-σ#. Candidate (c) also loses the competition, due to a fatal violation of the constraint ONSET. The winning candidate is (a) since the constraints MAX-IO and FT-BIN are low ranked, and violable, in TLA.

The optimal output in the tableau in (36), is an evidence of the degenerate foot, and hence it occurs as a minimal (independent) content word. Since the degenerate foot occurs as an independent word, then this entails that this structure is also allowed anywhere inside multisyllabic words. When this light syllable gets stressed, it violates the demand that requires heavy syllables to be stressed. Below, we consider a number of examples in TLA where the light syllable is stressed, as it is in a metrical strong position (see line (1) in (41-42).

To recap then, we have seen that since monosyllabic words of a CVC structure have a monomoraic foot, then this implies that the dialect allows multisyllabic words with degenerate feet. According to Hayes (1995), stray syllables can be parsed into degenerate feet, if it is metrically located in a strong position. His proposal argues for two types of degenerate foot prohibitions:

(40) **Prohibition of Degenerate Feet** **(**Hayes1995:87)
Foot parsing may form degenerate feet under the following conditions:
a. strong prohibition: absolutely disallowed
b. weak prohibition: allowed only in strong position, i.e. when dominated by another grid mark.

In TLA, the degenerate foot is not prohibited for two reasons. Firstly, the minimality of a content word can be a monomoraic CVC, since the coda is extrametrical, as shown in (36). Secondly, the position of the degenerate syllable in many cases is in a strong position. This can be observed by parsing the syllables in the examples /ˈma.dər.sa/ 'school', /ˈma.ħar.ma/ 'scarf', and /ˈʒa.nɪb.kan/ 'next to you plf', into feet. Using grid marks as in (41) gives us more asterisks to the left of the word, and the unparsed one on the right edge can be treated as an extrametrical syllable, since it is in a weak position.

(41) Degenerate feet construction

			(*)			**Line (1)**
	* * *		(*)	(*)	(*)	**Line (0)**
a.	ma.dər.sa	→	ma	dər	sa	
b.	ma.ħər.ma	→	mə	ħər	na	
c.	ʒə.bɪt.tɪn		→	ʒə	bɪt	tɪn

In line (0) an asterisk mark is given to every syllable, and in line (1), another asterisk mark is given to the stressed syllable. The first light syllables in (41) are in strong positions since the asterisk is not given to the heavy syllable in line (1).

Another way of parsing the above syllables into feet is by parsing the two syllables from Right-to-Left, as in (42) below.

(42) Ternary feet construction

			*		**Line (1)**
	* * *		(* *)	*	**Line (0)**
a.	ma.dər.sa	→	ma. dər	sa	
b.	ma.ħər.ma	→	mə. ħər	na	
c.	ʒə.bɪt.tɪn	→	ʒə. bɪt	tɪn	

As illustrated through (41)-(42), foot binarity is violated. In (41) the foot is CV degenerate, whereas in (42) the foot is CV.CVC ternary.

To explain the above algorithm, we can say that the light CV syllables in (42) prefer to be stressed due to the directionality of the parsing, and the foot construction. Since the foot binarity is violated in both cases, i.e. in both (41): (ma).dər.sa and (42): (ma.dər).sa the initial syllable gets stressed. In this way, (41) is preferred over (42) since the dialect allows a monomorphemic word constructed/built of a degenerate foot. (see chapter five for more details of the TLA stress algorithm).

3.4.3 Syllable parsing and foot directionality

The phonological parameters for classifying stress in TLA are difficult to capture, and this is true from a number of perspectives. Firstly, the relationship between foot binarity and stress assignment is not predictable under the syllable parsing system, given how the same left-over syllable of a stem is stressed in one stem, but not another as we will see in (43 a-b) below, as opposed to the rest. Moreover, it is not always the case that the head foot occurs on the right (heavy) syllable (iambic), since the head foot can also be on the left edge of the prosodic word (trochaic). The quantity sensitivity parameter does not prevail either, in the stress system in the dialect, since light syllables can bear stress even in the presence of heavy syllables. The directionality of foot construction is thus another parameter which specifies which of the word is the starting point for constructing feet. The process of parsing syllables into feet can be from the left edge to right edge, or vice versa. Below are some TLA examples of different syllable patterns with different stress patterns. Observe how the footed syllables are either in line with the foot binarity parameter, or a stressed light CV syllable. The CV light syllables which are left over due to their weak position are not parsed into feet.

(43) A representation of the feet and stress placement system in TLA

FORM	**STLLABE STRUCTURE**	**MEANING**
a. (ˈ**ʒa**)(nɪb).kan	(**CV**)(CVC)CVC	'next to you.plf'
b. ha.(ˈ**lab**).kan	CV(**CVC**)CVC	'he passed you.plf'
c. ʕa.(raf).(ˈ**nɛ:**)	CV(CVC)(**CVV**)	'we (m/f) knew him'
d. (ħam)ma(ˈ**mɛ:t**)	**(**CVC)CV(**CVVC**)	'bathrooms'
e. (ˈ**ɡam**).(ʕa.zat)	(**CVC**)(CV.CVC)	'she sat down'
f. (ɡam).(ˈ**ʕa**.zɪt)	(CVC)(**CV**.CVC)	'I sat down'
g. (ʒo.zɪ) (ˈ**jɛ:t**)	**(**CV.CV)(**CVVC**)	'pairs'
h. (san).(ˈ**du**) (ɡe:n)	**(**CVC).(**CV**)(CVVC)	'two boxes'
i. (dah).(ˈ**wa**) (rɪt)nɪ	**(**CVC).(**CV**)(CVC)CV	'you took me for sightseeing'

As observed through (43), TLA stress is not predictable and stress assignment is not always based on syllable weight. Examples (43a), (43h) and (43i) show that a light syllable can be stressed in different syllable patterns and different positions: in the initial light, in the antepenultimate, and in the ante-penultimatesyllable positions, respectively. Each of these syllables construct a degenerate foot, as they are in a strong position.

In terms of foot headeness, Kager (2007) proposes three types of feet for languages that are quantity sensitive. The first type is a syllabic trochee, which requires two syllables to be parsed as one foot. These syllables could be two light syllables (LL), two heavy syllables (HH) or one heavy and one light syllable (HL). The second type of foot is a moraic trochee, which requires either two light syllables (LL), or one heavy syllable (H). The binary foot in these feet is left-headed. The third type of foot is an iamb, which can have two light syllables (LL), one heavy syllable (H) or a light syllable followed by a heavy one (LH). The degenerate foot is one light syllable. (44) visually represents the feet types available in quantity sensitive languages.

(44) Kager's (2007) foot types

		Licit expansions	degenerate expansion
(a)	**Syllabic Trochee**	('σ σ)	('σ)
(b)	**Moraic Trochee**	('L L) ('H)	('L)
(c)	**Iamb**	(L 'H) ('H) (L 'L)	('L)

I analyse the TLA examples in (43) with the proposed foot inventory given in (44) above. The foot type and foot construction directionality will be examined from both right-to-left and left-to-right. I will also render the foot types given in (44) to see which the more suitable foot type and direction of metrification for TLA is. Since TLA allows one main stress, the focus will be only on the foot that carries the main stress.

(45) Asymmetric Feet

(a) Syllabic Trochee.

1. Metrification: from left to right

(ˈ**ʒa**.nɪb).kan/ 'next to you.plf'	('σ σ)
(ˈ**gam**.ʕa).zat 'she sat down'	('σ σ)

2. Metrification: from right to left

ha.(ˈ**lab**.kan) 'he passed you.plf'	('σ σ)
gam.(ˈ**ʕa**.zɪt) 'I sat down'	('σ σ)
san.(ˈ**du**.ge:n) 'two boxes'	('σ σ)

(b) Moraic Trochee

1. Metrification: from left to right

(ˈ**gam**).ʕa.zat 'she sat down'	('H)

2. Metrification: from right to left

gam.(ˈ**ʕa**.zɪt) 'I sat down'	('L L)
ħam.ma(ˈ**mɛ:t**) 'bathrooms'	('H)

(c) Iamb

1. Metrification: from left to right

(ˈ**gam**).ʕa.zat 'she sat down'	('H)

2. Metrification: from right to left

ʕa.raf.(ˈ**nɛ:**) 'we (m/f) knew him'	('H)
ħam(ma.ˈ**mɛ:t**) 'bathrooms'	(L 'H)
ʒo.(zɪ.ˈ**jɛ:t**) 'pairs'	(L 'H)

The examples provided in (43) are thus here being analysed into a three-type foot system, as in (45), involving a moraic trochee, syllabic trochee and iamb.

Another issue that poses difficulty in capturing stress in TLA is the characterisation of adjectival forms and verbal forms that take the syllable pattern CV.CVC. While the final coda is weightless in the dialect, lexical stress goes onto the initial syllable when the word class is an adjective, while stress goes onto the final syllable when it is a verb form. The contrast is illustrated visually in (46).

(46) CV.CVC foot type:

(a) Iamb: (Verbs)	**(b) Trochee: (Adjectives)**
/(ha.ˈbal)/ 'to make someone crazy'	/(ˈha.bal)/ 'crazy'
/(ha.ˈtaʃ)/ 'to take off a tooth'	/(ˈha.taʃ)/ 'gap-toothed. sgm'
/(ʕa.ˈraʒ)/ 'to cause a lame'	/(ˈʕa.raʒ)/ 'lame/crippled. sgm'
/(ħa.ˈwal)/ 'to cross eyes'	/(ˈħa.wal)/ 'cross-eyed. sgm'

As illustrated through (46) we see in CV.CVC shaped verbs stress fall onto the right head of the foot: iambic (right-headed) while adjective forms that take the same syllable pattern have stress falling on the initial syllable, resulting in a trochaic (left-headed) foot. Accordingly, the foot structure of the same syllable pattern can be both iambic and moraic trochee, and this appears to depend on the effects that are beyond phonology, but have to do with the word-forms category type. However, to overcome the problem of this apparent contradictory foot types given in (45) the Stratal OT will be used to deal with such contradictory behaviours by assuming different levels. I argue that the final coda is moraic in the case of verbs whereas it is extrametrical in the case of adjectives. We have already seen how this works when considering the constraint hierarchy contrast in (26) and (27) where the constraint *Final-C-μ was shown to dominate MORAICCODA in tableau (25), in order to achieve a light final closed CVC syllable. This would thus account for the behaviour of stress-placement of CV.CVC adjectives where stress falls on the initial CV leaving the final CVC syllable light.

3.5. Conclusion

In this chapter, three prosodic features of the TLA phonology have been discussed: The syllable, the mora and the foot. In the first part of the chapter, the syllable pattern types available were discussed in detail, illustrating patterns differences and similarities between isolated words and word-internal syllables. Following that we went on to discussion the interaction of syllable patterns and how this bears out on the stress assignment. The syllable structures internal to words and the issues related to sonority were discussed, considering such effects with respect to both the onset and the coda. Consonant clusters alternations in onset position and the type of cluster combination allowed in the coda position were discussed for the first time, where we observed how apart from geminates, we can only have a cluster formed out of a C followed by the neg- suffix/-ʃ/. In accounting for this behaviour in OT we considered the optimal onset segments and coda extrametricality in TLA. In the second part of the chapter, the mora in TLA was investigated, and the number of moras in a syllable that give monomoraic and bimoraic stems were discussed. Bimoraic suffixes, such as the du- and pl- realizing suffixes, were contrasted with monomoraic possessive suffixes. In the last part, I investigated the foot as a higher prosodic level, over the syllable. In this section, the degenerate foot in TLA was comprehensively analysed in a line with Hayes's (1995) assumptions, since a degenerate foot is allowed in the dialect, and it occurs in strong positions. We also saw, however, that the foot type in TLA is complicated by the interaction of positional and directional specifications we considered data illustrating how the foot looks iambic in some word classes and trochaic in other word classes. Furthermore, we also observed how metrification directionality is not well-grounded in TLA, since both right-to-left and left-to-right directions appear in the dialect, implying that the data observed does not provide us with a single consistent alignment for foot directionality.

With our initial considerations of all the phonological, behaviours, both segmental and beyond the syllable, given the discussion of the foot, discussed in this chapter I have aimed to start motivating Startal OT approach. Support of this is that is in fact what I will be arguing for in the following chapters.

4. Chapter Four: Morphology

4.1 Introduction

The purpose of this chapter is to give a basic analysis of nominal and verbal morphology in Tobruq Libyan Arabic (TLA). There have been previous studies that have dealt with the morphology of Libyan dialects. Harrama (1993) focuses on the morphology of Al-Jabal Algarbi (a dialect spoken in the Western mountains of Libya). He provides a comprehensive analysis of the morphology of nouns, verbs, adjectives, and pronouns. The latest study of Libyan morphology as far as I know, is Gaber (2012), who deals with the morphology of the broken plural within the context of non-concatenative morphology in Libyan Arabic. His study focused on the Sirt dialect, a city located in the mid-West coastline of Libya. In this chapter I start first by briefly discussing the morphology of Arabic derivational verb forms, focusing on the way non-concatenative morphology works including the formation of broken plural. The rest of the chapter then discusses how the different syllable patterns of TLA nouns and verbs comes about, and what syllable patterns are allowed. We will be doing this by considering the affixation system in the dialect, and how phonological processes interact with respect to different morphological forms.

4.2 The Morphology of Standard Arabic

The vast majority of Arabic words have three consonantal root. It is this root that carries the lexical meaning (see table (1) below). The Arabic morpheme thus comprises of a stem, which consists of a consonantal root, with vowels intercalated between these consonants. These vowels provide grammatical information related with Tense and Aspect. Moore (1990) (as cited in Watson 2002: 126) characterises Arabic morphemes into four distinct types, as presented below:

(a) Templates: which constitute the bare prosodic material;

(b) Roots: which are composed of the consonantal melody units;

(c) Vocalism: which is the vocalic melody;

(d) Affixes: which may consist of both prosodic and melodic units.

(Watson 2002:126)

The morphological structure of Arabic is referred to as one that employs a root-and-pattern system. Arabic content words thus involve a mixture of a consonantal root; vocalic melody; and a templatic pattern. The template morphology in Arabic reflects gemination of the middle radical consonant, changes in the vowel pattern, and the addition of affixes. The templatic system in Standard Arabic (SA) is such that it supports up to ten derivationally-related verb forms. The semantic functions associated with this system essentially involves the reduction or extension of the underlying verb's argument-structure. The verb forms from II to X below, are assumed to be derivations from the basic form I. The exemplification of these verbs is through the trilateral root k-t-b. I use the verb /katab/ 'write' to illustrate the different derivationally-related verb-forms. The representations below are all active verb-forms.

Table (1) SA triliteral verbs

Morphological form	**Verb root k-t-b**	**syllable structure**
I	katab	CVCVC
II	kattab	CVCCVC
III	ka:tab	CVVCVC
IV	ʔaktab	CVCCVC
V	takattab	CVCVCCVC
VI	taka:tab	CVCVVCVC
VII	nkatab	CCVCVC
VIII	ktatab	CCVCVC
IX	ktabb	CCVCC
X	staktab	CCVCCVC

From the above set of derivationally-related forms, one observes how the low vowel [a] occurs in all the above forms. This is taken to imply that the vowel has a grammatical function. In his study of Arabic root and pattern morphology, McCarthy (1979) develops further the auto-segmental framework that Goldsmith proposed in 1976. The theory is applied to Arabic derivational verbs. The diagram below represents the derivational category of discontinuous Arabic morphemes as follows:

(2) A representation of the set of morphemes that construct verb forms in Arabic

a. katab

The active perfective morpheme: ……………………a a

the perfect stem: ……………………………….. C V C V C

the root:………………………………………….. k t b

b. kutib

The passive perfective morpheme:…………………....u i

the passive stem: ……………………………….. C V C V C

the root:………………………………………….. k t b

Given a consonantal root such as k-t-b in the root tier [k-t-b] functions as a morpheme which carries the meaning ‘to write’. The vocalic tier [a-a] in (1a) works as a vocalic morpheme which expresses the fact that we are dealing with a perfective active verb form. The vocalic tier [u-i] in (1b) works as a vocalic morpheme that expresses the perfective passive verb form. According to Watson (2002), the stem in Arabic constitutes a word without the addition of affixes. Thus, a word such as /katabat/ ‘she wrote’ is formed of the (perfective) stem /katab/ and the suffix /-at/ ‘3SGF’. The stem in SA remains unchanged and the attached suffixes are what changes, in order to express the number, gender and person that inflects, displaying agreement with the subject. Below we illustrate how the situation in TLA differs, given how the attachment of the affixes changes the vocalic tier, and the templatic structure of the stem.

4.3 Morphology of TLA

Here I construct bit by bit a description of various aspects of the phonological system in TLA. Given that I here start first with the expression of pronominal morphology, it should be mentioned from the outset that there are two morphological aspectual forms of the TLA verb-form, which effect the expression of subject pronominal inflection: Perfective and Imperfective verb tenses. The perfective essentially functions as the citation form as well as the 3SGM verb-form that expresses the past tense. The imperfective form, on the other hand, expresses readings related to the present tense, future tense, as well as generic and habitual readings, depending on the context.

4.3.1 TLA subject and object morphemes

The morphology of the TLA verb is complicated by the complexity of the subject and object pronominal markers. It is important to add that TLA, as an Arabic dialect is a pro-drop language, which means that thanks to the rich inflection system on the verb, independent subject pronouns such as the ones in table (2) can be optionally omitted, when given the appropriate contexts. As shown from the list of pronominal forms below, TLA is an Arabic dialect that distinguishes GENDER in the 2nd and 3rd person singular and plural cells.

(2) TLA independent subject pronoun:

Singular		Plural	
1SG	/na:/	1PL	/nɪħ.na/
2SGM	/ʔən.ta/	2PLM	/ntu/, /ʔən.tu/ [13]
2SGF	/ʔən.ti/	2PLF	/ʔən.tan/
3SGM	/hu:/	3PLM	/həm/
3SGF	/hi:/	3PLF	/hən/

[13] The initial glottal stop is always optional in TLA, such as the /ʔə/ in /ʔən.tu/ (and other instances) can be also pronounced as monosyllabic: /ntu/, /nta/, /ntan/…etc

Table (3) now provides the set of affixes attached to both the perfective and imperfective verb-forms.

(3) TLA perfective and imperfective affixes:

	Perfective	**Imperfective**	
		Prefix	**Suffix**
1SGM	/-t/	/nə-/	-
2SGM	/-t/	/tə-/	-
2SGF	/-tɪ/	/tə-/	-ɪ
3SGM	Ø	/jə-/	-
3SGF	/-at/	/tə-/	-
1PL	/-na/	/nə-/	-u
2PLM	/-tu/	/tə-/	-u
3PLM	/-o/	/jə-/	-an
3PLF	/-an/	/jə-/	-u

These affixes function either as agreement markers with the subject, or else function themselves as the subjects of the sentence in the absence of a syntactic subject that is overtly expressed.

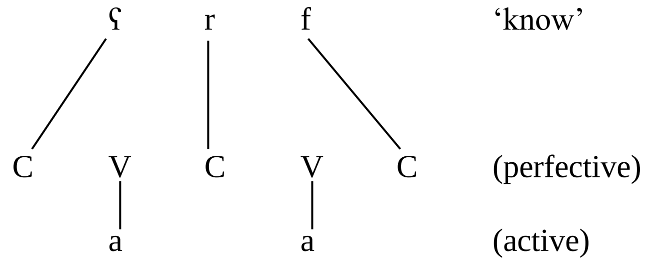
In table (4) we here represent the set of object pronominal suffixes in TLA, which attach onto verbs.

Table (4) TLA object attached pronouns

SINGULAR		PLURAL	
1SG	/-ni/	1PL	/-na/
2SGM	/-ak/	2PLM	/-kam/
2SGF	/-ik/	2PLF	/-kan/
3SGM	/-a/	3PLM	/-həm/
3SGF	/-ha/	3PLF	/-hən/

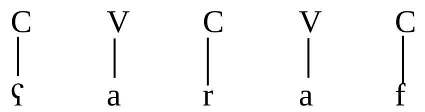
With that background of the inflectional verbal morphology, below I now urn to illustrate an analysis of how an inflected basic form I verb is analysed within auto-segmental phonology. Starting with the citation form, which is perfective 3sgm form of the active verb, I make use of the /ʕa.raf/ 'he/it knew', which involves the radical consonants /ʕ-r-f/, which relates to the lexical meaning of 'to know', a vocalic phoneme /a-a/, and the CVCVC templatic pattern, as in (3).

(3) Verb form I:



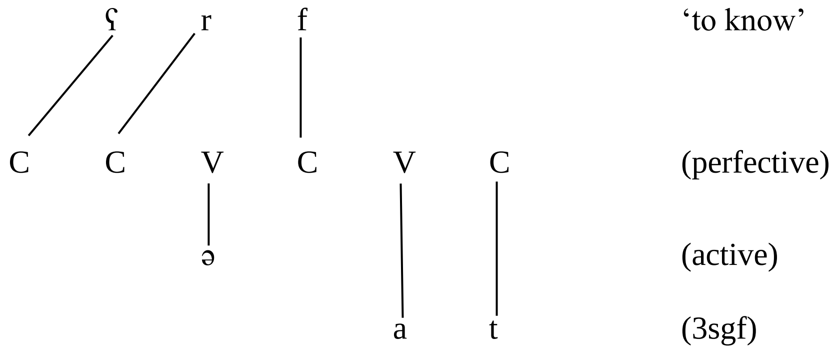
Combining the above morphemes into one tier results in the form /ʕa.raf/ 'he/it knew', as in the representation below:

(4)



Taking this verb-form as the base/underlying form and then attaching the perfective 3sgf suffix /-at/, to get to the verb form /ʕa.raf-at/, the process procedes as follows below in (5).

(5)

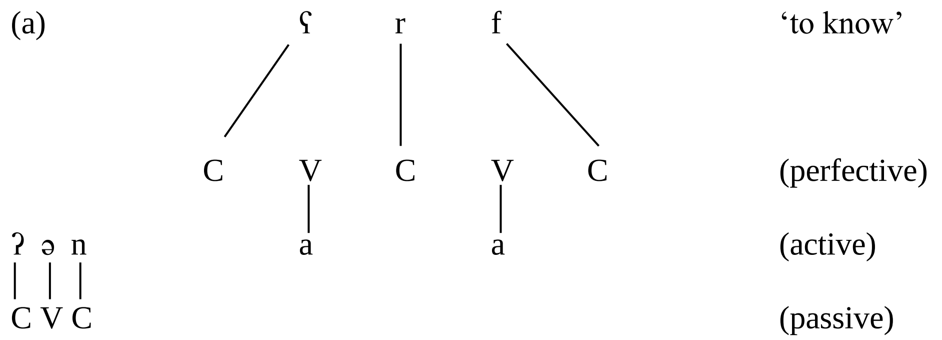


In what follows, I now concentrate on a number of individual affixes and observe how they map out within the auto-segmental phonological theory.

4.3.2 The perfective passive morpheme /ʔəC-/ in TLA

TLA has a passive prefix /ʔəC-/, with cause no changes on the perfective stem-form, and builds the verb form VII. Therefore, given the active /ʕa.raf/, we simply attach /ʔən-/, and we get /ʔən.ʕa.raf/ ‘he was known’. (6a) below represents the three tier morphemes, and (6b) represents the segments that constitute the phonological word:

(6) (a)



(b) C V C C V C V C — ʔ ə n ʕ a r a f (ʔəC- ‘prefix’ + stem)

Adding further the perfective 3sgf suffix, /-at/ to the phonological word in (6), we get the form in (7) below:

(7) C V C C V C C V C — ʔ ə n ʕ ə r f a t ‘she is known’

The surface form can be explained as in (8):

(8)

Underlying form	Surface form	Meaning
CVC.CV.CVC.CV	CVC.CVC.CVC	
/ʔən-ʕa.raf/	/ʔən.ʕa.raf/	‘he/it M is known’
/ʔən-ʕa.raf-at/	/ʔən.ʕər.fat/	‘she/it F is known’

Observe how the attachment of the suffix /-at/ results in the underlying stem’s second low vowel /a/ to be deleted, and the first one becoming a central /ə/, such that the stem is now /ʕərf/, as opposed to the underlying /ʕaraf/. Consideration of these behaviours are to be discussed in chapter 6.

4.3.3 The perfective active morphemes /a-a/ and /ə-a/

TLA verb-forms may take either /a-a/ or /ə-a/ vocalic infixes internal to the perfective verb-forms. Functionally, they are the same, but their presence is constrained by the nature of their phonological environment, i.e depending on their adjacent segments. The example /ʕaraf/ ‘knew’, for instance, involved the vocalic melody: /a-a/. The harmonised perfective active morpheme /a-a/ can be found in context, where the first vowel is preceded by a guttural consonant such as: uvulars /ʁ, x/, glottals /ʔ, h/, and pharyngeals /ʕ, ħ/, otherwise, the pattern /ə-a/ is used. Consider the distinct exemplifications in (9).

(9)	(a)	CaCaC	(b)	CəCaC
		/ʁa.sal/ ‘he washed’		/kə.tab/ ‘he wrote’
		/xa.baz/ ‘he baked’		/ʃərab/ ‘he drunk’
		/ħa.laf/ ‘he swore’		/məsak/ ‘he caught’

The interaction between the vocalic pattern and the environment of guttural consonantal types, with in the system of CVCVC verbs, is represented in (10).

(10) (a) [uvular
glottal
pharyngeal] + VCVC → CaCaC

(b) [labial
labiodental
alveolar
velar
palatal] + VCVC → CəCaC

If we are to incorporate reference to the illustration in § 3.4.3 in the previous chapter, as to how in CV.CVC templates, stress placement on the penultimate or the final syllable results in a differentiation in word class, we here have Cə.ˈCaC or Ca.ˈCaC patterned verb such as /ʕa.ˈraf/ ‘knew’ and /mə.ˈsak/ ‘caught’, whose stress must fall on the final syllable, given its verbal status, within both CəCaC and CaCaC vocalic patterns as in (11) below.

(11) **CV.CVC verbs**

/mə.ˈsak/ ‘caught’

/ha.ˈlab/ ‘passed’

/ʃa.ˈhad/ ‘witnessed’

/ʒə.ˈfal/ ‘ran’

/ɡa.ˈʕad/ ‘sat’

In contrast, both CəCaC and CaCaC vocalic patterned adjectives always take stress on the penultimate syllable as in (12) below

(12) **CV.CVC adjectives**

/ˈsə.maħ/ ‘beautiful’

/ˈrə.tˤab/ ‘soft 3sgm’

/ˈfə.laħ/ ‘foreigner’[14]

/ˈʕə.rəɡ/ ‘thin 3sgm’

The CaCəC and CaCaC vocalic patterned nouns, on the other hand, are of two types: one is final, where the low vowel [a] is on the final syllable such as CəCaC, and the other type is penultimate, where the low vowel is on the initial syllable: CaCəC take stress on the penultimate syllable thus creating an interesting contrast between stress-placement and vowel pattern, in noun category only. Consider the illustrative examples in (13) below.

(13) **(a) CV.CVC final stress nouns** **(b) CV.CVC penultimate stress nouns**

(a)	(b)
/bə.ˈsˤal/ ‘onion’	/ˈɡa.ləb/ ‘heart’
/ʕa.ˈrab/ ‘people’	/ˈħa.bəl/ ‘rope’
/ʃa.ˈħam/ ‘fat’	/ˈka.ləb/ ‘dog’
/ʒə.ˈmal/ ‘camel’	/ˈka.bəʃ/ ‘sheep’
/ɡə.ˈmar/ ‘moon’	/ˈʃa.məs/ ‘sun’

[14] The adjective /ˈfə.laħ/ is used in the Eastern Libyan to express the person who lives in Libya but is not originally from Libya.

4.3.4 Prosodic morphology

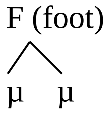
Prosodic morphology uses the same terminology as prosodic theory in general, where we find terminology such as mora, syllable, foot, and the phonological word. Below is the prosodic hierarchy based on Selkirk's (1980) work.

(14) **Prosodic hierarchy**

Phonological word	ω
Foot	F
Syllable	σ
Mora	μ

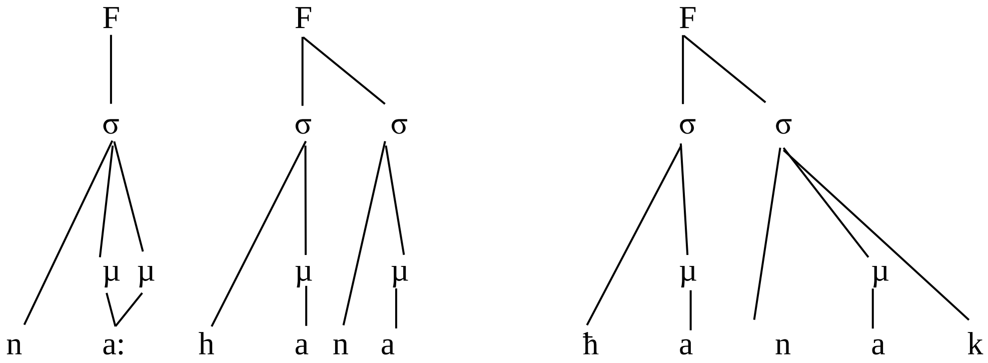
The basic or smallest word has one foot with a minimal quantitative trochaic/iambic system. In the previous chapter, particularly in §3.4.3, it was shown how TLA has both iambic and trochaic stress, therefore, it is difficult to decide whether the minimal word in TLA is trochaic or iambic. The illustration below gives the moraic level of the minimal word.

(15)



The minimal word is either one syllable with two moras, or consists of two syllables with one mora for each. Consider the examples in (16) below.

(16) (a) (b) (c)



'I' 'here' 'jaw'

The same as with (13a) above, the example (16) provides us with an exception in TLA, because the word-form in (16c) consists of a CV.CVC pattern, that is not consistently iambic. This is due to the fact that final consonant extrametricality is not consistently applied in the dialect. This thus violates the word minimality constraint, which emphasises the bimoraic minimal stem.

4.3.5 Basic stems

The stem refers to the morphological form devoid of any affixation. Sometimes the stem on its own constitutes a word-form in itself, and sometimes it does not. An example of a stem that can stand on its own as a word-form is: /kra:ʕ/ 'leg'. An imperfective verb-form such as /j-ɣɪʃʃ-ak/ 'he cheats you' comprises of the stem /ɣɪʃʃ/, which is the imperfective 2SGM word-form, the 3SGM subject prefix /j-/, and the 2SGM.ACC object suffix /-ak/. In the prosodic hierarchy, the stem is located under the phonological (ω) word and above the foot (F). The Arabic stem has maximally two feet (Watson, 2002). In what follows we provide a small discussion on nominal stems, since what follows then will be more of a concentration on verb-forms.

4.3.5.1 Nominal stems of one foot

The dialect has CV.CVC noun stems which have one foot, that can be iambic (. x) or trochaic (x .), or as in (17a), disyllabic, or two moras to a stem built of long vowel as in (17b).

(17) **Nominal stem of one foot**

a. **Iambic CV.CVC** | **Trochaic CV.CVC**

Iambic CV.CVC	Trochaic CV.CVC
σ σ (. x)	σ σ (x .)
μ μ	μ μ
/ʕasal/ ‘honey’	/kaləb/ ‘dog’
/ħanaʃ/ ‘snake’	/ħabəl/ ‘rope’
/ʃaħam/ ‘fat’	/ɡərəd/ ‘monkey’
/ʒəmal/ ‘camel’	/kabəʃ/ ‘sheep’
/ɡəmar/ ‘moon’	/ʃaməs/ ‘sun’

b. Trochaic words with a bimoraic syllable

σ σ

μ μ μ

ʒ ɛ: b j ə ‘water tank’

l a: m b a ‘lamp’

4.4 Level-One Morphology in TLA

In what follows, we discuss how TLA morphology is classified into two levels. Watson (2002) argues that Arabic morphology can be classified into levels, namely, level one and level-two morphology. These two levels do not correlate to Kiparsky (1982) or his later work within Lexical Phonology and Stratal OT. Watson’s (2002) distinct levels are meant to represent that Level-one processes make internal changes to the stem i.e. involve non-concatenative morphology, while Level-two morphology involves the addition of affixes without making any changes to the stem. TLA Level one morphology covers all the triliteral verbal patterns, with the exception of the verb form I, the basic form, in which the stem does not change when adding prefixes (of the inflectional type). Level-one morphology also includes the active and passive participles. We here first discuss Level one morphology of TLA with respect to the verbal morphology, and then we consider this with respect to the broken plural internal to the nominal morphology.

4.4.1 Level-One Verbal Morphology in TLA

The classification of TLA derived verbs is based on whether the consonantal root is constructed out of three or four radicals. The ten triliteral forms listed in (18) below are TLA exemplifications of the derivational verb-form system.

(18) **TLA triliteral verb forms**

Form	**Template**	**Example**	**Root**
I.	CV.CVC	/ʕa.raf/ ‘to catch’	ʕ-r-f
II.	CV.GVC	/fah.ham/ ‘to explain’	f-ħ-m
III.	CV:.CVC	/sa:maħ/ ‘to forgive’	s-m-ħ
IV.	ʔVC.CVC	/ʔankar/ ‘to deny’	n-k-r
V.	tV.CV.GVC	/təʕaddal/ ‘to adjust’	ʔ-d-l
VI.	tV.CV:.CVC	/təma:sak/ ‘to join’	m-s-k
VII.	nCV.CVC	/nsərag/ ‘to steal’	s-r-g
VIII.	CtV.CVC	/stəlam/ ‘to receive’	s-l-m
IX.	CCVG	/rtadd/ ‘to return’	r-t-d
X.	stVC.CVC	/staɣlab/ ‘to surrender’	ɣ-l-b

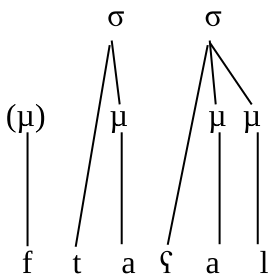
It is not necessarily the case that each verb/root will associate with 10 distinct verbs forms in TLA, and that’s why, unlike what’s the case in the SA variety, illustrated in table (1), we have not used the same verbal root with which to express our set of derivationally-built templatic forms.

4.4.1.1 Initial consonant affiliation in TLA

The verb forms IV to X have consonant sequences at the beginning of the word. The onset is sometimes occupied by one or more consonants. In the case of two consonant clusters, the argument here is whether the first consonant can be a syllabic one or it takes a mora, and if so, where to affiliate this mora. Should it affiliate to the same syllable, or can it be directly linked to the foot. In what follows, I will show two different analytical issues of such cases.

A bisyllabic verb form such as form VIII, which bears the CtVCVC template, as in /stəlam/ 'he received', is analysed by McCarthy and Prince (1990), as involving an initial consonant of the Arabic form VIII /ftaʕal/ that is extrametrical, and does not associate to any syllable. See how such an example is worked out in (19) below.

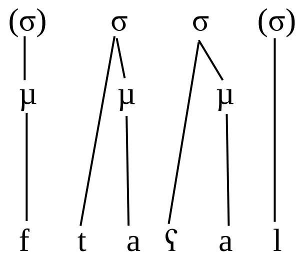
(19)



McCarthy and Prince (1990:12)

Watson 2002 argues that the form VIII template in San'ani and Cairene dialects are trimoraic, i.e. where the initial consonant is syllabified and moraic, while the coda is syllabified, but not moraic. Consider the (contrasted) example in (20) below:

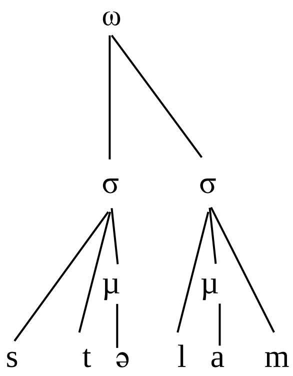
(20)



Watson (2002:135-36)

In TLA, the affiliation of the initial consonant of the complex onset in verb-forms VII-X is different from the ones given in (19) and (20) above. The initial consonant of the above forms neither stands alone as a semi-syllable, nor as a syllabic mora. Instead, the initial consonants are affiliated together to form a complex onset of the initial light syllable as in (21) below.

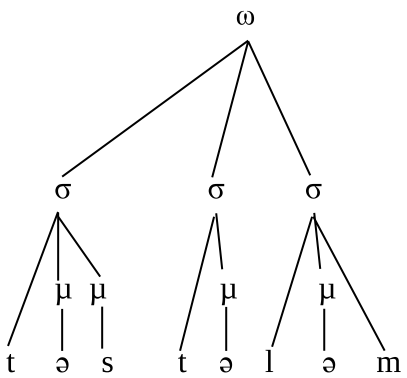
(21) **Complex onset affiliation in TLA**



'it/he received'

In (21), we observe how the initial consonant is linked with the initial syllable as it should have a vowel as neculus to form a syllable. The whole template now is formed as a monomorphemic word of two syllables. When any prefix is attached to the stem, for example, the imperfective 2SGM prefix /t-/, which renders the form: /əstələm/, then as illustrated through (22) below, we observe how the first templatic radical /s/ functions as a coda of the new emerged syllable with the prefix /t-/. Finally, the addition of the epenthetic vowel /ə/ is inserted to avoid three consonant clusters: */tstələm/

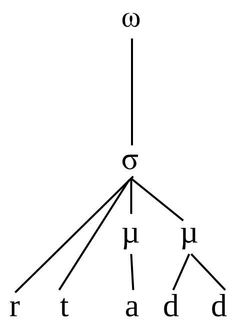
(22)



'you. SGM. receive'

Form IX is the only monosyllabic verb-form, and which has clusters at both word boundaries, but where the final cluster at the coda always consists of a geminate. The example in (23) below illustrates this with the verb-form /rtadd/ 'be returned'.

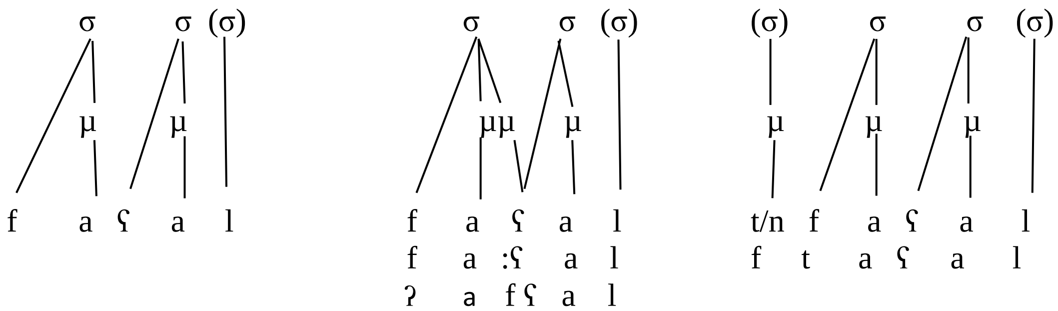
(23)



Watson (2002) discusses how mora reduplication is important in deriving the verb forms V-X in Cairene and Sanani Arabic. The verb form I is bimoraic, forms II, III, IV, VII, VIII and IX are trimoraic and V, VI and X are quadrimoraic:

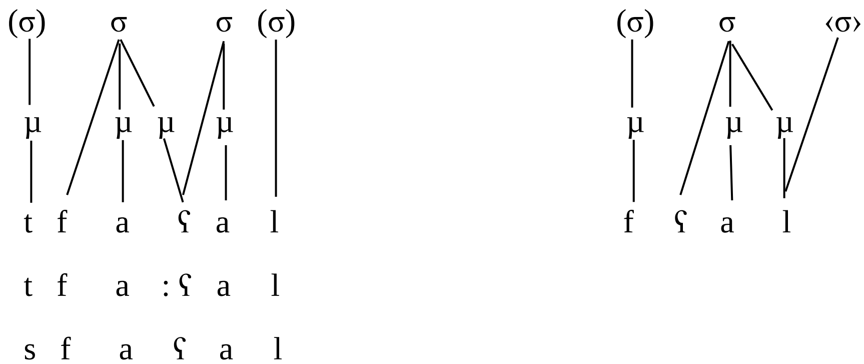
(24) Bimoraic Trimoraic

Forms I II, III, IV VII and VIII

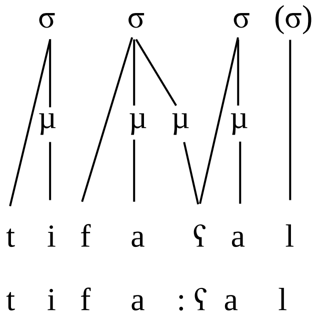


Quadrimoraic Trimoraic

Forms V, VI (Cairene Arabic) and X IX (Cairene Arabic only)



Forms V and VI (Sana'ni Arabic)

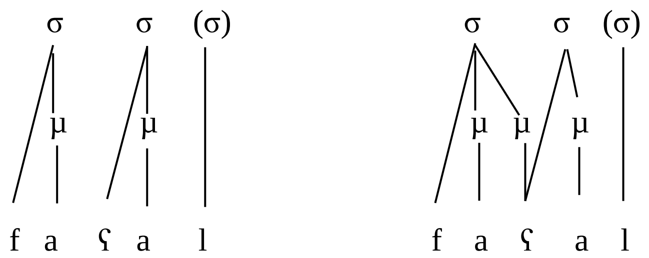


Watson (2002:135-36)

The variation between the Quadrimoraic Cairene Arabic forms V and VI and Sana'ni Arabic ones is that the initial consonant in Cairene Arabic is affiliated as forming an isolated syllable, whereas Quadrimoraic forms of Sana'ni Arabic the extrasyllabic mora is formed by the initial epenthetic vowel /i/.

McCarthy and Prince (1990) claim that the Arabic verb stem is different from the noun in that the verb stem permanently has two syllables, and where the second syllable is light with one mora:

(25)



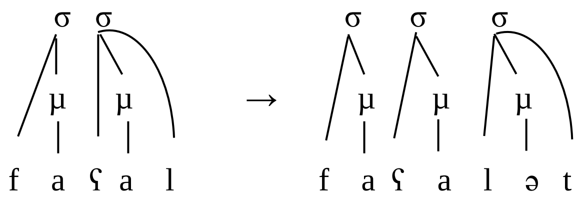
McCarthy and Prince (1990:35)

The claim in (21) is for Classical Arabic is not the same as for Cairene and Sana'ni dialects. For TLA, the vocalic and radical verb stem differs as will be seen in the next subsections.

4.4.1.2 Form I

The structure of verb form I in TLA takes a CV.CVC template, whose radical and vocalic pattern is either /fa.ʕal/ or /fə.ʕal/, as discussed in 4.3.3. The consonantal perfective suffix 1SG/2SGM /-t/ changes the CV.CVC pattern to CV.CV.CVC, given how an epenthetic vowel [ə] is inserted between the final root consonant and the inflectional /-t/:

(26)

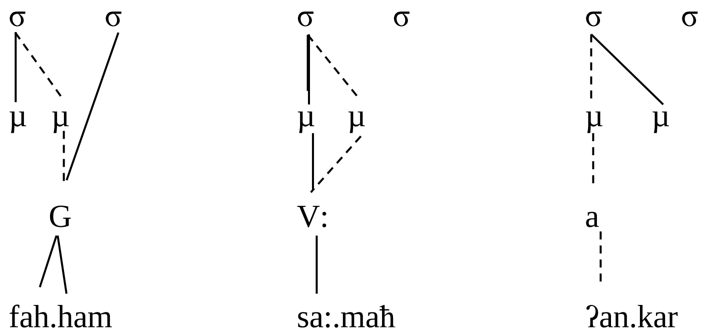


/ha.lab/ ‘he passed’ /ha.la.bət/ ‘I/you.SGM passed’

4.4.1.3 Forms II, III and IV

The verb forms II, III, and IV share a transitivising semantic property. Form II is causative and formed by doubling the middle radical consonant of form I. Form III can also be causative in meaning, and can sometimes substitute form I, except that phonologically it has an initial bimoraic syllable that comes about by lengthening the leftmost vowel. Form IV displays part of the prefixation system within this large derivational system, and involves the addition of a glottal stop. All of these processes are related phonologically, in that they all involve the repetition of the mora as displayed in (27).

(27) Form II Form III Form IV

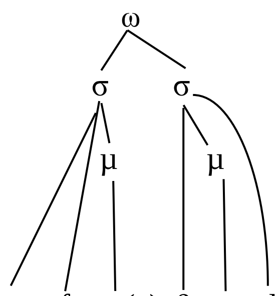


‘cause to understand’ ‘cause to forgive’ ‘to deny’

4.4.1.4 Forms VII, VIII, IX, and X

Forms VII to X share the fact that they have a consonantal prefix that results in an initial complex syllable. The forms have two light syllables that take the pattern CCV.CVC, as the final coda is always extrametical as illustrated in (28).

(28)



(a) VII	n	f	a	(ə)	ʕ	a	l
(b) VIII	f	t					
(c) IX	f	ʕ					
(d) X	s	t					

Forms VII-X are semantically related in that they express passivation. Form VII is used frequently in TLA, to passive upon form I: /səraɡ/ 'he stole' and form VII: /nsəraɡ/, etc. Similarly, in Form VIII, we get /stə.lam/ 'to be received', associated with the form I /sə.lam/, which is the active counterpart. Form IX is the only monosyllabic form, and which essentially requires the final consonant to be geminated as in /rtadd/ 'to be returned' and /nɡa.sˤsˤ/ 'to be cut', derived from the form II /rad.dah/ 'return' and /ɡasˤ.sˤa/ 'cut' respectively. Finally, in Form X, we get /stankar/ 'to be denied', associated with the from IV /ʔan.kar/ 'he denied'

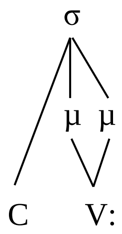
4.4.1.5 Forms V and VI

Form V as in /təʔaddal/ 'it is adjusted' is formed by adding a CV light syllable /tə-/ or /ta-/, to form II. If the prefix is followed by a guttural, it is /ta-/, and if it is followed by any other consonant it is /tə-/. Forms V and VI also have a semantic connection as they render the passivation of forms II and III, respectively. Form VI as in /təma:sak/ 'it is joined together' (təfa:ʕal) is derived from Form III via the prefix action of /tə-, ta-/.

4.4.1.7 Singleton, biliteral, and quadriliteral forms

Most of the Arabic verbal and nominal forms have a tri-consonantal root. In addition to the triliteral verb template, TLA also has verbs with a singleton consonant, biliteral, and quardiliteral consonants. Verbs with a singleton consonant constantly have the bimoraic template CVV, as in /ʒa:/, ‘he came’ or /ba:/ ‘he accepted’, as represented in (29).

(29) Singleton consonant verb



The TLA CVV template could be derived from the SA bilateral CVʔV /ʒaʔa/ ‘he came’. The CVV template is expected to be a result of a glottal stop deletion. The deletion of the glottal stop is a common process in Libyan Arabic. Abumdas (1985) discusses the process of glottal stop deletion across Libyan Arabic dialects in initial and medial positions. When such deletion occurs in an initial position, the word becomes onset-less, as illustrated in (30).

(30) Libyan Arabic glottal stop deletion in initial position

ʔ → 0 / # __ v

a. /ʔuχt/ → /uχut/ ‘sister’

b. /ʔumm/ → /umm/ ‘mother’ (Abumdas 1985:167)

When a glottal stop is deleted in medial position, compensatory lengthening of the preceding vowel takes place, as illustrated in (31):

(31) Libyan Arabic glottal stop deletion in medial position

ʔ → 0 / v __ c

a. /biʔr/ → /bi:r/ ‘well’

b. /raʔs/ → /ra:s/ ‘head’ (Abumdas 1985:167-8)

Bilateral verbs are common to in the dialect. Their template can be a monosyllabic hollow one, such as: /ɣa:b/ ‘he became absent’, /tˁa:ħ/ ‘he fell down’, which take a monosyllabic CVVC structure. Bilateral (monosyllabic) verbs can also be composed of an initial consonant with a short vowel, followed by a geminated coda: CVG as in /radd/ ‘he came back’, /sadd/ ‘he blocked’ and /mall/ ‘he is bored’. Such verb types can also be bisyllabic, taking the pattern: CV.CVV, as in /məʃa:/ ‘he went’, /ʃəra:/ ‘he bought’, /ʕatˁa:/ ‘he gave’. The long vowel in this final syllable is very much conditioned by a consonant initial suffix in TLA, in parallel with what has been said about Cairene Arabic in Watson (2002). A paradigmatic representation of such verb-forms is through the paradigm of /nisa:/ ‘forget’ in table (5) below.

Table (5) A representative perfective paradigm of CV.CVV verb in TLA

	Perfective ni.sa: ‘forget’
1SG	/nsi:-t/
2SGM	/nsi:-t/
2SGF	/nsi:-ti/
3SGM	/nisa:/
3SGF	/nis-at/
1PL	/nsi:-na/
2PLM	/nsi:-tu/
3PLM	/nis-o/
3PLF	/nis-an/

As observed through the representation, the leftmost vowel is deleted when an initial bimoraic vowel-initial suffix is added. We delay somewhat the onset of this discussion, and keep this for chapter 6.

4.4.2 Level-One nominal morphology

There are two types of plural nouns in Arabic: the sound plural and the broken plural. The formation of the broken plural in TLA will be considered as level-one morphology since the output that results does not require a plural suffix morpheme. Broken plural is the conventional term for an irregular plural in Arabic. It involves internal changes to a noun or an adjective form, from the singular form, without any changes at the word edges. In contrast, changing a singular of sound plural requires adding suffixes without changing the stem form. In this section, the broken plural in Standard Arabic is discussed first, and in what follows, I will then deal with the TLA broken plural.

4.4.2.1 The prosodic circumscription of the broken plural

The prosodic circumscription domain as an aspect of prosodic morphology theory suggested by McCarthy and Prince (1990) that is meant to analyse the Arabic broken plural, demonstrating the basic structure of the phonological word and its morphological effects. Prosodic circumscription is derivational step-by-step in nature, unlike the requirement of OT. The idea of circumscription is that the right and/or the left edge of the singular stem is prosodically structured to form the broken plural. Circumscription may positively parse out the two moras in the first syllable. For example the CVC syllable /sək/ in the singular form /sək.ki:n/ 'knife', such that /sək-/ is the base in the circumscription process, and the remaining constituent is then mapped onto a light iambic template to become the CVCV '/səka/', when forming the broken plural form. The residue of the singular form, i.e /ki:n/ remains the same.

(32) **The mechanism that results in the formation of broken plural forms**

(i) (ii) (iii) (iv)

Input	**Left-edged positive circumscription**	**Parsing onto LL iambic**	**Restoring the right-edge**	**Output**	**Meaning**
/sək.ki:n/	/sək-/	/sə.ka/	/-ki:n/	/sə.ka.ki:n/	'knives'

Prosodic circumscription is a derivational step-by-step in nature, unlike the requirements of Optimality Theory. Prosodic circumscription can be defined and applied more clearly by explaining the function ф(C, E), where C represents the constituent, and E is the edge of the base B. The B is of two parts: the initial two moras in the singular form (B:ф) ‘the kernel’, and the rightmost which comes after the kernel (B/ф) (McCarthy and Prince, 1990:226). Consider the table below.

(33)

B	B:ф	B/ф	Plural form	Meaning
/təm.ri:n/	/təm/	/ri:n/	/tə.ma.ri:n/	‘exercises’

In the above table, B:ф is a bimoric CVC, and B/ф is CVVC. This can be formed differently with respect to the word minimal domain. In the example below, the B:ф is a bimoraic CVV, and the B/ф is a monomoraic CVC. Consider the illustration in table (34) below.

(34)

B	B:ф	B/ф	Plural form	Meaning
/ʃɛ:rəʕ/	/ʃɛ:/	/rəʕ/	/ʃəwa:rəʕ/	‘streets’
/ʒɛ:məʕ/	/ʒɛ:/	/məʕ/	/ʒəwa:məʕ/	‘mosques’

In /ʃɛ:rəʕ/ and /ʒɛ:məʕ/, the B:ф is mapped to the left edge to form the broken plural, which becomes B:ф ‘/ʃəwa:/’ /ʃəwa:/. The /w/ is compensated to give a correct BP form, thus /w/ → Ø in the singular form.

The broken plural in TLA will also be considered in terms of two other issues; the number of root consonants (Triliteral, Quardiliteral), and in terms of the foot type (iambic, trochic, or monomoraic).

4.4.2.2 TLA broken plural form

The broken plural (PB) data collected here are represented as singular forms in each example, and the BP morpheme is created either according to the number of consonants, or according to the vowel quality that gives the output of the BP form. In other words, the TLA BP form can be predicted by changing the vowel quality and keeping the consonantal root of the singular (or most basic part of it).

4.4.2.2.1 Triliteral BP template CCV:C, /u:/ and /a:/ morphemes

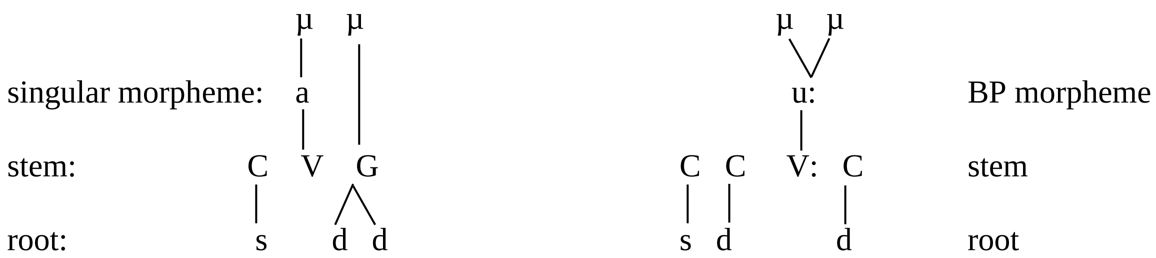
The pattern of singular biliteral roots is monosyllabic in TLA. The form is either a consonant in each boundary with bimoraic vowel as in (35a), or an onset and a geminated coda separated by a bimoraic broken plural morpheme as in (35b) below. (See also (36b) for further explanation).

(35)	**a. /Ce:C/**	**/CCu:C/**
	/tˤe:r/ ‘bird’	/tˤju:r/ ‘birds’
	/se:r/ ‘belt’	/sju:r/ ‘belts’
	/ʕe:n/ ‘eye’	/ʕju:n/ ‘eyes’
	b. /CaG/, /CɪG/	**/CCu:C/**
	/sadd/ ‘dam’	/sdu:d/ ‘dams’
	/bɪss/ ‘cat’	/bsɛ:s/ ‘cats’
	/sɪnn/ ‘tooth’	/snu:n/ ‘teeth’
	c. /Ca:C/, /Ci:C/, /Co:C/, /Cu:C/	**/CCa:C/**
	/da:r/ ‘room’	/dja:r/ ‘rooms’
	/bi:r/ ‘well’	/bja:r/ ‘wells’
	/ħo:ðˤ/ ‘pool’	/ħwa:ðˤ/ ‘pools’
	/sˤu:r/ ‘wall’	/sˤwa:r/ ‘walls’

The example in (35a) shows that the singular morpheme /e:/ is changed to the glide /-j-/ followed by /u:/. In (35b), the geminate coda of both CaG and CiG is separated by inserting a long vowel such as /u:/ and /ɛ:/ to form complex onset the plural forms. In examples (30c), the broken plural is formed by inserting a glide consonant such as /j/ or /w/, followed by the long vowel /a:/, which can be said to be one of the forms that expresses the plural. Below is the analysis of the BP morphemes for TLA.

(36a) **Singular** **Broken Plural**

(36b) **Singular** **Broken Plural**



The singular morpheme in (36a) exhibit the long vowel /e:/ along with the consonantal root, which is /tˤ/ and /r/ which forms /tˤe:r/ 'bird'. The broken plural morpheme surfaces as /u:/ when preceded by the glide /j/ to form /tˤju:r/ 'birds'. In (37b), the singular morpheme exhibits a short vowel /a/ followed by a geminate. The broken plural is formed of a complex onset, and the insertion of a broken plural morpheme /u:/ breaks up the geminate to surface as /sdu:d/.

4.4.2.2.2 The triliteral broken plural template: CCV:C with /ɛ:/ and /u:/

The broken plural stem word quality is either /ɛ:/or /u:/, at least across the broken plural forms that take a CCVVC monosyllabic templatic form. The input to these structures is the disyllabic CV.CVC singular template. Consider the illustrations in (37-38) below:

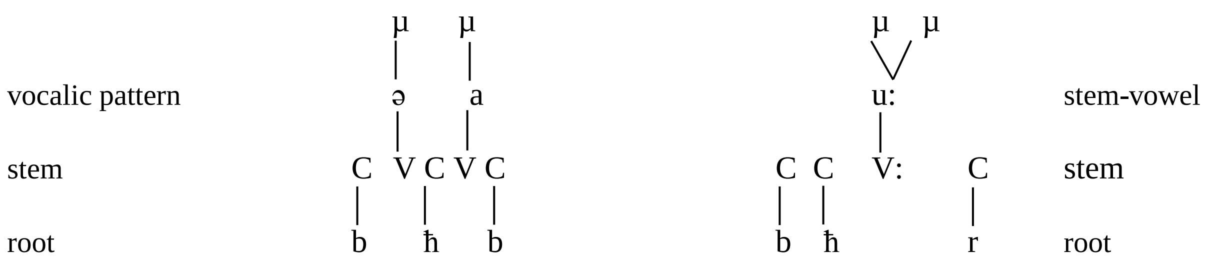
(37) **The /ɛ:/ stem-vowel in the CCVVC broken plural templates**

Singular		**Broken Plural**
C {a / ə} CaC	→	**CCɛ:C**
/ħa.naʃ/ 'snake'		/ħnɛ:ʃ/ 'snakes'
/ʒə.mal/ 'camel'		/ʒmɛ:l/ 'camels'
and		
CaCəC	→	**CCɛ:C**
/ka.ləb/ 'dog'		/klɛ:b/ 'dogs'

(38) **The /u:/ stem-vowel in the CCVVC broken plural template**

Singular	**Broken Plural**	
CaCaC	→	**CCu:C**
or		
C {a / ə} CəC	→	**CCu:C**

/ɡə.rəd/ 'monkey' /ɡru:d/ 'monkeys'
/ba.ħar/ 'sea' /bħu:r/ 'seas'
/ɡa.bər/ 'grave' /ɡbu:r/ 'graves'



From the representations above, we observe how the disyllabic singular noun CV.CVC changes to a monosyllabic broken plural structure via the deletion of the vowel in the first open syllable. This is done through lengthening and changing the quality of the vowel in the closed syllable, whilst preserving the bimoraicity of the broken plural form.

4.4.2.2.2 Quadriliteral broken plural forms

Broken plural forms in TLA may also have four consonants and would fit within a CV.CV.CVVC template, derived out of the CVC.CVVC template of the singular counterpart. A number of processes combine together to get the broken plural forms. This includes the presence of an /i:/ in the final syllable (39) the presence of an /a:/ in the final syllable along with either the geminates of the medial consonant of the root (40a); the prefixation of the CV /ʔa-/ prefix in (40b); or the optional presence of this same /ʔa-/ prefixation along with a /w/ following the first consonantal root (40c).

(39) **Change to an /i:/**

CVC.CVVC	**CV.CV.CVVC**
(i) /məʃ.wa:r/ 'distance'	/mə.ʃa.wi:r/ 'distances'
(ii) /məsˤ.ra:n/ 'gut'	/mə.sˤa.ri:n/ 'guts'
(iii) /ɣər.bɛ:l/ 'sieve'	/ɣa.ra.bi:l/ 'sieves'
(iv) /dək.ka:n/ 'shop'	/də.ka.ki:n/ 'shops'

(40) **Change to an /a:/**

(a)	**CVV.CVC**	**CVC.CVVC**
	(i) /ħɛ:rɪs/ ‘goal keeper’	/ħɪr.ra:s/ ‘goal keepers’
(b)	**CV.CVC**	**CVC.CVVC**
	(ii) /wɪ.tˤɪn/ ‘area/zone’	/ʔaw.tˤa:n/ ~ /wtˤa:n/ ‘areas/zones’
	(iii) /mə.tˤar/ ‘rain’	/ʔam.tˤa:r/ ~ /mtˤa:r/ ‘rains’
(c)	**CVVC**	**CVC.CVVC**
	(iv) /ħo:ðˤ/ ‘bathtub’	/ʔaħ.wa:ðˤ/ ~ /ħwa:ðˤ/ ‘bathtubs’
	(v) /sˤo:r/ ‘wall’	/ʔasˤ.wa:r/ ~ /sˤwa:r/ ‘walls’
	(vi) /su:ɡ/ ‘market’	/ʔas.wa:ɡ/ ~ /swa:ɡ/ ‘markets’

What we observe in (41) is yet another change involving an /a/ → /ə/ change in the first syllable, along with the insertion of an /ɛ:/, and a further change from /a/ → /ə/ in the final syllable.

(41)	**CVC.CVC**	**CV.CVV.CVC**
	(i) /maɡ.ʕad/ ‘chair’	/mə.ɡɛ:.ʕəd/ ‘chairs’
	(ii) /mak.tab/ ‘office’	/mə.kɛ:.təb/ ‘offices’

4.5 Level-Two Morphology in TLA

Level two morphology, by contrast to level-one morphology, does not result in any changes to the stem to which they are added. The morphs in level-two morphology are mainly continuous, this means that they are attached onto the stem in a concatenative fashion, either as suffixes or as prefixes, with suffixes being a more common affixation pattern in TLA. There are two morphemes which however require the affixation of both a prefix and a suffix, functioning as discontinuous morphemes. These are the negative morpheme, expressed as a /ma-/ prefix and a /-ʃ/ suffix, as in /ma.kə.tabʃ/ ‘he did not write’ as well as the imperfective subject prefixes (/nə-/, /jə-/, and /tə-/), which express the criterion of the NUMBER belong to the level two morphology. In what follows, level-two morphemes will be discussed with respect to verbal, nominal, and adjectival forms.

4.5.1 Level-Two Verbal Morphology

Verbal morphology is presented first by making use of the TLA imperfective verb-stem and affixes. The presentation of the verbal morphs is based on whether the subject suffixes affect the imperfective verb stem, and what output may result after the vocalic and consonantal suffixes are attached.

4.5.1.1 Level-two imperfective verbal morphs

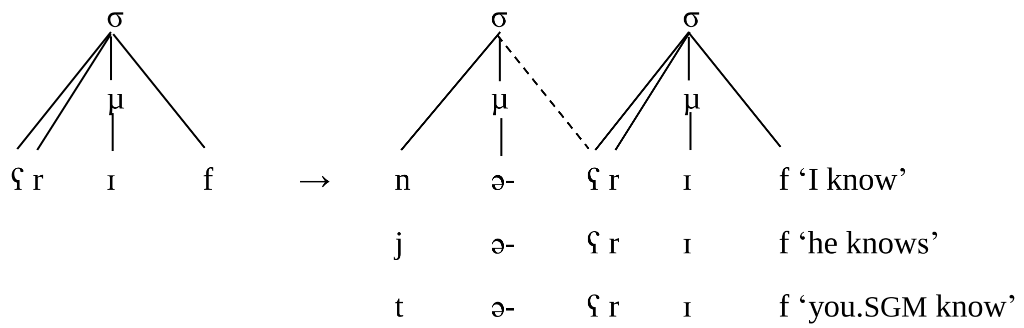
The imperfective verb-form in TLA expresses the present tense, providing reference to ongoing/continuous states or actions, or habits. The imperfective verb-form is also used to express the future and past depending on the context. The form of the imperfective is constructed out of the attachment of both suffixes and prefixes that express the PERSON, NUMBER and GENDER of the subject onto the stem, (which are peripheral to any derivational prefixes), as illustrated in (3) §4.3.1. The possible imperfective templatic-forms are listed in the examples in (37) below, illustrating an array of stem-types across the different TLA forms.

(37) TLA imperfective stem forms

	Template	Example	Form
(a)	CCVC	/-ʕrɪf-/ ‘know’	I
	CVG	/-rɪdd-/ ‘return’	I
	CVVC	/-ʃu:f-/ ‘see’	I
(b)	CV.CVC	/-sərəɡ-/ ‘steal’	II
(c)	CV.GVC	/-dar.rɪs-/ ‘teach’	III
(d)	CV:.CVC	/-ɡɛ:bɪl-/ ‘meet’	VI

Unlike the affixes of level one morphology, the prefixes attached onto the imperfective stems do not cause any phonological changes. An illustration of how this is the case is provided in (38), using the PERSON-expressing prefixes /nə-/, /tə-/ and /jə-/ attached onto the CCVC stem /-ʕrɪf-/ 'know'

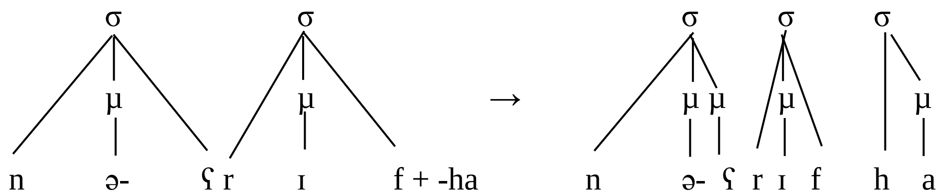
(38) **(a) CCVC** **(b) imperfective prefix /nə-, tə-, jə-/**



The illustration in (38) thus identifies the imperfective PERSON-expressing prefixes as part of level two morphology. In (39) below, we can consider how the addition of object pronominal forms onto inflected imperfective forms affect the stem-form, in the output form.

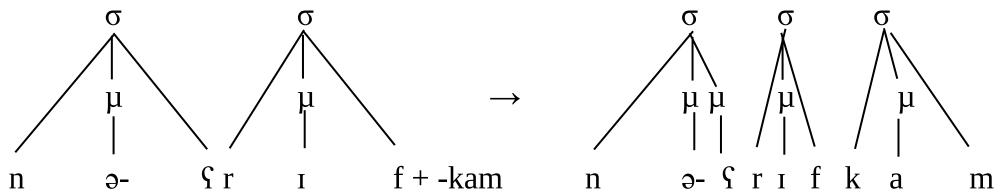
(39) **Prefixed imperfective /nə-ʕrɪf-/ 'I know' with several object pronominal forms**

(a) **with /-ha/ '3SGF.ACC'**



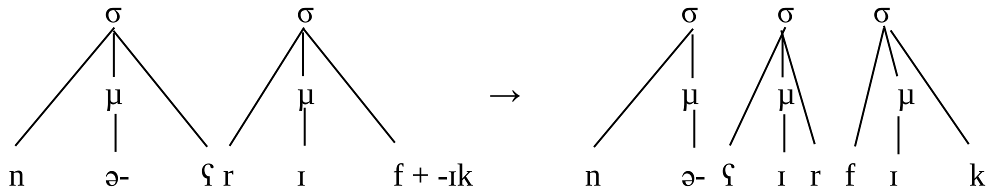
'1SG- know.IMPV-3SGF.ACC'** 'I know her'

(b) **with /-kam/ '2PLM.ACC'**



'1SG- know' 'I know you. PLM'

(c) **with /-ɪk/ ‘2SGF.ACC’**



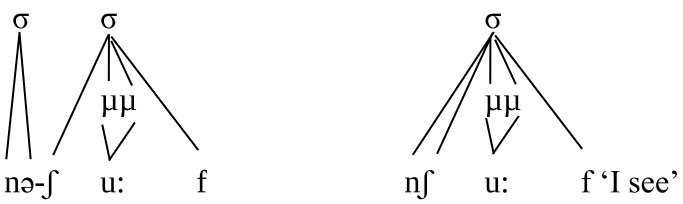
‘1SG- know.IMPV-2SGF.ACC’ ‘I know you. SGF’

As we can observe through a representation of various attached object pronominal forms onto 1SG inflected imperfective forms, the situation varies, as to whether the imperfective stem gets affected or not. We observe that the attachment of /-ha/ and /-kam/ in (39a)-(39b) does not affect the imperfective stem /-ʕrɪf-/. In contrast, in (39c), the attachment of /-ɪk/ results in a change in the imperfective stem-form from /-ʕrɪf-/ to /-ʕɪrf-/, in the word form /nə-ʕɪrf-ɪk/ ‘I know you. SGF’. An epenthetic vowel is inserted and breaks up the complex onset of the stem. This is because the attached suffix that starts with a vowel builds a new syllable to the right edge of the stem. Accordingly, from the observed behaviour, consonantal subject suffixes are shown to belong to level two morphology, whereas vowel subject suffixes belong to level one morphology, respectively.

If we return to consider monosyllabic imperfective stem templates, such as the case with CVG /-rɪdd-/ ‘return’ and the hollow verb CVVC /-ʃu:f-/ ‘see’ given in (37a), the prefix turns out to have a different effect. From what we have observed in the case of CCVC stem-form in (38). Given a CVG, as CVVC stem-form the prefixation of a CV PERSON-expressing morph results in a maintenance of the stem-form, but with a change in the expression of the PERSON morpheme, such that in the process, the imperfective prefix vowel deletion takes place, to keep the stem monosyllabic, while creating phonologically-conditioned allomorphs such as /nə-/ ~ /n-/. Consider the exemplifications below.

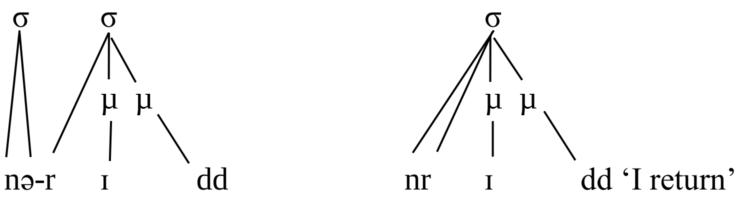
(40) **Monosyllabic stem and CVVC imperfective prefix vowel deletion**

(a) CVVC (b) vowel deletion



(41) **Monosyllabic CVG stem imperfective prefix vowel deletion**

(a) CVG (b) vowel deletion



With this we thus conclude that imperfective prefixal forms are indeed instances of level two morphology in TLA, and where the stem-form maintenance is preferred over the maintenance of a fixed set of morphos. Rather, we here observe that TLA indeed illustrates a case of phonologically-conditioned allomorphs in the expression of PERSON in the imperfective paradigm. On the other hand, when outside of the inflectional word-form, and with addition of objective pronominal forms, such morphological forms do not constitute a uniform set, such that, at least in relation to CCVC-type stem, we get a distinction between vowel vs. consonant-initial suffixes, whereby the forms were shown to being about changes to the stem.

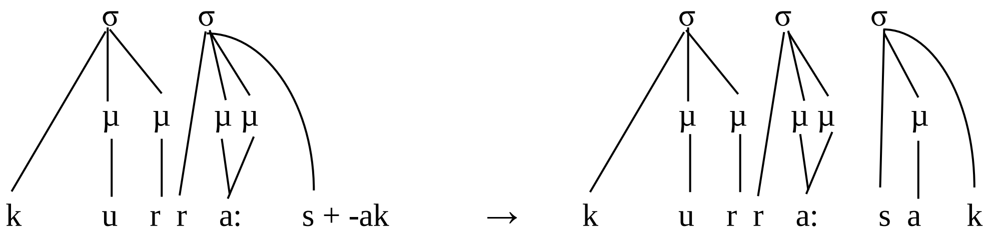
4.5.2 Level-Two Nominal and Morphology

In level-two nominal and adjectival morphology, there are two important nominal grammatical features that have to be taken into consideration. The first criterion is NUMBER, i.e whether the nominal is singular, dual or plural. The second criterion is GENDER, which has to do with whether the subject is masculine or feminine. The affixes of the nominal and adjectival forms that express these two features may sometimes have different allomorphs depending on whether the stem final segment is a vowel, or a consonant.

4.5.2.1 Level-Two Nominal Suffixes

Level-two nominal suffix morphemes generally are of two types: possessive pronouns, and morphemes. These forms are allomorphs of each other and are conditioned by the number of syllables of the corresponding singular form appears on the monosyllabic nominal stems. While nominal forms that take two or more syllables take the output /-i:n/. The non-singular expressing morphs in TLA are: /-e:n/ for the DUAL, /-ɛ:t/ for the plural feminine, and the two morphs /-i:n/ and /-ɛ:n/ expressing the plural masculine. In addition to the above set of suffixes that can attach onto a nominal stem are also the SGM and SGF suffixes /-ɪ/ and /-ɪa/ which function as derivational suffixes and which attach onto nominal forms. The attachment of level two possessive non-singular nominal suffixes onto nominal stems is illustrated through (42) and (43) below.

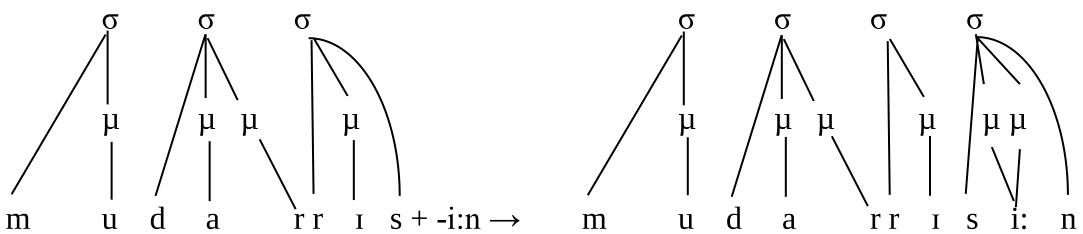
(42) Nominal stem + possessive pronouns



‘book. SGM-2SGM.GEN’ ‘your book. SGM’

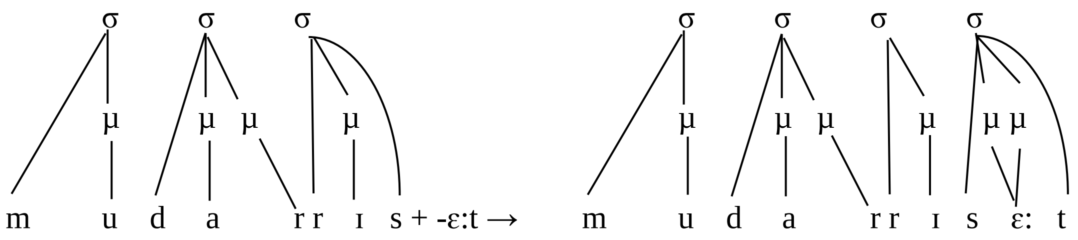
(43) Nominal stem + plural suffixes

(a) /-i:n/ ‘PLM’



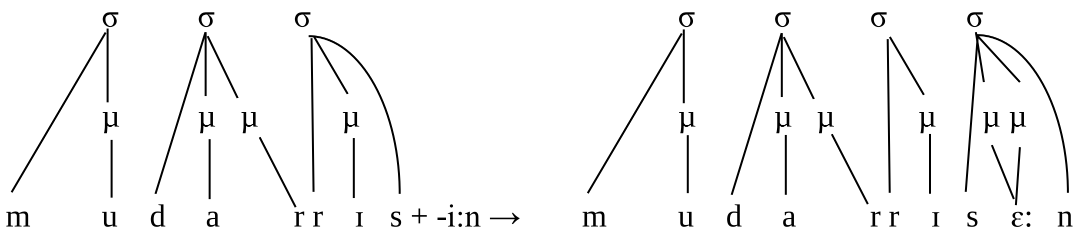
‘teacher. SGM-PLM’ ‘(male) teachers’

(b) /-ɛ:/ 'PLF'



'teacher. SGM-PLF' '(female) teachers'

(44) Nominal stem + dual suffix

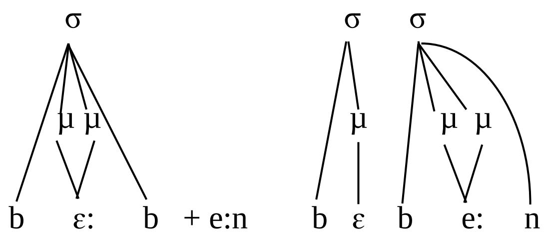


'teacher' 'two teachers'

While the above illustration suggests that the possessive pronominal form and the non-singular suffixes do not have an effect on the nominal stem, and can thus be analysed as further exemplification of level two morphology, exceptionally, however, if the dual morpheme /-e:n/ or masculine plural morpheme /-ɛ:n/, for example, are suffixed to a monosyllabic CVVC patterned nominal stem, an obligatory vowel shortening applies to the stem. The reason why this must be the case is that a CVVC stem-structure must be bimoraic right-headed, and to get to the plural form, the shortening of the singular structure CVVC to CVC, must take place. Consider the illustrative examples in (45) below:

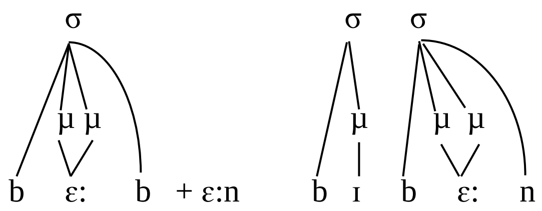
(45) **Obligatory vowel shortening in monosyllabic CVVC stems**

a. **CVVC stem + the DU-expressing /-e:n/**



‘door. SGM-DU’ ‘two doors’

b. **CVVC stem + the PLM-expressing /-ɛ:n/**



‘door. SGM-PLM’ ‘doors’

The illustrations in (45) show that the CVVC stem is changed to CVC, following the attachment of the dual and plural suffixes. Similar examples are represented in (46a) below, in order to demonstrate other parallel behaviour. In (46b) I then provide data illustrating different multisyllabic nominal stems, where in the case, no such change is applied. Contrast the monosyllabic and multisyllabic nominal stems in (46) below.

(46) a. **Monosyllabic CVVC SGM stems + the PLM-expressing suffix /-ɛ:n/**

(i) CVVC	/fɛ:s/	/fɪ.sɛ:n/ ‘axes’
(ii) CVVC	/na:r/	/nɪ.rɛ:n/ ‘fires’
(iii) CVVC	/θo:r/	/θɪ.rɛ:n/ ‘oxen’

(46) b**. Multisyllabic stems + the PLM suffix /-i:n/ and the PLF sufffix /-a:t/**

(i) CVCCV	/ðˤarba/	/ðˤarba:t/ ‘beats’
(ii) CVCVGVC	/mudarrɪs/	/mudarrɪsi:n/ ‘teachers’
(iii) CVCCVCV	/karhaba/	/karhaba:t/ ‘cars’
(iv) CCVCV	/bɡə.ra/	/bɡə.ra:t/ ‘cows’

The possessive pronoun suffixes, are listed in table (6) below. Essentially, the forms look the same just as those in table (4) in section §4.3.1, except for the 1SG form, which is expressed as /-ɪ/, and the fact that these forms attach onto nominal stems, rather than verbal ones, and provide the meaning of possession.

Table (6): TLA Possessive Pronoun Nominal morphemes

	Possessive bound pronouns in TLA
1SG	/-ɪ/
2SGM	/-ak/
2SGF	/-ɪk/
1PL	/-na/
2PLM	/-kam/
2PLF	/-kan/
3SGM	/-ə/
3SGF	/-ha/
3PLM	/-həm/
3PLF	/-hən/

As with level-two verbal morphemes, these morphemes, when suffixed to the stem do not result in any phonological changes. However, once again, just as we saw to be the case with the attachment of the object pronouns onto verbal stems in §4.3.1, we see that while consonant-initial possessive pronoun suffixes such as /-na/ '1PL.GEN' results in no phonological changes to the stem: /ka.ləb/ 'dog' becomes /ka.ləb.na/ 'our dog', in parallel to the same non-effect on the stem when the object pronoun /-na/ '1PL.ACC' verbal is involved, as in /kətab/ 'he wrote', which becomes: /kətab.na/ 'he wrote'. In yet a similar fashion, just as the vowel-initial object suffix /-ak/ '2SGM.ACC' attaches onto the verb stem /kətab/, which becomes /ktə.bak/ 'he wrote you. SGM.ACC', involving a stem-change from /kətab/ to /ktəb/, the noun stem /ka.ləb/ 'dog' becomes /kal.bak/ 'your dog. SGM', following the addition of the possessive pronominal suffix /-ak/ '2SGM.GEN'.

4.5.2.4 TLA derivational adjectival suffix morphemes /ɪ/ and /-awɪ/

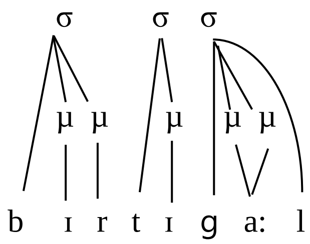
The adjectival suffix **/-ɪ/** is a derivational morpheme that attaches onto a nominal stem in order to derive an adjectival form. For example, the adjective /ʔən.sa:nɪ/ 'humanitarian' is derived from the noun /ʔən.sa:n/ 'person/human' and the addition of /-ɪ/. The derivational suffix /-ɪ/ is different from the homophonous 'SG.GEN' possessive pronoun suffix /-ɪ/, as unlike the possessive pronominal suffix, it is more selective as to what type of nominal stems it can be attached to. Furthermore, the derivational suffix takes an associated allomorph. Consider the examples in (47) below. While the possessive pronominal suffixes never change its form, as shown in the (a) examples, the derivational suffix /-ɪ/ takes the form /-awɪ/, along with associated changes to the stem-form, as shown in (b). note that I have here used the same nouns on purpose, so that the distinct behaviour can be observed in a more striking manner.

(47) **a. Possessive pronoun suffix /-ɪ/** **b. Derivational suffix /-ɪ/**

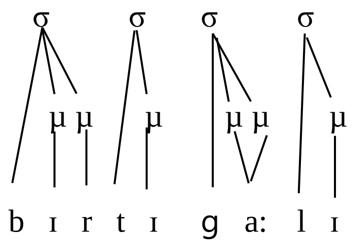
Noun	Noun + possessive suffix	Noun +Adjectival allomorph /-awɪ/
/jadd/ 'hand'	/jad.dɪ/ 'my hand'	/ja.da.wɪ/ 'manual (by hand)'
/damm/'blood'	/dam.mɪ/ 'my blood'	/da.ma.wɪ/ 'bloody'

Given the richness of Arabic expressions, a word-form such as /dam.mɪ/ can end up with a distinct meaning, and consequently with a distinct morphological analysis, even if the forms are homophonous. The form /dam.mɪ/ in a phrase such as: /sˤalu:n dammɪ/ which means 'red sofa', what we have this time is really the nominal /damm/ and the actual attachment of the derivational suffix /-ɪ/, and not the possessive '1SG.GEN' pronoun, such that the expressed meaning is 'bloody', which in the context of this phrase refers to the colour of blood. In a similar manner the colour orange is derived in TLA, through the suffix /-ɪ/ is attached onto the noun /bɪr.tɪ.ɡa:l/ 'orange' to get the colour adjective: /bɪr.tɪ.ɡa:lɪ/ 'orange/orangy'. Consider the derivation as it applies in (48) below.

(48) **The attachment of the derivational suffix /-ɪ/**



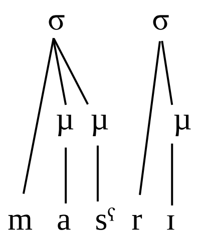
N: 'orange'



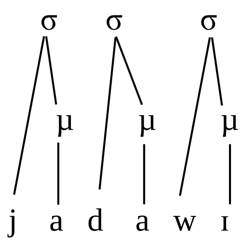
A: 'orange'; 'orangy'

Just as we seem to observe with the plural masculine allomorphs in TLA as discussed just above §4.5.2.1, where we had a phonological conditioning that depended on the number of syllables of the stem, the conditioning between the choice of /-ɪ/ and /-awɪ/ is that the latter is employed when the consonantal root is bilateral. In this way, therefore, if the root involves more than two consonants as in /masˤ.ər/ 'Egypt' and /ʔən.sa:n/ 'person/human', then the adjectival morpheme /-ɪ/ is added to the noun, rendering the forms /masˤ.rɪ/ 'Egyptian' and /ʔən.sa:nɪ/ 'humanitarian'. Changes to the stem happens in both instances. On the other hand, with a bilateral root such as /jadd/, /-awɪ/ is what is attached.

(52) a. TLA adjectival morpheme /-ɪ/ **b. TLA adjectival allomorph /-awɪ/**



'Egyptian'



'manual'

With this we thus conclude that the establishment of whether such derivational suffixes are level 2 morphology or not really depends on the nature of the template nominal form.

4.6. Conclusion

In this chapter, the morphology of TLA was discussed, starting with a brief discussion of how previous studies have dealt with the non-concatenative system of Arabic morphology in SA. Here I have discussed the prosodic template and how the prosody is useful for explaining how the basic stem and the changes that occur to it, affect the word structure. The rest of the chapter consists of a discussion on Watson's (2002) discussion of two distinct levels of morphology: Level-one, and level-two. Level-one morphology is non-concatenative, and where changes to the stem are inevitable, and for which we gave illustrations from both verbal and nominal morphology. In the former we mainly concentrated on the ten triliteral pattern system that results in a number of derivationally-related verbal forms derived from the same consonantal root with internal changes to the template. In level-one nominal morphology, we concentrated on the broken plural, given how this formation requires infixation without involving any changes to the initial and final segments of the stem. In contrast to level-one morphology, level-two morphs are affixed to the word stem without changing the base. This means that level-two essentially involved concatenative morphology along with a number of allomorphic changes to some suffix morphemes. However, it proved to be rather difficult to merely classify such affixes as clear instances of level two morphology, given how these varied in their effect on the stem, on the basis of the templatic forms of the stem involved. In our discussion we observed differences between the consonantal and vowel-initial object suffixes, attached onto verbal stems, with the latter resulting in changes to the stem, as well as allomorphic conditioning for the derivational suffixes /-ɪ/ ~ /-awɪ/ depending on the number of consonants of the root.

With that I conclude this preliminary overview of the intricate nature between morphology and phonology in TLA, and how they influence on each other. Such a relation will be further explored in the next two chapters, where stress placement and syncopation are discussed.

Chapter Five: Stress

5.1 Introduction

The purpose of this chapter is to explain the complex stress system of TLA. I will develop and define the role of syllable weight in the assignment of stress, the dialect foot type, and the role of affixes in stress placement. I will also show that Classical OT is unable to provide a unified analysis that accounts for the interaction between the phonology and morphology in TLA in relation to the stress system.

The syllable structure and the interaction between stress and some other phonological processes will also be discussed. In addition, the role of affixes in triggering the stem and word levels of TLA morphology will be discussed. This chapter is also concerned with the syllable structure in TLA and the role that phonology and morphology of the word class play in the process, particularly given how stress-placement differentiates between the word-class in the case of derivationally-related items of the same form, in the case of CV.CVC words.

A number of previous works related to the Libyan dialects have dealt with stress. Mitchell (1960), Harrama (1993) investigates stress in the Aljabal dialect (a dialect in the West of Libya). Al-Ageli (1995) discusses stress placement in the Tripoli Dialect, Elgadi (1986), Abumdas (1985), Zlitin Dialect, Owens (1980, 1984) considers Eastern Libyan Arabic, but mainly the Benghazi dialect. Sheredi (2015) compares some phonological processes including stress placement in both Eastern and Western Libyan dialects. Altubuly (2016) essentially compares the production and perception of Libyan Arabic stress patterns by English learners of Arabic, and by (native) Libyan Arabic speakers.

In phonology, there are two main factors that affect stress assignment these are (1) the foot type, which gives stress a regular pattern that is either iambic ‘right-headed’ or trochaic ‘left-headed’, and (2) syllable weight, given how stress tends to fall onto the heavy syllable (H), rather than a light one (L). Another additional segmental factor in stress assignment argued for by Parker (2002) has to do with the sonority of the vowels, which itself has a role to play in determining syllable weight. The fact of sonority is based on a universal hierarchy elicited from a number of studies, including De Lacy (2002), Bianco (1996), and Kenstowicz (1996).

Stress can be metrically treated through referring to the number of moras in the syllables, within a word. Phonological theories differ in the way in which this relationship gets analysed. In his metrical stress theory, Hayes (1995) states that there are three types of feet: moraic trochee, syllabic trochee and iambic. The foot is a moraic trochee if stress goes to the left heavy syllable. The foot is a syllabic trochee if stress goes to the left, in a foot that contains two light syllables. In quantity sensitive languages, the foot is an iamb (right-headed).

Hayes (1995) also provides four typological characteristics of stress:

- Culminativity, when stress falls on the strongest syllable in a word or phrase; Rhythmic Distribution (Selkirk 1984), where stress is located at equal intervals; for instance, in languages that allow for words with six syllables, stress is distributed after every two light syllables as in ˈσσˈσσˈσσ, but not σσσˈσˈσˈσ.
- Stress Hierarchies property which states that there may be languages where stress has multiple levels: main stress, secondary stress and phrasal stress (Liberman & Prince 1977: 262).
- Lack of Assimilation, which illustrates an instance where stress cannot be assimilated since a stressed syllable does not cause stress on the following or preceding syllable.

Some of the characteristics mentioned above are not applicable in TLA. Accordingly, in terms of Culminativity, stress in TLA is not necessarily located on the strongest syllable. This can be clearly seen in word-forms with a CV.CVC.CV trisyllabic pattern as in

/ˈʕa.nab.ra/ ‘nutmeg’, /ˈma.ħar.ma/ ‘scarf’, and /ˈʔa.rəðˤ-na/ ‘our land’. In all of these above examples, stress is on the first syllable, despite the fact that it is not the strongest or heaviest one. In TLA, the Rhythmic Distribution and Stress Hierarchies characteristics are also not applicable since the dialect has no multiple stresses in long words, as there is only one stress per word.

This chapter is divided as follows: § 2 provides an overview of the stress patterns found in TLA. § 3 discusses weight-sensitivity, extrametricality, degenerate feet and non-finality. § 4 introduces a constraint-based approach (Optimality Theory) for TLA stress analysis, where I also illustrate how Stratal OT can be used to handle the data better, observing instances of the application of cyclicity and the preserve of stressed epenthetic vowels. § 5 concludes the chapter.

5.2 Overview of stress and syllable weight in TLA

Identifying stress by syllable weight in TLA is complicated. In some circumstances, the light syllable CV is stressed (even) in the presence of the heavy syllable CVC. Below I present the possible syllable patterns of TLA verbs, nouns and adjectives, in order to give a comprehensive overview of stress in TLA. Data with variable stress placement where a light syllable is stressed over a heavy one, will be first examined using Classical OT, and then will be revised within Stratal OT.

Stress in Libyan Arabic has been analysed in several studies. Some of these studies are descriptive in their scope (e.g., Abumdas (1985), Laradi (1983), Owens (1980, 1984) and Mitchell (1960)). Other studies use OT to analyse stress in Libyan Arabic: (e.g., Al-Ageli (1995), AlSheredi (2015), Altubuly (2016)).

In his descriptive account, Abumdas (1985) concludes that there are three rules of stress placement in the Zilten dialect spoken in the West of Libya. He emphasises how these rules cannot be applied randomly and must be applied in a specific order.

(1) LA stress rules. Abumdas (1985)

i. the final CVC is stressed;

ii. if CVC does not occur in the final position, then the penultimate syllable is stressed;

iii. if the penultimate is CV, then the antepenultimate syllable is stressed.

If we are to start by comparing the behaviour of TLA with the rules for 'Libyan Arabic' in Abumdas (1995), we notice that the rule in (1i) is already non-applicable in TLA. Final CVC syllables in TLA are not always stressed. This is due to two reasons. Firstly, in some circumstances, it behaves as a light syllable, and in others, as a heavy syllable. For example, the final CVC in some CV.CVC nouns can be treated as heavy, as it attracts stress in forms like /ʃa.ˈħam/ 'fat'. Secondly, in many other cases, some CV.CVC shaped nouns have stress on the first syllable as in /ˈʕa.raf/ 'custom', moreover, all the CV.CVC shaped adjectives also have stress on the initial syllable. This will be discussed in more detail in §5.2.1.

Al-Ageli (1995) discusses stress patterns in Tripolitanian Arabic (TA). However, his proposal for stress assignment in TA cannot be applied to Eastern Libyan dialects, such as TLA showing how the two have different stress patterns.

In the next sub-sections I discuss stress in TLA, in detail, taking into consideration the fact that the final CVC attracts stress in some syllable structures. In CV.CVC patterns, the weight of the final CVC is triggered by word class type. This means that the final CVC *behaves light* in certain word classes but heavy in others (see section 2.1 below). Stress in all other syllable structures will first be discussed morphologically simplex forms (i.e in contexts devoid of affixes), and then in morphologically complex forms where affixes are attached. The role of affixes in stratification or level ordering in TLA, will also be discussed.

5.2.1 Stress placement in CV.CVC patterns

In TLA, stress plays a systematic contrastive role in the lexicon, particularly within CV.CVC syllable patterns given how stress is able to determine verb and noun directionally-related pairs. Final consonant extrametricality which will be discussed in section X also plays a functional role in determining word class in the dialect. The location of stress in this syllable pattern tells us whether the word is an adjective, noun or verb. Accordingly, stress in a CV.CVC verb pattern differs from the stress assigned to adjectives and noun types of the same CV.CVC pattern.

In CV.CVC verbs, stress always goes to the right edge (ultimate) as shown in (2).

(2) CV.CVC final stress verbs

/fa.ˈham/ ‘understood’

/ma.ˈsak/ ‘caught’

/ʕa.ˈraf/ ‘knew’

/χa.ˈbatˁ/ ‘crashed’

/ðˁa.ˈrab/ ‘hit’

By contrast, there are two types of CV.CVC nouns. I call type 1, the first set of nouns where stress is ultimate (3), while in the second set, where I refer to as type 2, are CV.CVC nouns whose stress falls on the penultimate syllable (4).

(3) CV.CVC ultimate stress nouns (Type 1)

/bə.ˈsˁal/ ‘onion’

/də.ˈbaʃ/ ‘clothes’

/ʃa.ˈħam/ ‘fat’

/ʒə.ˈmal/ ‘camel’

/wa.ˈlad/ ‘boy’

(4) CV.CVC penult stress nouns (Type 2)

/ˈɡa.lab/ ‘heart’

/ˈħa.bəl/ ‘rope’

/ˈka.ləb/ ‘dog’

/ˈka.baʃ/ ‘sheep’

/ˈbɪ.nɪt/ ‘girl’

CV.CVC adjectives always display a behaviour the type 2 nouns, i.e where stress placement falls on the penultimate syllable (5).

(5) CV.CVC penult adjectives

/ˈsə.maħ/ ‘beautiful M SING’

/ˈħa.raʃ/ ‘rough M SING’

/ˈħa.mar/ ‘red M SING’

/ˈʕa.raʒ/ ‘lame/crippled M SING’

/ˈha.taʃ/ ‘gap-toothed M SING

As discussed in chapter 3, §3.4.3, a shift in stress in the type 2 noun results in a verb-form, given how it is only stress-placement that creates minimal pair with directionality related verbs, given how CV.CVC verbs always take stress on the ultimate syllable. Such directionality-related minimal pair types are listed in (6) below:

(6)	**Nouns/adjectives**	**vs**	**verbs**
	/ˈðˤa.rab/ ‘hit (n)’		/ðˤa.ˈrab/ ‘hit’
	/ˈʕa.raʒ/ ‘crippled (adj)’		/ʕa.ˈraʒ/ is ‘crippled sgm ’
	/ˈʁa.latˤ/ ‘wrong’		/ʁa.ˈlatˤ/ ‘mistake
	/ˈʕa.tˤal/ ‘damag (n)’		/ʕa.ˈtˤal/ ‘damage’

/ˈfa.ham/ ‘understanding’ /fa.ˈham/ ‘understood’

5.2.2 Stress placement in CVC.CVC patterns

In the CVC.CVC syllable pattern, stress in verbs, nouns and adjectives is always on the penult, as illustrated through the exemplifications in (7-9), respectively.

(7) CVC.CVC penult verbs

/ˈbah.dal/ ‘exhaust’

/ˈħan.tˤar/ ‘hold up’

/ˈʔaz.ʕaʒ/ ‘annoy’

(8) CVC.CVC penult nouns

/ˈmas.raf/ ‘bank’

/ˈman.ʒal/ ‘sickle’

/ˈsan.dal/ ‘flip-flop’

(9) CVC.CVC penult adjectives

/ˈʔab.jaðˤ/ ‘white. sgm’

/ˈʔaz.raɡ/ ‘blue. sgm’

/ˈʔam.las/ ‘soft. sgm’

The behaviour just represented is only that of CVC.CVC verbs, nouns and adjectives in their basic and non-affixed forms. The role of affixes will be discussed after looking at stress assignment in the heavy CVV and CVVC in the next sub-section.

5.2.3 Stress placement in CVV(C) patterns

In TLA, as in many other languages, heavy syllables take priority in the placement of stress, although this is not always the case. A heavy syllable is stressed if it has a bimoraic nucleus (long vowel CVV). Consider the examples in (10) below where H and L refer to heavy and light syllables.

(10) **a. HL & LH**

i. **CVV**.CV /ˈgaː.lo/ ‘they said’

ii. **CVVC**.CVC /ˈʃaː.f.kam/ ‘he saw you. plm’

iii. CVC.**CVVC** /ħaw.ˈʃiːn/ ‘houses’

b. LH & LLH

i. CV.**CVV** /ʁa.ˈdaː/ ‘lunch’

ii. CVC.**CVV<C>** /sˤan.ˈduːg/ ‘box’

iii. CV.CV.**CVV<C>** /sˤə.naː.ˈdiːg/ ‘boxes’

As (13) shows, in TLA, CVV always attracts stress, irrespective of its position. The syllable CVC loses to a CVV syllable even when it occurs initially, where no extrametricality can be assumed. Recall however that in CVC.CVC-shaped words, stress is always on the penult (examples 7-9)

Following the above overview of stress-placement, the next sub-section deals with cases of morphological complexity i.e. when affixes start being attached. I do so with the goal of understanding whether affixes play a role in stress placement, and whether following Kiparsky’s (2000,2003), there is evidence of a phonological stem, and distinct word levels, in the stress pattern of TLA.

5.2.4 The TLA stratification role of affixes

The claim that affixes play a role at different levels of phonology is reported by many scholars, including Kiparsky (2000, 2003), Abu Mansour (1987, 1991), Kenstowicz (1994), (Booji 1997), Watson (2002) and Kabrah (2004). TLA provides evidence for the assumption of lexical and post lexical levels and a stem and word level. Subject suffixes and the dual suffixes belong to the stem level, while the plural suffix marker, possessive and object suffixes belong to the word level. Evidence for this division will be provided in the following discussion. Consider the examples of TLA perfective subject-relating suffixes, object bound pronouns, and possessive suffixes, in the different paradigms below, and the placement of stress in each.

(11) Subject (inflectional) suffixes

Paradigm	Base+suffix	output	gloss
1sg.m/f	ʃa.rab-**t**	ˈʃrə.bɪt	**‘**I drunk’
2sgm	ʃa.rab-**t**	ˈʃrə.bɪt	**‘**you drunk’
2sgf	ʃa.rab **-tɪ**	ˈʃrəb.tɪ	**‘**you (f. s.) drunk’
1pl.m/f	ʃa.rab **-na**	ˈʃrəb.na	**‘**we (m/f) drunk’
2plm	ʃa.rab **-tu**	ˈʃrəb.tu	**‘**you (m. pl.) drunk’
2plf	ʃa.rab **-tan**	ˈʃrəb.tan	**‘**you (f. pl.) drunk’
3sgm	ʃa.rab-Ø	ˈʃrəb	‘he drunk’
3sgf	ʃa.rab **-at**	ˈʃrə.bat	**‘**she drunk’
3plm	ʃa.rab -**o**	ˈʃrə.bo	**‘**they drunk’

(12) Object suffixes

Paradigm	Base+suffix	output	gloss
1sg.m/f	ðˤarab-**nɪ**	ðˤa.ˈrab.nɪ	**‘**he beat me’
2sgm	ðˤarab-**ak**	ˈðˤrə.bak	**‘**he beat you (m.s.)’
2sgf	ðˤarab-**ɪk**	ˈðˤrə.bɪk	**‘**he beat you (f.s.)’
3sgm	ðˤarab-**ɛ(a)**	ˈðˤrə.ba	**‘**he beat him’
3sgf	ðˤarab-**ha**	ðˤa.ˈrab.ha	**‘**he beat her’
1pl.m/f	ðˤarab-**na**	ðˤa.ˈrab.na	**‘**he beat us’
2plm	ðˤarab-**kam**	ðˤa.ˈrab.kam	**‘**he beat you (m.pl.)’
2plf	ðˤarab-**kan**	ðˤa.ˈrab.kan	**‘**he beat you (f.pl.)’
3plm	ðˤarab-**hum**	ðˤa.ˈrab.hum	**‘**he beat them (m.)’
3plf	ðˤarab-**hɪn**	ðˤa.ˈrab.hɪn	**‘**he beat them (f.)’

From the behaviour of the data set in (12), the object suffixes behave as subject suffixes, even though they belong to the word level. This is because they are directly attached to the stem. In other words, an object suffix must be preceded by a subject suffix (which belong to the stem level) to get the correct ordering of levels. To understand how these affixes (object suffixes) behave in different way, see the levels ordering of the inflectional subject and object suffixes in (14-16).

TLA possessive suffixes, which belong to the word level, are listed in (13). The paradigm of the noun walad ‘son’ is used with the bound poss.prn.

(13) The paradigm of walad ‘son’ + bound poss.prn

	Input	**Output**
1sg.m/f	walad-**ı**	ˈwlə.dı
2sgm	walad-**ak**	ˈwlə.dak
2sgf	walad-**ık**	ˈwlə.dık
3sgm	walad-**a**	ˈwlə.da
3sg	walad-**ha**	wa.ˈlad.ha
1pl.m/f	walad-**na**	wa.ˈlad.na
2plm	walad-**kam**	wa.ˈlad.kam
2plf	walad-**kan**	wa.ˈlad.kan
3plm	walad-**hım**	wa.ˈlad.hım
3plf	walad-**hın**	wa.ˈlad.hın

The object suffixes given in (12) above, which belong to the word level, show stress fluctuating, and in some cases vowel deletion process. They behave like stem level suffix as they delete the vowel in open syllable, since they are not attached to the stem level subject suffix. I propose that processes like vowel deletion belongs to the stem level whereas processes like epenthesis belong to the word level.

To test the above proposal, three suffixes which have the same lexical form, namely, the stem level subject suffix /-na/ ‘1pl’, the object suffix /-na/ ‘1pl. acc’ and the possessive suffixes /-na/ ‘1pl. gen’ will be attached to the stem to see how they affect the phonology of the dialect. Consider the examples in (14-16) below.

(14) Subject suffixes:

Suffix	Input	Output	
-na ‘1pl’	ʃa.rab-na	ˈʃrəb.na **‘**we drank’	(stem level)

---

(15) Object suffixes:

Suffix	Input	Output
-na ‘1pl. acc’	ðˤa.rab.na	ðˤa.ˈrab.na ‘he beat us’

(16) Possessive suffixes:

Suffix	Input	Output	
-na ‘1pl. gen’	wa.lad-na	wa.ˈlad.na ‘our son’	(word level)

The outputs in examples (14-16) show that the exact same form /-na/, yet expressing subject inflection in (14), and a bound pronominal form that functions as an OBJ in (15), and a possessor in (16), behave differently. In (14), the stem level subject suffix deletes the low vowel of the open syllable. The word level bound object pronoun in (15) and possessive pronoun in (16) do not display such deletion that belongs to the stem level. To get sufficient strata, as specified by the morphological endings, stem-level suffixes must occur inside word-level suffixes. Levels must be ordered under the Affix Ordering Generalisation in Stratal Phonology. Accordingly, a word level suffix must be attached after (the right side of) a stem level suffix, to get the correct level ordering, as illustrated in (17) below.

(17)

(a) Stem level:	**Subject suffix**	**Input**	**Output**
	-na ‘1pl’	ʃa.rab-na	ˈʃrəb.na **‘**we drunk’
(b) Word level:	**Object suffixes**	**Input**	**Output**
	-ha ‘3sgf. acc’	ˈʃrəb.na-ha	ʃa.rab.ˈna:.ha **‘**we drunk it’

As shown in (17) above, stem level is triggered after attaching a subject suffix to a bare stem, as in (17a), where a deletion process is applied. In contrast, the word level object suffix is attached to the stem level output, as in (17b). An epenthetic vowel is inserted, and consequently stress is shifted out of the stem domain. Thus, the object suffixes that are attached directly to the stem, as in (15) above, cannot be counted as word level suffixes.[15]

If we go back to the discussion of the role of suffixes in word level phonology in TLA, it is worth mentioning that the phonology-morphology conflict causes stress to be assigned on some suffixes, and other suffixes are then left without being stressed. The morphological information that makes stress to be assigned out of the stem boundary is not stipulated by the condition of having a long vowel nucleus. There are some suffixes that share same phonological characteristics, such as the weight, but they have different morphological information, for example, subject suffixes, dual suffix or the nominal plural suffix marker. As a result, as we have also seen through this section, some suffixes attract stress and other suffixes repel stress.

5.2.5 Stress Placement Effects in TLA

TLA has affixes that affect the location of word stress. The degree to which the morphological information may affect stress placement depends on the type of affix (prefix or suffix), syllable weight and the position of the attachment. The issue of weight as a stress attractor is debatable, since there are two types of suffixes that have the same weight, but one type attracts stress and the other does not. This will be discussed in sub-sections below.

5.2.5.1 Stress-attracting affixes

Stress placement in TLA is sometimes subject to quantity-sensitivity. Suffixes that attract stress are either the plural Masculine /-i:n/ and Plf /-ɛ:t/ or the object suffix /-ɛ:/ which express 3sgm. acc. Consider the examples in (18) below showing how stress shifts to the heavy syllable once this is attached.

[15] An object suffix that is directly attached to a verb devoid of any inflections for subject marking is not a word level affix. In the case of a bare stem, followed by a subject suffix, and then an object suffix, the word level is successfully triggered.

(18) Stress attracting suffixes:

	Underlying form		**Surface form**
a. **Masculine plural suffix:**	/ˈmɛː.sɪk-iːn/	→	/mɛs.ˈkiːn/ 'holding. plm'
b. **Feminine plural suffix:**	/ˈmɛː.sɪk-ɛːt/	→	/mɛs.ˈkɛːt/ 'holding. plf'
c. **Object suffix:**	/ðˤa.ˈrab-n-ɛː/	→	/ðˤa.rab.ˈnɛː/ 'we hit him'

Stress on the free morpheme or the root always goes to the right syllable, which has a long vowel, as in /mɪs.ˈkiːn/ 'a poor man'. Plural suffixes with long vowels attract stress, as in (18) above, but all the other suffixes repel stress, including the dual suffix which has a long vowel, as will be shown in the next subsection.

5.2.5.2 Stress-repelling affixes

The dialect has a suffix that is expected to attract stress, given how it has a long vowel nucleus, yet this in fact it repels stress. This is the DU-expressing suffix /-eːn/. Consider the examples in (19) below.

(19) Dual suffix /eːn/

SG form		DU form
/ˈbɪ.nɪt/	→	/ˈbɪn.teːn/ 'two girls'
/ˈmas.raf/	→	/ˈmas.ra.feːn/ 'two banks'

Examples in (18) and (19) have the same weight, but one attracts stress (in 18a, b) and the other is invisible to stress (15). This contrast provides us with another strong evidence in support of the claim of strata in TLA. It would be difficult to explain the differences of stress-placement on the right most heavy syllable in (18) and (19), without recourse to levels. Accordingly, plural suffixes, as given in (18) belong to the word level, whereas the dual suffix belongs to the stem level.

5.2.6 Stress and word classes in TLA

Stress in TLA has the function of a word-formation process, given how stress shift changes the word class of a word from a verb to a noun or adjective. For example, /ha.ˈlam/ ‘he dreamt’ vs. /ˈha.lam/ ‘a dream’. Stress determines whether the CV.CVC syllable pattern is a verb or a noun. When the first syllable is stressed, the pattern indicates a nominal or adjective word-form. When it is on the second syllable, it indicates that it is a verbal-form. The same alternation is seen with adjectives, which can also be derived from causative verbs by a shift in stress. In both cases we can consider this to be a derivational process deriving nominals from verbs. Consider the examples in (20) below.

(20) Contrastive CV.CVC stress in TLA

a. CV.CVC verbs	**b. CV.CVC adjectives**
/ʕa.ˈraʒ/ ‘to cause lame to someone’	/ˈʕa.raʒ/ ‘lame-sgm’
/ha.ˈtaʃ / ‘to take off someone’s tooth’	/ˈha.taʃ/ ‘gap-toothed. sgm’
/ħa.ˈwal/ ‘to cause’	/ˈħa.wal/ ‘cross-eyed. sgm’
/ħa.ˈraʃ/ ‘to cause roughness’	/ˈħa.raʃ/ ‘rough. sgm’
/sˤa.ˈhad/ ‘to cause hotness’	/ˈsˤa.həd/ ‘hot. sgm’
/ha.ˈbal/ ‘to cause madness’	/ˈha.bal/ ‘crazy. sgm’

5.2.7 Weight and extrametricality

In TLA, and many other languages, like English, a word class may exhibit a right-headed foot, while another word class exhibits a left-headed foot. According to Hyde (2011), this difference is due to the role of extrametricality, which is applied depending on the weight of the final syllable or the final consonant segment. In English verbs and nouns, for example, there are two types of stress patterns. In the case of English verbs, if the final syllable has a bimoraic nucleus, like CVV, CVVC or CVCC, then stress is ultimate. If the final syllable is a light CV or CVC, stress goes to the preceding (penult) syllable. The contrast between verbs and nouns is specified by consonant and syllable extrametricality (ibid). Consider the examples of English verb final consonant extrametricality in (21).

(21) Consonant extrametricality in English verbs (Hyde 2011:1043)

a.			(x .)
	μ μ μ	→	μ μ μ
	de . ve. lo<p>		de . ve . lo<p>
b.			(x)
	μμ μμ	→	μμ μμ
	tor.men<t>		tor.men<t>

For English nouns, the ultimate syllable is excluded from the weight, and the penult is stressed as in (22) below.

(22) Syllable extrametricality in English nouns (ibid)

a.		(. x .)
	a . me . ri <ca>	a . me . ri <ca>
b.		(. x .)
	a . gen . <da>	a . gen . <da>

The English verb in (21a) above is affected by consonant extrametricality, which causes the final syllable to be treated as a light syllable. In contrast, the English noun in (22) is affected by syllable extrametricality once the foot is constructed at the right edge, with the final syllable, as in (22b), being treated as weightless to give the correct stress as in: /a.(ˈme.ri)<ca>/, but not */a.me.(ˈri.ca).

In comparison to the English behaviour of extrameticality, TLA works slightly different. The dialect has two types of extrametricality: coda consonant extrametricality, which is applicable with all CV.CVC adjectives and nouns of type 2, and final syllable extrametricality. Below we consider both in detail.

5.2.7.1 Final Consonant Extrametricality in TLA

In many examples of TLA, the final consonant is excluded from the final syllable weight in order to avoid it being part of the stressed syllable. As (23) below illustrates, the final CVC emerges as a light syllable in both CV.CVC adjective and type 2 nouns.

(23) Coda Extrametricality in a CV.CVC syllable pattern

	Underlying form	**Surface form**	**Gloss**
a. Noun type (2)	bɪ.nɪt	ˈbɪ.nɪ<t>	‘girl’
b. Adjective	ha.bal	ˈha.ba<l>	‘idiot. sgm’

In both examples in (23), the coda in the final syllables /-nɪt/ and /-bal/ is extrametrical. The two -CVCs are monomoraic and prevented from contributing to the weight and are therefore invisible to stress assignment. As a result, they are counted as light syllables.

(24) Weight of coda under consonant extrametricality

µ
CV<C>

In contrast, in the CV.CVC patterns of verbs and type 1 nouns, as in (25) below, the coda takes a mora. The evidence is that these patterns always have final stress, so the extrametricality principle must be blocked to give the dialect this unique characteristic across the Arabic dialects. In (25), the syllable CVC /-lad/ in (25a) and (25b) /-rab/ is stressed, because it succeeds in being treated as heavy in final position.

(25) Moraic coda in CV.CVC syllable pattern

	UF	**SF**	**Gloss**
a. Nouns type 1	wa.lad	wa.ˈlad	‘son’
b. Verbs	ðˤa.rab	ðˤa.ˈrab	‘beat’

The examples in (25) shows that the final consonant contributes to the characterisation of the final syllable weight as being moraic, since this final syllable is always stressed in these two words classes (at least for CV.CVC noun types). The final syllable weight paradigm of the above examples is as below.

(26) Weight of final consonant moraic coda

μμ
CVC

The argument of final consonant extrametricality in some languages, as in English (Hayes (1982), Hyde (2010)) and in Arabic (McCarthy (1979), Hayes (1995)), is not consistently in line with TLA since a massive number of TLA examples allow the final coda to contribute to syllable weight as moraic consonants.

5.2.7.2 Final Syllable Extrametricality in TLA

Excluding a whole syllable from the prosodic structure is another type of extrametricality where the final syllable is not stressed. Final syllable extrametricality is applied in TLA when the final syllable is light or formed of morphologically light syllable endings (suffixes). Since TLA tolerates degenerate feet, the penult syllable can be parsed into a foot after the application of final syllable extrametricality. Consider the examples in (27) below.

(27) TLA final syllable extrametricality

	Extrametricality	**Parsing**	**Meaning**
a.	ðˤrə.bat.<kam>	ðˤ(rə.ˈbat).<kam>	'she hit you-msg'
b.	daw.wa.<rɪt>	daw.(ˈwa).<rɪt>	'I searched'
c.	ðˤra.ˈbo:<ha>	ðˤra.(ˈbo:)<ha>	'they. plm hit her/it'
d.	χa.ba.<tˤɪt>	sɪr.(ˈwa).<le:n>	'two trousers'
e.	ʕa.raf.ti:.<hum>	ʕa.raf.(ˈti:).<hum>	'you. sgf knew them plm'
f.	fa.ham.tan<na>	fa.ham.(ˈtan)<na>	'you. plf understood us'
g.	ʃrə.<ba>	(ˈʃrə).<ba>	'he drunk it'
h.	kal.lɪ.man.<kam>	kal.lɪ(ˈman)<kam>	'they F talked to you. plm'

Final syllable extrametricality generates the patterns in the examples in (27), after which an iambic foot is constructed. With the extrametricality of the final syllable, the examples daw.(ˈwa).<rɪt>, in (27b) (16c) sɪr.(ˈwa).<le:n> in (27c) and (ˈʃrə).<ba> in (27g) show that the penultimate is parsed as a degenerate foot.

5.2.7.3 Weight-insensitivity and stress non-finality

The situation of excluding the final syllable from the weight parameter in TLA makes the stressed syllable the one which immediately precedes the final extrametrical one, and this goes against the assumption that TLA is a quantity-sensitive system. As illustrated in (28) below, stress in TLA is weight-insensitive. By excluding the last syllable from the domain of stress, stress falls on the syllable that is in the rightmost position. Consider the paradigm in (28) below.

(28) TLA Weight-insensitive stress

(a)	**H L L**	**(b)**	**H L H**
	↓		↓
	σ (σ) σ		σ (**σ**) σ
	↓		↓
	ħan(ˈtˤa)<rɪt>		sˤan(ˈdu)<ɡe:n>
	'I delayed'		'two boxes'

The examples in (28) show that the final syllable is never stressed. This is acceptable under the final-syllable extrametricality rule, yet the problem in both cases is that stress targets the light syllable which constructs a monomoraic foot. Moreover, the syllable pattern in (28b) is heavy-light-heavy (HLH), and the stressed syllable is neither the left heavy nor the right heavy one. This problem could be resolved in (28a) by parsing the final syllable with the stressed one, since the final syllable is light under, the final consonant extrametricality rule, and therefore does not display syllable extrametricality.

The location of stress in the light syllable in (28), especially (28b) raises conflicts between foot minimality and syllable parsing requirements. Alternatively, the stressed light syllable constructs a degenerate (monomoraic) foot since it is favoured as stressed over its adjacent heavy syllables. Accordingly, the TLA prosodic (foot-level) layering allows a monosyllabic foot of one light (monomoraic) syllable, as given in (28) above, resulting from extrametricality making the last heavy syllable invisible to the application of stress. This is not always the case, since the application of weight-sensitivity is activated and extrameticality is blocked, in cases of un-affixed words where the final heavy syllable is always stressed, as in (29) below.

5.2.7.4 Weight-sensitivity and stress finality

Syllable extrametricality and/or non-finality principles are violated in two cases in TLA. In the first case, the word final heavy syllable is stressed if it ends with a long vowel. This is under the phonological condition that the final stressed heavy syllable must not have an attached morphological ending (suffix), and it must be a bare stem with a final long vowel syllable. The long vowel heavy syllable is always stressed at any position in the case of free morphemes, i.e a word devoid of affixes of its own, for example, /ˈtˤa:.lɪb/ ‘student sgm’, /ˈtˤa:.wlɪ/ ‘a table’, /ˈχa:.dɪm/ ‘waiter sgm’ and /ˈʕa:.lam/ ‘world’. The same holds for right-most long vowel heavy syllables in monomorphemic words. Consider the examples in (29) below:

(29) Unaffixed word Final Heavy Stressed Syllable

	Bare stem	**Parsing**	**Meaning**
a.	maʕ.dɪ.nu:s	maʕ.dɪ.(ˈnu:s)	‘coriander’
b.	mus.ta.ʃa:r	mus.ta.(ˈʃa:r)	‘counsel’
c.	tˤa.bu:r	tˤa.(ˈbu:r)	‘queue’
d.	naɡ.rɪ.zɛ:n	naɡ.rɪ.(ˈzɛ:n)	‘problem’
e.	mus.ta.ħi:l	mus.ta.(ˈħi:l)	‘impossible’
f.	bu.kaʃ.ʃɛ:n	bu.kaʃ.(ˈʃɛ:n)	‘lizard’
g.	sa.ka.na:n	sa.ka(ˈna:n)	‘annoying’
h.	ʔɪb.ʕa.de:n	ʔɪb.ʕa(ˈde:n)	‘later’

The second case of final syllable extrametricality and/or non-finality blocking is a stem attached with particular morphological endings such as the bound object pronouns, the plm and plf suffixes, as illustrated through the examples in (30) which as a result will be treated as word-level suffixes.

(30) Affixed word Final Heavy Stressed Syllable

a.	**Input**	**Object Suffix**	**Parsing**	**Meaning**
	ðˤa.rab	/-o/	ðˤra.(ˈbo:)	‘they M hit him/it’
	ðˤa.rab-na	/-ɛ/	ðˤa.rab(ˈnɛ:)	‘we hit him’
	bah.dal	/-o/	bah.(dɪ.ˈlo)	‘they M laboured him’
	ʕa.raf-na	/-ɛ/	ʕa.raf(ˈnɛ)	‘we knew him’

b.	**Bare Stem**	**Plural Suffix**	**Parsing**	**Meaning**
	mo.rat.tab	/-ɛ:t/	mo.rat.ta.ˈbɛ:t	‘salary. plm’
	mo.han.dɪz	/-i:n/	mo.han.dɪ.(ˈzi:n)	‘engineer. plm’
	tˤab.ba:χ	/-a:t/	tˤab.ba.(ˈχa:t)	‘chef. plf’
	ma.kɛ:n	/-ɛ:t/	maka(ˈnɛ:t)	‘place. plm’

5.3 Opaque Stress

As the dialect has one main stress, it can be positioned in one of three syllables: final, penultimate and antepenultimate. Most of the cases where stress is on the third syllable are instances involving inflectional suffixes. The behaviour of weight in TLA is sometimes phonologically indistinguishable and is difficult to explain. In general, heavy syllables with long vowel sometimes attract stress at any position. This depends on the morphology. A suffix may be stressed while another fails to receive stress, even though, the two share the same phonological characteristics in terms of weight. Consider the examples in (31) below.

(31) Stress on three syllable windows.

a. Antepenult	**b. Penult**	**c. Ultimate**
ˈ**ha**.bal.na	ma.ˈ**ka**.ne:n	ma.ka.ˈ**nɛ:t**

In the case of (31a) we have antepenultimate stress with the /-na/ suffixes that expresses possession ‘1pl. gen’. In the case of (31b), with stress on the penult, the suffix /-e:n/ which expresses the DU number, is attached onto the noun /ma.ˈkɛ:n/ ‘place’, and as noted earlier, the dual repels stress. In (31c), the plural suffix /-ɛ:t/ results in stress on the final syllable where this suffix attracts stress.

5.3.1 Light syllables and opaque stress

The stressed syllable in (31a) /ˈ**ha**.bal.na/ must be parsed into a degenerate foot as (ˈ**ha**$_{\mu}$).nbal.na because the next unstressed syllable forms an isolated bimoraic foot (ˈ**ha**$_{\mu}$)(bal$_{\mu\mu}$).na. The stressed syllables in (31b) and (31c) show that in (31b) the suffix does not attract stress, whereas in (31c) the suffix does attract stress despite the fact that the two suffixes are heavy.

In (32) below, a combination of the constituent grid and the bracket grid is used for the metrical presentation of word stress patterns. The metrical grid will be used for the stressed syllables presented in (31).

(32) Grid representation of the three-syllable window

(a)	**Antepenultimate**				
	PrWd-level	*			
	Foot-level	(*)	(*)		
	Syllable-level	*	*	*	
		ˈha.	bal.	na	‘our idiot. sgm’
(b)	**Penultimate**				
	PrWd-level		*		
	Foot-level	(	*)	(*)	
	Syllable-level	*	*	*	
		ma.	ˈka.	ne:n	‘ two places’
(c)	**Ultimate**				
	PrWd-level			*	
	Foot-level	(*	*)	(*)	
	Syllable-level	*	*	*	
		ma.	ka.	ˈnɛ:t	‘places’

The grid representation in (32) shows three columns for each example. Each column represents a syllable at syllable-level. At the upper level (foot-level), the two light syllables are parsed into a foot (as in (32c)), or one heavy syllable, as in (32b) and (32c). At the higher level, the prosodic word shows the word stress in the dialect. In the case of (32a), the light syllable is parsed into a foot because it is the head of a prosodic word. The comparison between (32a)-(32b) indicates the opacity of stressing the light syllable in these examples. Weight, of course, plays an important role in assigning stress to the heavy syllable but only in specific morphological contexts. This follows from the conditions on the foot's construction and the type of suffix. In the case of satisfying the required foot form, as mentioned in the above example (32c) CV.CV.CVVC [ma.ka.ˈnɛ:t], the ultimate heavy syllable is stressed because it satisfies the right-most heavy syllable constraint. In the case of stressing the light syllable, stress assigning falls onto the penultimate morphologically complex structure CV.CV.CVVC as in (32b) [ma.ˈka.ne:n].

5.3.2 Epenthesis and opaque stress

Vowel insertion occurs as a re-syllabification process in many languages and can clearly be seen in TLA in cases where consonant clusters are avoided, when a consonantal suffix is attached to a consonant-final stem or in connected speech. In the synchronic phonology of TLA, there is no word that has a syllable structure of CVCC or CVVCC. The underlying form of the hollow verb /ʒɛ:b/-t 'I brought' is syllabified via the insertion of a vowel to break up the final two consonants to produce /ˈʒɪbɪt/, with penult stress in preference of preserving lexical stress, resulting in */ˈʒɪbt/ */ʒɪ.ˈbɪt/ as being ungrammatical.

At the post-lexical level, stress can be placed on the epenthetic vowel outside of the stem. For example, attaching the preposition /-l/ 'to' and the object suffix /-kam/ to /ˈʒɪbɪt/ together creates a sequence of three consonants. As a result, this interaction creates a re-syllabification of the underlying form. Consider the interaction of stress and the epenthetic vowel at both the lexical and post-lexical levels in (33) below.

(33) Stress and epenthetic vowel interaction

(a) lexical level:	**input**	**output**
Stem stress preservation ✓	/ʒɛ:b/-t	/ˈʒɪ.bɪt/ */ʒɪ.ˈbɪt/
Final consonants clusters ×	-	/ˈʒɪ.bɪt/ */ʒɪbt/
(b) post-lexical level:	**input**	**output**
Stem stress preservation ×	/ˈʒɪ.bɪt/-l-kam	/ʒɪbt.ˈɪl.kam/ */ˈʒɪ.bɪt.lkam/
Final consonants clusters ✓	-	/ʒɪbt.ˈɪl.kam/ */ʒɪbɪt.ˈɪl.kam/

The examples in (33) show some facts of stress and vowel epenthesis interaction in TLA. At the lexical level (33a), there are three facts: (i) stress is preserved on the stem; (ii) the epenthetic vowel does not attract stress; and (iii) final consonant clusters are not permitted. At the post-lexical level, on the other hand, stress does not have to be preserved on the stem; the epenthetic vowel can be stressed, and two consonant clusters are permitted. A stratal OT account of this will be given in section 5.7.

5.4 Foot binarity and the parsing system in TLA

Identifying the position of stress is directly related to foot and syllable tiers. This means that a foot's construction is based on the directionality of parsing, from Left-to-Right or Right-to-Left, and foot headiness iambic (right-headed) or trochaic (left-headed). The stray syllable which remains after parsing the syllables into binary feet can be stressed in TLA when they are paired into a degenerate foot. The validity of a degenerate foot is evaluated in CV.CVC adjectives and nouns of **type (1)**. The foot binarity requirement is not mandatory as the feet can be formed with a single light syllable. This can be seen in cases where stress skips a heavy syllable in preference of a light antepenult syllable, as in (34a).

(34) Foot binary requirement

	Example	**Foot Construction**	**Meaning**
a.	**/ˈma.ħar.ma/**	**(ˈma) (ħar) ma**	**'scarf'**
b.	**/kɪ.ˈta.bɪt/**	**(kɪ.ˈta) bɪt**	**'wrote. 1sgm'**

c.	**/maʕ.dɪ.ˈnu:s/**	**(maʕ) dɪ (ˈnu:s)**	**‘coriander’**

The construction and direction of the feet in TLA will be tested by counting from both sides, i.e left to right edge, and the right to the left edge, in order to get to the correct directionality system.

(35) Foot parsing and directionality

	Left-to-Right	**Right-to-Left**	**Meaning**
a.	**(ˈma) (ħar) ma**	**ˈma (ħar) ma**	**‘scarf’**
b.	**(kɪ.ˈta) bɪt**	**kɪ(ˈtabɪt)**	**‘wrote. 1sgm’**
c.	**(maʕ) dɪ (ˈnu:s)**	**(maʕ) dɪ (ˈnu:s)**	**‘coriander’**

The left-to-right direction, in example (35b), gives an iambic foot and the left-over of an unparsed syllable on the right edge. The right-to-left direction gives a trochaic foot with a left-over syllable on the left edge. The parsing systems left-to-right and right-to-left give the same result in example (35c), because the formed feet in both sides have two moras, and the left over light syllable, which is in the middle, cannot form a foot. The right-to-left parsing system in (35a) gives only one unheaded foot. Since the stressed syllable must be footed, then the best way is to parse it into a (degenerate) foot. This is permitted, given that TLA allows degenerate feet.

Based on the above discussion, then, TLA has iambic feet, allows for a degenerate foot, and the directionality of parsing is from left to right. Stress falls on the right-most foot of the long vowel syllable in the case of un-affixed words as in (35c). In the case of morphologically complex words, as will be sorted out by Statal phonology, stress goes onto the heavy syllable at the word level, whereas at the stem level, weight is redundant, and a foot can be constructed out of a light syllable. The subsection below gets into more detail on degenerate foot.

5.4.1 Degenerate Foot

Building feet from right-to-left gives an unparsed stressed syllable, as in (35a). When the same example has a foot that is constructed from left-to-right, this gives one unstressed binary foot, and another stressed degenerate foot. According to Hayes (1995), a stray syllable can be parsed into a degenerate foot, if it is metrically located in a strong position. His proposal claims that there are two types of degenerate foot constraints on its prohibition.

(36) Prohibition of degenerate feet (Hayes 1995:87)

Foot parsing may form degenerate feet under the following conditions:

a. strong prohibition: absolutely disallowed

b. weak prohibition: allowed only in a strong position, i.e. when dominated by another grid mark.

TLA adheres to (36b), and allows degenerate feet when in a strong position. This can be seen from the grid representation in example (35a) /(ˈha).bal.na/ above, where the initial light syllable that bears stress rather than the bimoraic CVC syllable is the strongest, with three grid marks.

5.5 Stress algorithm in TLA

The stress algorithm in TLA, which is based on the above discussion, is conducted from the conflict that arise from the interaction between phonology and morphology. Morphologically, the addition of some affixes to a stem affect the phonology, in this case, in particular, the location of stress. This means that certain suffixes attract stress while others repel stress even though they have the same phonological characteristics i.e., both are heavy. In contrast, in the case of monomorphemic words stress always goes to the right most heavy syllable. Phonologically, the location of stress is variable, depending on the type of attached suffix (bound morpheme). The stress algorithm in TLA is difficult to be accomplished without recourse to levels. Accordingly, stress algorithm will be dealt with better, as in (37) below, where I show that monomorphemic words and similar examples sharing the same condition. Consider the algorithm in (37).

(37) TLA stress algorithm

(a) Stress the right most heavy syllable CVV or CVVC of a monomorphemic word or plural suffix.

Monomorphemic word:	/mos.ta.ˈtˤiːl/ ‘rectangular’
Monomorphemic word:	/ba.ˈtˤaː.tˤa/ ‘potato’
Plural suffix:	/mu.ka.la.ˈmɛːt/ ‘phone calls’

(b) Otherwise stress the penultimate CVV or CVVC of a plural suffix, or lengthen the V-final inflectional suffix that precedes an object suffix.

Plural suffix:	/kur.ra.ˈsɛːt.kam/ ‘your books’
Lengthened subject suffix:	/kal.lɪ.ˈmoː.na/ ‘they talked to us’

(c) Otherwise stress the ultimate CVC of CV.CVC verbs and CV.CVC nouns (type 1)

CV.CVC noun type 1:	/wa.ˈlad/ ‘son’
CV.CVC noun type 1:	/ʒa.ˈmal/ ‘camel’
CV.CVC verb:	/ðˤa.ˈrab/ ‘hit’

There are some exceptions to the dialect stress algorithm. One of these is an exception to (37c) above, which we have already exemplified yet I repeat here for further exemplification, in (38a). The other exception is with respect to stressing the right-most heavy syllable which, as has already been shown, does not apply for some suffixes such as the DU-expressing marker, as shown in (38b) below.

(38) Exceptions for TLA stress algorithm

(a) Stress the left-most light CV if the syllable pattern is a CV.CVC noun (type 2) and CV.CVC adjective.

CV.CVC nouns type 2:	/ˈʕa.lam/ ‘flag’

CV.CVC adjectives: /ˈha.bal/ ‘idiot’

(b) Heavy ultimate CVVC is not stressed if it is a dual suffix.

Dual suffix: /ˈmas.ra.fe:n/ ‘two banks’
Dual suffix: /mos.ˈtaʃ.fe:n/ ‘two hospitals’

The discussion in the previous section shows that the quantity sensitive parameter is satisfied in some cases of long vowel (CVV, CVVC) heavy syllables.[16] The CVC syllable is not always a stress attractor in TLA, since a CV syllable can sometimes bear stress to the exclusion of CVC or even CVV syllables. We see this in the contrast seen between type 1 and type 2 nouns with the syllable structure **CV.**CVC.CV, where the latter nominal type has initial stress as in the case in **/ˈbɪ.**nɪt-na/ ‘our daughter’, and the adjective /ˈha.bal-na/ ‘our idiot. sgm’. The former type, on the other hand, which nouns usually displsy stress on the second syllable, maintain stress on the penultimate syllable, as in: /wa.ˈ**lad**.na/ ‘our son’. This in turn patterns exactly with the verb-form: /ðˤa.ˈrab-na/ ‘he hit us’, given how type 1 nouns behave like verbs.

5.6 An OT account of stress in TLA

The next sections will examine the effects of syllable weight and the fluctuation of stress assignment that we observed in CVV, CVC and CV syllables in TLA. Firstly, Classical OT (McCarthy & Prince 1993) is used to analyse this opaque stress system, then Stratal OT is introduced in the theoretical background chapter, will follow, in order to re-examine the variable patterns to establish a consistent analysis of the dialect’s stress system.

Parsing the syllable pattern ˈCV.CVC.CV as shown in the examples above gives the wrong prediction that TLA is quantity insensitive, since we observe that the CV syllable is stressed in the presence of a CVC heavy syllable. As already demonstrated, stress in TLA may fall on the heavy syllables CVC, CVV or on the light syllable CV. The examples in (39) are recalled

[16] Stress goes to heavy syllables that are part of the stem. Not all CVV suffixes attract stress.

from the above sections in order to be analysed one a time in OT, to reveal the constraints hierarchy that explains the stress system of the dialect.

(39) TLA different stress patterns

Input		**Output**
a. ˈCV.CVC-CV	i./ˈbɪ.nɪt-na/ ‘our daughter’	/ˈbɪ.nɪt.na/
	ii. /ˈha.bal-na/ ‘our idiot m.sing’	/ˈha.bal.na/
b. CV.ˈCVC-CV	i. /wa.ˈlad-na/ ‘our son’	/wa.ˈlad.na/
	ii. /ðˤa.ˈrab-na/ ‘we hit’	/ðˤa.ˈrab-na/
c. ˈCVVC-C-C-CVC	/ˈɡa:l/-t-l-kam/ ‘I m/f said to you m. pl’	/gɪl.ˈtɪl.kam/
d. CV.ˈCV:C-V:C	/ma.ˈkɛ:n-e:n/ ‘two places’	/ma.ˈkɛ.ne:n/
e. CV.ˈCV:C-V:C	/ma.ˈkɛ:n-ɛ:t/ ‘places’	/ma.kɛ.ˈnɛ:t/

5.6.1 A Classical OT analysis

In the previous sections, it has been established that syllable weight, foot type and stress/epenthesis interaction together result in an inconsistent picture of stress assignment in TLA. This following sub-section aims to test whether Classical OT can handle the lexical exceptionality of phonological stress assignment of TLA, investigated though the examples in (39).

5.6.1.1 A Classical OT account of ˈCV.CVC.-CV

To get a good analysis of stress in TLA, we begin with developing a constraint ranking that explains the way syllables are parsed into feet, in the case the initial light syllable is stressed, in ˈCV.CVC.CV, and also in the case where heavy CVC in CV.ˈCVC.CV syllable patterns is stressed.[17] Accordingly, six constraints are required: HEAD-FOOT, PARSE-SYLLABLE, FT-BIN, WSP, INITIAL GRIDMARK and FAITH-STRESS. The constraint HEAD-FOOT permits an output with only one main stressed syllable. PARSE-SYLLABLE demands that syllables must be passed

[17] To avoid any confusion the only parsed syllable is the one which parsed inside the headed-foot.

into feet. FT-BIN demands that a foot must be either two light syllables or one heavy syllable. WSP demands that stress must be located on a heavy syllable. FAITH-STRESS prevents the lexically determined stressed syllable in the input from being unstressed in the output, and INITIAL GRIDMARK, which preserves the stress on the first syllable. The exceptionality of certain forms with respect to stress is due to lexical stress, which is not overridden by WSP. These constraints are given in (40-45) below.

(40) HEAD-FOOT (H-F): (Hyde 2012)

Every prosodic word has a head foot.

(41) PARSE-SYLLABLE (PARSE-σ):

Every syllable is parsed into a foot.

(42) FT-BIN

Feet are binary under moraic or syllabic analysis.

(43) FAITH-STRESS: (Hyde 2012b)

A stress in the input occurs on the same syllable in the output.

(44) Weight-to-Stress Principle (WSP)

Heavy syllables must be stressed. (If heavy, then stressed.)

(45) INITIAL GRIDMARK:

The initial syllable of a prosodic word is stressed.

The constraint HEAD-FOOT is undominated since the prosodic word should be stressed somewhere. The constraints PARSE-σ and FT-BIN are expected to be violable and in free ranking relation. Moreover, the constraint FAITH-STRESS is expected to outrank WSP, since the light syllable is stressed in the pattern ˈCV.CVC.-CV, as given in (39a) above. Consider the application of these interacting constraints in the tableau (46) below.

(46) A Classical OT account of (39a) /ˈha.bal.na/

ˈCV.CVC.-CV /ˈha.bal-na/	HEAD-FOOT	FAITH-STRESS	INITIAL GRIDMARK	WSP	PARSE-σ	FT-BIN
a. ☞ (ˈha)bal.na				*	**	*
b. ha.(ˈbal).na		*!	*		**	
c. ha.bal.na	*!	*	*	*	***	**
d. ha.bal(ˈna)		*!	*	*	**	*

Candidate (a) in tableau (46) wins the competition because it satisfies the highly ranked FAITH-STRESS. Candidate (b) loses because it fatally violates the constraint FAITH-STRESS. Candidate (c) is ruled out because it incurs a fatal violation of the high ranked constraints HEAD-FOOT. Finally, candidate (d) also loses as it violates the constraint FAITH-STRESS. The interaction of the constraints in tableau (46) gives the hierarchy in (47) below.

(47) ˈCV.CVC.CV HEAD-FOOT >> FAITH-STRESS , INITIAL GRIDMARK >> WSP >> PARSE-σ , FT-BIN

5.6.1.1.1 Foot alignment and the directionality of ˈCV.CVC.-CV

After determining the hierarchy of constraint interaction, we still need to determine the feet parsing directionality system in TLA. Since parsing syllables into feet from left to right is established for the optimal output of (ˈCV)(CVC).CV, in tableau (46), with the dialect tolerant to have a degenerate foot on the right edge, parsing from right to left would create an unparsed stressed syllable on the left edge of the prosodic word, which is not preferred. Accordingly, the alignment constraint ALLFEETR is needed along with the constraints FAITH-STRESS and FT-BIN to support the desired output of tableau (49). The constraint ALLFEETL bans the unparsed syllable from being located at the right edge of the word. In contrast, the constraint ALLFEETR bans the unparsed syllable from being at the left edge.

(48) Alignment constraint (McCarthy and Prince 1993)

(a) ALLFEETR.

The right edge of every foot is aligned with the right edge of some prosodic word.

(b) ALLFEETL.

The left edge of every foot is aligned with the left edge of some prosodic word.

(49) ˈCV.CVC.-CV foot parsing directionality

ˈCV.CVC.-CV ˈha.bal.na	FAITH-STRESS	ALLFEETR	FT-BIN
a. ☞ (ˈha)bal.na		**	*
b. ha.(ˈbal).na	*!	*	
c. ha.bal(ˈna)	*!		*

Tableau (49) shows that candidates (b) and (c) lose the competition since they incur fatal violations of the constraint FAITH-STRESS. Candidate (a) is the winner since the constraint FAITH-STRESS is highly ranked and the constraint FT-BIN is ranked lower in the dialect. In short, foot alignment and directionality constraints are less important than the constraint FAITH-STRESS. This is because the constraint ALLFEETR is not in a position to decide the winner candidate, since the priority is taken by the constraint FAITH-STRESS.

The discussed constraints for the syllable pattern ˈCV.CVC.-CV are brought together in one ranking in the tableau in (50) below.

(50) ˈCV.CVC-CV stress and foot parsing directionality

ˈCV.CVC.-CV ˈha.bal.na	HEAD-FOOT	FAITH-STRESS	INITIAL GRIDMARK	WSP	PARSE-σ	ALLFEETR	FT-BIN
a. ☞ (ˈha)bal.na				*	**	*	*
b. ha.(ˈbal.na)		*!	*		*		*
c. ha.bal.na	*!	*	*	*	**	*	*
d. ha.bal(ˈna)		*!	*	*	**		*

Tableau (50) shows that the involvement of the alignment constraint ALLFEETR did not make significant changes to the hierarchy. Candidates (b) and (d) incur fatal violations of the constraint FAITH-STRESS respectively. Candidate (c) loses the competition since it incurs a fatal violation of the undominated constraint HEAD-FOOT. The winning candidate is (a), since the constraint WSP is ranked low. The constraint hierarchy for the syllable pattern of /ˈha.bal.na/ ˈ**CV.**CVC.CV is given in (51) below.

(51) Constraints hierarchy of (39a) /ˈha.bal.na/

HEAD-FOOT >> FAITH-STRESS >> INITIAL GRIDMARK >> WSP >> PARSE-σ , ALLFEETR , FT-BIN

5.6.2 Classical OT account of CV.ˈCVC-CV

For the analysis of words like /wa.ˈlad.na/ 'our son', the first step is to capture the importance of weight for stress assignment in these cases. The low ranked constraint WSP in (50) will need to be ranked higher, above INITIAL GRIDMARK and FT-BIN, as in tableau (51)

(51) Classical OT account to (39b) /wa.ˈlad.na/ 'our son'

CV.ˈCVC-CV wa.ˈlad.na	WSP	FT-BIN	INITIAL GRIDMARK
a. (ˈwa)lad.na	*!	*	
b. ☞ wa.(ˈlad).na			*

Tableau (51) shows that violation of the constraint WSP is fatal. As a result, candidate (a) is ruled out, despite the fact that tableaux (46/50) show that the FT-BIN is low ranked. The ruled-out candidate (39a) was the winner in the above tableaux, because the constraint INITIAL GRIDMARK was ranked higher than WSP. The optimal candidate, however is (b). The ranking of the full set of constraints is exemplified through (52).

(52) Classical OT account to (39b) /wa.ˈlad.na/ 'our son'

CV.ˈCVC-CV wa.ˈlad.na	HEAD-FOOT	WSP	FT-BIN	FAITH-STRESS	ALLFEETR	INITIAL GRIDMARK	ALLFEETL	PARSE-σ
a. (ˈwa)lad.na		*!	*	*	*			**
b. ☞wa.(ˈlad).na						*	*	**
c. (wa.lad) na	*!	*	*	*	*	*		*
d. wa.lad.(ˈna)		*!	*	*		*		**

Tableau (52) shows that there is no domination relationship between the constraints INITIAL GRIDMARK and FAITH-STRESS, as they both dominate the constraint ALLFEETR. The constraint ALLFEETR dominates ALLFEETL. As a result, there is no dominant relationship between the constraints ALLFEETL and PARSE-σ. The constraint hierarchy is provided in (53).

(53) Constraints hierarchy for (39b) /wa.ˈlad.na/

HEAD-FOOT >> WSP >> FT-BIN , FAITH-STRESS , INITIAL GRIDMARK , ALLFEETR >> ALLFEETL , PARSE-σ

So far, two different types of constraint rankings, which are not compatible with the standard OT, are established in (50) and (53) for the stressed syllable patterns of CV.CVC.CV for adjectives and nouns pattern type 2 on the one hand, and verbs and nouns type 1 on the other.

5.6.3 Classical OT account of ˈCV.CVC-C-CVC

The analysis of this syllable pattern requires the constraints HEAD-FOOT, FAITH-STRESS and WSP. The word-form /ˈɡɪ.lɪt/ (39c) is followed by suffixes /-l-/ and /-kam/, and together form a syllable pattern that contains three consonants word-internally. Therefore, two more constraints are needed, since complex codas are not allowed. For this reason, I add the constraints DEP-IO and CLUSTER-CONDITION. CLUSTER-CONDITION bans coda consonant clusters from being in word-internal positions, therefore resulting in a vowel insertion that break up the consonant sequences.

(54) CLUSTER-CONDITION (CL-CON). (McCarthy, 2007)

Nonfinal Coda clusters are not allowed.

(55) DEP-IO

Every segment of the output has a correspondent in the input (no epenthesis)

(56) Classical OT account of (39c)ˈCV.CVC-C-CVC

ˈCV.CVC-C-CVC /ˈɡɪ.lɪt-l-kam/	HEAD-FOOT	CL-CON	WSP	FAITH-STRESS	DEP-IO
a. ɡɪ.(lɪt).lkam	*!		*	*	
b. (ˈɡɪ.lɪt)lkam			*!		
c. ☞ ɡɪl.(ˈtɪl).kam				*	*
d. ɡɪ.lɪtl(ˈkam)		*!			

Tableau (56) shows that candidate (a) is ruled out due to the fatal violation of the undominated constraint HEAD-FOOT. Candidate (b) loses because of the constraint WSP. Candidate (d) also loses the competition as it violates the high ranked constraint: CL-CON. Candidate (c) is the winner, as it only violates the two low ranked constraints FAITH-STRESS and DEP-IO.

The optimal candidate in (56) shows a stressed epenthetic vowel. The rest of the constraints that were used for the examples in (39a-b) will also be used for (39c). Consider the tableau in (57) below.

(57) Classical OT account of (39c)ˈCV.CVC-C-CVC

ˈCV.CVC-C-CVC /ˈɡɪ.lɪt-l-kam/	HEAD-FOOT	CL-CON	WSP	FT-BIN	INITIAL GRIDMARK	ALLFEETL	ALLFEETR	PARSE-σ	FAITH-STRESS	DEP-IO
a. ɡɪ.lɪt.lk.am	*!		*		*	*	*	****	*	
b. (ˈɡɪ.lɪt)lk.am			*!	*			*	**		
c. ☞ ɡɪl.(ˈtɪl).kam					*	*	*	**	*	*
d. ɡɪ.lɪtl(ˈkam)		*!		*		*		**	*	
e. (ˈɡɪ).lɪt.lk.am				*!						

Tableau (57) shows that the constraints FAITH-STRESS and DEP-IO are low ranked whereas there is no domination relationship between the constraints INITIAL GRIDMARK, ALLFEETL, ALLFEETR and PARSE-σ. The constraint hierarchy for the example in (39c) is as in (58).

(58) Constraints hierarchy of (39c) /ɡɪ.l.ˈtɪl.kam/

HEAD-FOOT >> CL-CON >> WSP , INITIAL GRIDMARK , FAITH-STRESS , ALLFEETL , ALLFEETR , PARSE-σ , FT-BIN >> DEP-IO

The optimal candidate in (57) is a counterexample to opaque stress in TLA, since the epenthetic vowel is unexpectedly stressed. Violating the constraint DEP-IO is an accepted process for output re-syllabification that avoids consonants clusters. However, the reason for stressing such an epenthetic vowel is not clear, and cannot be accounted for by Classical OT.

5.6.4 Classical OT account of CV.ˈCV:C-V:C

In the above tableau in (57), the constraint FAITH-STRESS is outranked by the constraint WSP. Accounting for the stress placement of the syllable pattern of (39d): CV.ˈCV:C-V:C cannot be achieved by the constraint hierarchy given in (58) since stress is invisible to syllable weight, particularly with the dual suffix /-e:n/. Therefore, the constraints Ident-[long]-V and

*V:$^{\sigma}$V:$^{\sigma}$ represented in (59), will conflict with each other. The constraint *V:$^{\sigma}$V:$^{\sigma}$ is needed as the dialect does not allow two syllables with long vowels in a sequence. Consider the tableau in (61).

(59) *V:σ.V:σ

No adjacent syllables with long vowels.

(60) Ident-[long]-V. (McCarthy 2008)

Long vowel in the input has a correspondent in the output.

(61) Classical OT analysis of CV.ˈCV:C-V:C

CV.ˈCV:C-V:C /ma.ˈkɛ:n-e:n/	HEAD-FOOT	*V:σ.V:σ	Ident-[long]-V
a. ma.kɛ:.ne:n	*!	*	
b. ma.ˈkɛ:.ne:n		*!	
c. ☞ ma.ˈkɛ.ne:n			*

Tableau (61) shows that candidate (a) is ruled out because it incurs a fatal violation of the undominated constraint HEAD-FOOT. Candidate (b) is ruled out as it also incurs a fatal violation of the constraint *V:σ.V:σ. The winning candidate is (c) since the constraint Ident-[long]-V is outranked by the constraint *V:σ.V:σ.

The winning candidate in tableau (49), /ma.ˈkɛ.ne:n/, is problematic, because stress is assigned to a light, syllable and not to the right most heavy one. Accordingly, the constraints WSP, FAITH-STRESS and INITIAL GRIDMARK will play a role in getting the desired output. The constraint NONFINALITY (62) is then used to ban stress from being located on the final syllable.

(62) NONFINALITY (Prince and Smolensky 1993)

No head of PrWd is final in PrWd.

(63) Classical OT analysis of CV.ˈCV:C-V:C

CV.ˈCV:C-V:C /ma.ˈkɛ:n-e:n/	HEAD-FOOT	*V:σ.V:σ	NONFINALITY	FAITH-STRESS	Ident-[long]-V	INITIAL GRIDMARK	WSP
a. ma.kɛ.ne:n	*!			*		*	*
b. (ˈma).kɛ:n.e:n		*!		*			*
c. ma.(ˈkɛ:)ne:n		*!				*	
d. ☞ (ma.ˈkɛ).ne:n					*	*	*
e. ma.kɛ(ˈne:n)			*!	*	*	*	

Tableau (63) shows that candidate (a) is ruled out by the undominated constraint HEAD-FOOT. Candidates (b) and (c) incur a fatal violation of the constraint *V:σ.V:σ. Candidate (e) loses the competition with a fatal violation of the constraint NONFINALITY. Candidate (d) is the winner, even though the light syllable is stressed above the heavy one. The constraints hierarchy for the example in (39d) is given below.

(64): (39d) CV.ˈCV:C-V:C /ma.ˈkɛ:n-e:n/ → /ma.ˈkɛ.ne:n/

HEAD-FOOT >> *V:σ.V:σ >> NONFINALITY >> FAITH-StRESS , INITIAL GRIDMARK , Ident-[long]-V >> WSP.

The above constraint hierarchy shows that the final heavy syllable /-ne:n/ of the optimal candidate is not a stress attractor, since the preceding light syllable is stressed. Thus, the only phonological change is a long vowel shortening of the root.

5.6.5 Classical OT account of CV.ˈCV:C-V:C

The constraint hierarchy in (64) shows that the WSP constraint is ranked low and violated by the winning candidate. To account for the example in (39e) CV.ˈCV:C-V:C /ma.ˈkɛ:n-ɛ:t/, the constraints *V:σ.V:σ, FAITH-STRESS, WSP, INITIAL GRIDMARK and the undominated constraint

HEAD-FOOT will be used first. Other constraints are then added to get the optimal output. Consider the tableau in (65)

(65) Classical OT analysis of (39e) CV.ˈCV:C-V:C

CV.ˈCV:C-V:C /ma.ˈkɛ:n-ɛ:t	HEAD(PrWd)	*V:σ.V:σ	WSP	INITIAL GRIDMARK	FAITH-STRESS
a. ma.kɛ.ne:t	*!		*	*	*
b. (ma.ˈkɛ)ne:t		*	*!	*	
c. ma.kɛ:.ˈ(ne:t)		*!		*	*
d. ☞ ma.kɛ(ˈne:)t				*	*

Tableau (65) shows that candidate (a) is ruled out as it incurs a fatal violation mark of the constraint HEAD-FOOT. Candidate (b) also loses the competition with a fatal violation of the constraint WSP. Candidate (c) loses the competition since it fatally violates the constraint *V:σ.V:σ. The winning candidate is thus (d) since it has the least violations. This is contrary to the previous discussion, as it shows that constraint WSP must outrank the constraints *V:σ.V:σ and FAITH-STRESS. Accordingly, the constraints Ident-[long]-V and NONFINALITY must be included in the hierarchy, in order to generate the correct optimal output. Consider the tableau in (66).

(66) Classical OT analysis of (39e) CV.ˈCV:C-V:C

CV.ˈCV:C-V:C /ma.ˈkɛ:n-ɛ:t	HEAD-FOOT	WSP	*V:σ.V:σ	INITIAL GRIDMARK	Ident-[long]-V	FAITH-STRESS	NONFINALITY
a. ma.kɛ.ne:t	*!	*	*	*		*	
b. (ma.ˈkɛ)ne:t		*!		*	*		
c. ma.kɛ:.ˈ(ne:t)			*!	*		*	*
d. ☞ ma.kɛ(ˈne:)t				*	*	*	*
e. (ˈma).kɛ:.ne:t		*!	*			*	

Again, the constraint Ident-[long]-V is ranked low since it is violated by the optimal candidate in (d). The winner (d) also violates NONFINALITY. There is no dominant relationship between Ident-[long]-V and the constraint FAITH-STRESS. The constraint hierarchy for this example is as in (67) below.

(67) Constraints hierarchy of (39e) CV.ˈCV:C-V:C

HEAD-FOOT >> WSP , *V:σ.V:σ >> INITIAL GRIDMARK , Ident-[long]-V , FAITH-STRESS >> NONFINALITY.

The constraint hierarchies that we have reached at the end of the above syllable patterns in the preceding sections are repeated below:

(68) Constraints hierarchy of (39a): ˈCV.CVC-CV

HEAD-FOOT , ALLFEETL , FAITH-STRESS , INITIAL GRIDMARK >> WSP >> PARSE-σ , ALLFEETR , FT-BIN.

(69) Constraints hierarchy of (39b): CV.ˈCVC-CV

HEAD-FOOT >> WSP >> FT-BIN , FAITH-STRESS , INITIAL GRIDMARK , ALLFEETR >> ALLFEETL , PARSE-σ.

(70) Constraints hierarchy of (39c): ˈCV.CVC-C-CVC

HEAD-FOOT >> CL-CON >> WSP , INITIAL GRIDMARK , FAITH-STRESS , ALLFEETL , ALLFEETR , PARSE-σ , FT-BIN >> DEP-IO.

(71) Constraints hierarchy of (39d) CV.ˈCV:C-V:C

HEAD-FOOT >> *V:σ.V:σ >> FAITH-StRESS , INITIAL GRIDMARK , Ident-[long]-V >> WSP.

(72) Constraints hierarchy of (39e) CV.ˈCV:C-V:C

HEAD-FOOT >> WSP , *V:σ.V:σ >> INITIAL GRIDMARK , Ident-[long]-V , FAITH-STRESS.

To conclude this section, classical Optimality Theory faces some difficulties in handling stress in TLA. Firstly, the given examples in (39) show that the heavy syllable does not always get stressed, in other words, there is no consistency in the role of weight in stress assignment in the dialect. This can be seen when given the example in (39e): CV.ˈCV:C-V:C /ma.ˈkɛ.ne:n emerges as the optimal candidate in tableau (63). This violates the constraint WSP but the constraint FAITH-STRESS is surprisingly satisfied, as it is high ranked. The constraint Ident-[long]-V is not significant since it is ranked low in both constraint hierarchies in both (71) and (72). By contrast, for the example given (39d): CV.ˈCV:C-V:C /ma.kɛ.ˈnɛ:t/, in tableau (66), the constraint WSP is ranked highly, and cannot be violated, whereas the constraint FAITH-STRESS is ranked low and is violable. Secondly, as has been shown, Classical OT needs different constraint hierarchies to account for stress in TLA. These hierarchies must be based in different levels to handle the data, since the rankings result from a phonology morphology conflict. Lastly, the opaque stress of the epenthetic vowel in (39c) ˈCV.CVC-C-CVC /ˈɡɪ.lɪt/-l-kam/ /ɡɪl.ˈtɪl.kam/ is another case that Classical OT cannot address or even explain. The reason of stressing certain suffixes and neglecting others could be related to a hidden conflict between phonological and morphological processes that Classical OT cannot immediately capture.

5.7 Proposing a Stratal OT analysis

The above data show that reference to stress, as it applies to stems and certain suffixes in contrast to others, is crucial in any analysis. For this reason, a Stratal OT account as pointed by Kiparsky (2000, 2003, 2008, 2014) and Bermudez-Otero (2018), will be used to explain stress in TLA.

As shown in (68-72) Classical OT requires different constraint hierarchies in order to account for the stress facts, in particular the paradoxical patterns that come out from the interaction of phonology and morphology. This suggests that a multi-level approach may be the most appropriate. We will thus use Stratal OT to account for the stress patterns as given in (39). The five different stress patterns given in (39) i.e. ˈCV.CVC-CV, CV.ˈCVC-CV, ˈCV.CVC-C-CVC, CV.ˈCV:C-V:C and CV.ˈCV:C-V:C. will each be discussed and accounted for. These are given in table (1) below, additionally showing the morphology involved.

Table (1) Underlying and Surface forms of contrasting stress patterns

Base		**Suffix**	**Underlying Form**	**Surface Form**
a. ˈ**CV.CVC** ˈha.bal ˈbɪ.nɪt		POSSESSIVE -na ‘1pl.gen’	ˈha.bal.na ‘idiot. Sgm (adjective)’ ˈbɪ.nɪt.na ‘our daughter (noun)’	ˈha.bal.na ˈbɪ.nɪt.na
b.	**CV.**ˈ**CVC** ðˤa.ˈrab	SUBJECT -na ‘1pl’	ðˤa.ˈrab.na.ɛ: ‘we hit him’	ðˤa.rab.ˈnɛ:
		OBJECT -ɛ: ‘3sgm.acc’		
	wa.ˈlad	POSSESSIVE -na ‘1pl. gen’	wa.ˈlad.na ‘our son’	wa.ˈlad.na
c. ˈ**CVVC** ˈɡa:l		SUBJECT -t ‘I’ (1st sg.)	ˈɡa:l.-t-l-kam ‘I said to you. plm’	ɡɪl.ˈtɪl.kam
		PREPOSITIONAL -l- ‘to’		
		OBJECT –kam ‘2plm. acc’		
d. CV.ˈ**CV:C** ma.ˈkɛ:n		DUAL -e:n	ma.ˈkɛ:n.e:n ‘two places’	ma.ˈkɛ.ne:n
e. CV.ˈ**CV:C** ma.ˈkɛ:n		PLURAL -ɛ:t	ma.ˈkɛ:n.ɛ:t ‘places’	ma.kɛ.ˈnɛ:t

The data given in table (1) above contains the base form examples on the left column, followed by object, possessive, inflectional suffixes, propositional, dual and plural.

Before using a Stratal OT analysis, the examples in table (1), the adjectival ˈCV.CVC base: /ˈha.bal/ will be used as a counterexample to evaluate the problem of the dialect metrical incoherence in the subsection below.

The position of stress location in TLA the CV.CVC pattern is of two types: The first type is ultimate, as in the case of the CV.ˈCVC verb pattern. The second type is the penultimate ˈCV.CVC pattern as in the case of adjectives. In the case of CV.CVC nouns, as an exception, stress can opaquely either be in ultimate or penultimate position. This is already shown through the contrast of the constraint hierarchies in (68) and (69).

Stem and word levels will be required to account for these contrasting metrical patterns since the un-affixed stem has two different stress patterns for the same syllable pattern, i.e., ˈCV.CVC and CV.ˈCVC.

To account for the different outcome from affixed CV.ˈCVC and ˈCV.CVC forms, the level in which the type of affix belongs to, will be important. Accordingly, suffixes in table (1) above are divided into two types, depending on their phonological behaviour internal to a serial strata. The suffix /-na/ that attaches to adjectives and nouns as shown in (1a) ˈCV.CVC /ˈha.bal/ 'idiot. sgm', /ˈbɪ.nɪt/ 'girl' and the DU-expressing suffix /-e:n/ that attaches to the nominal in (1d) CV.ˈCV:C /ma.ˈkɛ:n/, will be classified as stem level suffixes. On the other hand the object 3sgm.acc suffix /-ɛ:/ that attaches to the CV.ˈCVC verb /ðˤa.ˈrab/, and the plm suffix /-ɛ:t/ that attaches to the noun (1d) CV.ˈCV:C /ma.ˈkɛ:n/, will be classified as word level suffixes. The motivation for this distribution is given in the following discussion.

5.7.1 Stem-Level

The constraint ranking in (68) along with other additional constraints are needed to account for stress in ˈCV.CVC forms. Crucially, the inflectional suffixes at the proposed stem level will be important in accounting for stress in forms like: /ˈha.bal-na/ 'our idiot. sgm'. The constraint HEAD-FOOT will be used in all data, as the dialect must have stress in every prosodic word. To account for the degenerate feet at stem level, we need to establish the ranking of the constraint FT-BIN. Consider tableau (73) below.

(73) Stem Level: /ˈCV.CVC/-na

/ˈha.bal/-na	HEAD-FOOT	FT-BIN
a. ha.bal.na	*!	
b.☞ (ˈha).bal.na		*
c. (ha.ˈbal).na		*

Tableau (73) shows that candidate (a) is ruled out by the constraint HEAD-FOOT. Both candidates (b) and (c) violate the constraint FT-BIN. The winning candidate is (b) despite candidate (c) having stress on the heavy syllable. At this point there is a tie between candidates (b) and (c). To optimize candidate (b) over candidate (c) the constraint FAITH-STRESS is needed to militate against the constraint FT-BIN. The constraint FT-BIN should be outranked by the constraint FAITH-STRESS. Consider tableau (73) below:

(73) Stem Level: /ˈCV.CVC/-na

/ˈha.bal/-na	HEAD-FOOT	FAITH-STRESS	FT-BIN
a. ha.bal.na	*!		
b. (ha.ˈbal).na		*!	*
c.☞ (ˈha).bal.na			*

Tableau (73) shows that candidate (a) is ruled out because it incurs a fatal violation of the constraint HEAD-FOOT as noted earlier. Candidate (b) fatally violates the highly ranked FAITH-STRESS constraint. The winning candidate is (c) because the constraint FT-BIN is ranked lower than FAITH-STRESS, at the stem level.

The constraints WSP, NONFINALITY and PARSE-σ must be included in the competition. This is because the constraint WSP is needed to militate against the constraint FAITH-STRESS, to check the probability of a candidate like in (74d) to be the winner. The constraint NONFINALITY demands final stress avoidance, which (d) does violate. The constraint PARSE-σ is needed to count the left and parsed syllables at the same time the type of parsed foot. Consider the tableau (74) below.

(74) Stem Level: /ˈCV.CVC/-na

/ˈha.bal/-na	H-F	NONFINALITY	FAITH-STRESS	WSP	PARSE-σ	FT-BIN
a. ha.bal.na	*!				***	
b. (ha.ˈbal)na			*!	*	*	*
c.☞ (ˈha).bal.na				*	**	*
d. ha.bal(ˈna)		*!	*	*	**	*

The tableau (74) shows that the final syllable is stressed in candidate (b). This makes candidate (b) be ruled out by the constraint NONFINALITY. The constraints WSP and PARSE-σ are ranked lower than the constraint FAITH-STRESS. The winning candidate is still the same as the previous tableau, since the constraint WSP is ranked low. In other words, syllable weight is not a significant factor for stress assignment at the stem level. The constraint hierarchy for the stem level output (ˈha).bal.na is as in (75) below.

(75) Stem Level constraint hierarchy for ˈCV.CVC.CV

HEAD-FOOT >> NONFINALITY >> FAITH-STRESS >> WSP , PARSE-σ , FT-BIN.

The other case of stem level stress is for the CV.ˈCVVC pattern, as in /ma.ˈkɛ:n/, with the attached stem level DU-expressing suffix -e:n. The same constraint hierarchy given in (75) above can account for this syllable pattern. However, once again, this needs more constraints, since the input ends with a long vowel syllable, and the attached suffix also contains long vowel, yet it is only one of these that maintains its length contrast in the end. Accordingly, the constraints *V:σ.V:σ, Ident-[long]-V and TROCHEE have to be included in the competition. Constraint *V:σ.V:σ bans two adjacent syllables that have nuclei with long vowels. The Ident-[long]-V constraint bans any changes in the input vowel length. The constraint TROCHEE bans the head foot from being on the right edge of the foot. This constraint is defined as below, and tableau (77) illustrates the distinct constraints at work.

(76) TROCHEE

Assign a violation for a foot whose head is on the right.

(77) Stem Level: /CV.ˈCVVC/-e:n

ma.ˈkɛ:n-e:n	HEAD-FOOT	NONFINALITY	FAITH-STRESS	*V:σ.V:σ	Ident-[long]-V	TROCHEE	WSP	PARSE-σ	FT-BIN
a. ma.kɛ:.ne:n	*!								
b. ma. kɛ:.(ˈne:n)		*!	*	*		*		**	
c. (ˈma.kɛ).ne:n			*!		*	*	*	*	
d. ma.(ˈkɛ:).ne:n				*!				**	
e.☞ma.(ˈkɛ)ne:n					*		*	**	*

Tableau (77) shows that candidate (a) incurs a fatal violation of the constraint HEAD-FOOT, and so it is ruled out of the competition. Candidate (b) is also ruled out as it gets a fatal violation of the highly ranked constraint NONFINALITY. Candidate (c) incurs a fatal violation of the constraint FAITH-STRESS. Candidate (d) is ruled out of the competition due to a fatal violation of the constraint *V:σ.V:σ. Candidate (e) emerges as the winner, since the constraint

Ident-[long]-V is ranked lower than the constraint *V:σ.V:σ. The constraints WSP, PARSE-σ and FT-BIN are ranked low at the stem level. Accepting that candidate (e) /ma.(ˈkɛ)ne:n/ provides the best foot structure means that the stem level motivates a degenerate foot at the stem level. However, this needs to be ensured by adding the constraints TROCHEE and FT-BIN. Consider tableau (78) below:

(78) Stem Level: /CV.ˈCVVC/-e:n

/ma.ˈkɛ:n/-e:n	HEAD-FOOT	FAITH-STRESS	TROCHEE	FT-BIN
a. ma.kɛ.ne:n	*!			
b. (ˈma.kɛ).ne:n		*!		
c. (ma.ˈkɛ).ne:n			*!	
d.☞ma.(ˈkɛ).ne:n				*

The above tableau shows that candidate (d) is the optimal one, since the un-footed candidate (a) is ruled out by the constraint HEAD-FOOT. Candidate (b) is ruled out by the FAITH-STRESS candidate, and candidate (c) is ruled out by the TROCHEE constraint.

To make sure that the proposed stem level suffixes /-na/ and /-e:n/ maintain a consistent constraint hierarchy for both the examples /ˈha.bal.na/ ‘our idiot. sgm’ and /ma.ˈkɛ:n-e:n/ ‘two places’, they are integrated into one tableau with the same ranking. Consider tableau (79) below:

(79) **Stem Level:** /ˈCV.CVC/-na, /CV.ˈCVVC/-e:n

1. /ˈha.bal/-na	HEAD-FOOT	NONFINALITY	FAITH-STRESS	*V:σ.V:σ	Ident-[long]-V	TROCHEE	WSP	PARSE-σ	FT-BIN
a. ☞ (ˈha).bal.na							*	**	*
b. ha.bal(ˈna)		*!	*					**	
c. (ha.ˈbal).na			*!			*		*	*
d. ha.(ˈbal.na)			*!					*	*
e. ha.bal.na	*!								
2. /ma.ˈkɛ:n/-e:n	HEAD-FOOT	NONFINALITY	FAITH-STRESS	*V:σ.V:σ	Ident-[long]-V	TROCHEE	WSP	PARSE-σ	FT-BIN
a.☞ ma.(ˈkɛ).ne:n					*		*	**	*
b. ma. kɛ:.(ˈne:n)		*!	*	*		*		**	
c. (ˈma.kɛ).ne:n			*!		*	*	*	*	
d. ma.(ˈkɛ:).ne:n				*!				**	
e. ma.kɛ:.ne:n	*!								

As the above tableau shows, Stratal OT succeeds in classifying the two different stress patterns for ˈCV.CVC.CV /(ˈha).bal.na/ and CV.ˈCV.CVVC /ma.(ˈkɛ).ne:n/, to be expressed/represented on the same stratum, which in this case is the stem level, with the same constraint hierarchy. The final constraint hierarchy which I have thus developed for the stem level phonology of TLA represented through the hierarchy in (80) below.

(80) Stem Level constraint hierarchy:

HEAD-FOOT >> NONFINALITY >> FAITH-STRESS >> *V:σ.V:σ >> Ident-[long]-V , TROCHEE >> WSP , PARSE-σ >> FT-BIN.

So far, a standard constraint hierarchy has been developed for the TLA stem-level phonology. These constraints work consistently for all the examples involving suffixes that are represented at the stem level.

The same constraints will now in turn be used for the second stratum, which is the word level. However, as expected in Stratal OT, the constraints are expected to be ranked in a different order, since word level suffixes behave differently from stem level ones.

5.7.2 Word-Level

Suffixes at the word level include the 3sgm.acc object suffix /-ɛ:/ and the plm suffix /-ɛ:t/. The plural suffix /-ɛ:t/ is attached to noun stems such as /ma.ˈkɛ:n/ 'place'. The object suffix is attached to verb stems such as /ðˤa.ˈrab/ 'hit'. Unlike the stem level '1pl' subject suffix /-na/ and the dual suffix /-e:n/, word level suffixes are expected to show phonological changes that shift the stress of the stem domain, elsewhere. This will entail a change in the order of constraints given in (80) above.

The word level suffixes interact with the constraints that are directly related to stress. From the starting, the constraints FAITH-STRESS and WSP are expected to be in conflict as to which is to get the first ranking of the word level output. Consider tableau (81) below:

(81) Word Level: /CV.ˈCVVC/-ɛ:t

/ma.ˈkɛ:n/-ɛ:t	WSP	FAITH-STRESS
a. (ma.ˈkɛ).nɛ:t	*!	
b.☞/ma.kɛ.(ˈnɛ:t)		*

At the word level, as shown in tableau (81) candidate (a) is ruled out as it incurs a fatal violation of the constraint WSP. The winning candidate is (b). Thus, at the word level, satisfying the constraint WSP is favoured over satisfying FAITH-STRESS. The decision which results in chasing the optimal candidate in (81) above is not yet satisfactory, since the input stress pattern differs from the winning candidate at the stem level. Accordingly, the constraint FT-BIN should be included at the word level ranking. The constraint FT-BIN should outrank WSP. Consider tableau (82) below:

(82) Word Level: /CV.ˈCVVC/-ɛ:t

/ma.ˈkɛ:n/-ɛ:t	FT-BIN	WSP	FAITH-STRESS
a. (ma.ˈkɛ).nɛ:t		*!	
b.☞ma.kɛ.(ˈnɛ:t)			*
c. ma.(ˈkɛ).nɛ:t	*!		

Tableau (82) shows that candidate (c) is ruled out from the competition as it incurs a fatal violation of the constraint FT-BIN. The winning candidate is still (b), since stressing the syllable that has a long vowel is crucial at the word level.

Two long vowels are not allowed: neither in a morphological complex word nor in a monomorphemic word in TLA. This clearly helps avoid the input form from being the winning candidate. Accordingly, the constraint *V:σ.V:σ is needed, as in tableau (83) below.

(83) Word Level: /CV.ˈCVVC/-ɛ:t

/ma.ˈkɛ:n/-ɛ:t	*V:σ.V:σ	FT-BIN	WSP	FAITH-STRESS
a. (ma.ˈkɛ).nɛ:t			*!	
b.☞ma.kɛ.(ˈnɛ:t)				*
c. ma.(ˈkɛ).nɛ:t		*!		
d. ma. (ˈkɛ:). nɛ:t	*!		*	*

Tableau (83) shows that candidate (d) is ruled out from the competition as it incurs a fatal violation of the constraint *V:σ.V:σ. Candidate (a) is still the winner because it is not influenced by the added constraint *V:σ.V:σ, since long vowel shortening is applied both at the stem and word levels. At the word level, the constraints *V:σ.V:σ, WSP and FT-BIN are in a strict domination relationship, but the constraint *V:σ.V:σ is useful in the above situation because it helps to get rid of candidate (d), otherwise the FT-BIN constraint could wrongly be ranked higher than WSP, making no significant difference between the stem-level and the word-level. Accordingly, the word level sub-hierarchy is as in (84) below.

(84) Word level sub-hierarchy of /CV.ˈCVVC/-ɛ:t

*V:σ.V:σ >> FT-BIN >> WSP >> FAITH-STRESS

At the word level, another significant constraint, namely ONSET, is needed. Consider why, in tableau (85) below:

(85) Word Level: /CV.ˈCVVC/-ɛ:t

/ma.ˈkɛ:n/-ɛ:t	ONSET	*V:σ.V:σ	FT-BIN	WSP	FAITH-STRESS
a. (ma.ˈkɛ).nɛ:t				*!	
b.☞ma.kɛ.(ˈnɛ:t)					*
c. ma.(ˈkɛ).nɛ:t			*!		
d. ma. (ˈkɛ:). nɛ:t		*!		*	*
e. ma.(ˈkɛn).ɛ:t	*!				

Tableau (85) shows that the candidate (e) loses the competition due to a fatal violation of the constraint ONSET. The constraints *V:σ.V:σ and ONSET are in a free ranking ordering, but the Onset constraint is that which helps avoid candidate (e) from being the winner, as otherwise, candidate (e) could have won given that it satisfies the constraints *V:σ.V:σ, FT-BIN, WSP and FAITH-STRESS.

Parsing all the syllables of a prosodic word into feet is not important at both stem and word levels, as *only the stressed syllable is parsed into a foot*. The reason for neglecting parsing other syllables into feet is that since there is only one stress in the dialect, and no secondary stress at all, then the constraint HEAD-FOOT gets the job done no matter how many violation marks are incurred by the constraint PARSE-σ. A hypothetical candidate, without any stressed syllable, is also needed. Accordingly, the constraint PARSE-σ is expected to be low ranked whereas HEAD-FOOT is undominated and inviolable. Consider tableau (86) below:

(86) Word Level: /CV.ˈCVVC/-ɛ:t

/ma.ˈkɛ:n/-ɛ:t	HEAD-FOOT	ONSET	*V:σ.V:σ	FT-BIN	WSP	FAITH-STRESS	PARSE-σ
a. (ma.ˈkɛ).nɛ:t					*!		*
b.☞ma.kɛ.(ˈnɛ:t)						*	**
c. ma.(ˈkɛ).nɛ:t				*!			**
d. ma. (ˈkɛ:). nɛ:t			*!		*	*	**
e. ma.(ˈkɛn).ɛ:t		*!					**
f. ma.kɛ:.nɛ:t	*!		*		*	*	***

Tableau (86) shows that candidate (f) fatally violates the undominant constraint HEAD-FOOT. The constraint PARSE-σ is violable and in a free ranking order with FAITH-STRESS.

As can be seen, the constraints that are used at the stem level still work at the word level. However, they do so with a different ranking. To get a complete image of the word level constraint hierarchy, in comparison with the stem level, the constraints Ident-[long]-V, and NONFINALITY are included for comparative expository purposes. Consider the tableau in (87) below.

(87) Word Level: /CV.ˈCVVC/-ɛ:t

/ma.ˈkɛ:n/-ɛ:t	HEAD-FOOT	ONSET	*V:σ.V:σ	FT-BIN	WSP	FAITH-STRESS	PARSE-σ	Ident-[long]-V	NONFINALITY
a. (ma.ˈkɛ).nɛ:t					*!		*	*	
b.☞ma.kɛ.(ˈnɛ:t)						*	**	*	*
c. ma.(ˈkɛ).nɛ:t				*!			**	*	
d. ma. (ˈkɛ:). nɛ:t			*!		*	*	**		
e. ma.(ˈkɛn).ɛ:t		*!					**	*	
f. ma.kɛ:.nɛ:t	*!		*		*	*	***		

Tableau (87) illustrates how candidate (a) is ruled out of the competition due to a fatal violation of the constraint WSP. Candidate (c) incurs a fatal violation of the constraint FT-BIN so it is ruled out too. Candidate (d) is ruled out by a fatal violation of the constraint *V:σ.V:σ. Candidate (e) is also ruled out by the constraint ONSET. Candidate (f) loses the competition by a fatal violation of the constraint HEAD-FOOT. Candidate (b) wins the competition since it has the least violation marks, and neither a violation of FT-BIN nor of WSP. Moreover, the constraints FAITH-STRESS and NONFINALITY are ranked low at word level, and there is no domination relationship between them.

The next input for the word level will be the verb + inflectional affix /ðˤa.ˈrab.na/, along with the attached word level object suffix /-ɛ:/. The undominated constraint HEAD-FOOT along with the constraints ONSET and FT-BIN will be used to account for stress that occurs outside of the stem domain. Consider tableau (88) below:

(88) Word level: /ðˤa.ˈrab.na/-ɛ:

/ðˤa.ˈrab.na/-ɛ:	HEAD-FOOT	ONSET	FT-BIN
a. ðˤa.rab.nɛ:	*!		
b. ðˤa.(ˈrabn)ɛ:		*!	
c. (ˈðˤa).rab.nɛ:			*!
d.☞ ðˤa.rab(ˈnɛ:)			

Tableau (88) shows that candidate (a) is ruled out of the competition by a fatal violation of the constraint HEAD-FOOT. Candidate (b) fatally violates the constraint ONSET. Parsing the initial light syllable into a foot causes a fatal violation of the constraint FT-BIN, i.e. candidate (c). The winning candidate (d) gets a stress placement that is different from the input stem domain, i.e. the constraints FAITH-STRESS and NONFINALITY are expected to be ranked low, with no domination between them. Consider the tableau in (89).

Tableau (89): Word level: /ðˤa.ˈrab.na/-ɛ:

/ðˤa.ˈrab.na/-ɛ:	HEAD-FOOT	ONSET	FT-BIN	FAITH-STRESS	NONFINALITY
a. ðˤa.rab.nɛ:	*!				
b. ðˤa.(ˈrabn)ɛ:		*!			
c. (ˈðˤa).rab.nɛ:			*!	*	
d.☞ ðˤa.rab(ˈnɛ:)				*	*
e. ðˤa. (ˈra)bnɛ:			*!		

At the word level, tableau (89) shows that candidate (a) is ruled out by the constraint HEAD-FOOT. Candidate (b) is ruled out by the markedness constraint ONSET, while candidates (c) and (e) are ruled out by the high ranked constraint FT-BIN. Violating the constraints FAITH-STRESS and NONFINALITY does not affect the winning candidate (d) since both constraints are violable and low ranked, at the word level.

At the word level, the established constraint hierarchy is used for both the examined syllable patterns given in table (1) with the proposed word level possessive and dual suffixes. The tableau in (90) below shows both forms and how they get applied via the same ranking within the word level.

(90) Word Level: /ma.kɛ:n(ˈɛ:t)/ ‘places’, /ðˤa.rab(ˈnɛ:)/ ‘we hit him’

1. /ma.ˈkɛ:n/-ɛ:t	HEAD-FOOT	ONSET	*V:σ.V:σ	FT-BIN	WSP	TROCHEE	FAITH-STRESS	PARSE-σ	Ident-[long]-V	NONFINALITY
a. (ma.ˈkɛ).nɛ:t					*!			*	*	
b.☞ma.kɛ.(ˈnɛ:t)							*	**	*	*
c. ma.(ˈkɛ).nɛ:t				*!				**	*	
d. ma. (ˈkɛ:). nɛ:t			*!		*		*	**		
e. ma.(ˈkɛn).ɛ:t		*!						**	*	
f. ma.kɛ:.nɛ:t	*!		*		*		*	***		
1.h. (ˈma.kɛ).nɛ:t						*!				
2. /ðˤa.ˈrab.na/-ɛ	HEAD-FOOT	ONSET	*V:σ.V:σ	FT-BIN	WSP	TROCHEE	FAITH-STRESS	PARSE-σ	Ident-[long]-V	NONFINALITY
a. ðˤa.rab.nɛ	***!**									
b. ðˤa.(ˈrabn)ɛ:		***!**			*	*				
c. ðˤa.(ˈra)bnɛ:				***!**	*	*				
d. (ðˤa.ˈra)bnɛ:					***!**	*				
e. (ðˤa.ˈra)bnɛ:						*!				
f.☞ ðˤa.rab(ˈnɛ:)							*	**	*	*

At the word level, the optimal candidates of the syllable structures CV.CV.(ˈCV:C) in (90.1) and CV.CVC.(ˈCV:) in (90.2) are established successfully by the constraint hierarchy listed in (91) below:

(91) Word level constraint hierarchy

HEAD-FOOT >> ONSET , *V:σ.V:σ >> FT-BIN >> WSP >> TROCHEE >> Ident-[long]-V >> FAITH-STRESS , PARSE-σ , NONFINALITY.

5.7.3 The application of cyclicity in TLA

When stem level suffixes such as the inflectional suffixes listed in section 5.2.4 above are followed by object suffixes, some of these object suffixes trigger word level phonology while others do not. The latter instead involve a reapplication of stem level phonology. Consider the first four examples in table (2) below.

Table (2) Stem cyclic domain and Word level non-cyclicity

Stem Level				**Word Level**		
Input: ðˤa.ˈrab ‘hit. pvf.3sgm’		**inflection**	**Output**	**Input**	**Bound Obj-Suff**	**Output/meaning**
a.	ðˤa.ˈrab	/-Ø/ ‘3sgm’	ðˤa.ˈrab	ðˤa.ˈrab	-a ‘3sgm’	*(ˈðˤər.b)a ‘he drunk it’
b.	ðˤa.ˈrab	/-at/ ‘3sgf’	ˈðˤrə.bat	ˈðˤrə.bat	-ak ‘2sgm’	*(ðəˤr.ˈba:).tak ‘she hit you’
c.	ðˤa.ˈrab	/-o/ ‘3plm’	ˈðˤrə.bo	ˈðˤrə.bo	-ha ‘3sgf’	*(ðəˤr.ˈbo:).ha ‘they hit her/it’
d.	ðˤa.ˈrab	/-t/ ‘1sgm’	ðˤa.ˈra.bɪt	ðˤa.ˈra.bɪt	-nɪ ‘1sm/f’	*(ðˤa.ˈra.bɪt).nɪ ‘you hit me’
e.	ðˤa.ˈrab	/-tɪ/ ‘2sgf’	ðˤa.ˈrab.tɪ	ðˤa.ˈra.bɪt	-hum ‘3plm’	ðˤa.ra.bˈti:.hum ‘you hit them’
f.	ðˤa.ˈrab	/-na/ ‘1pl.m/f’	ðˤa.ˈrab.na	ðˤa.ˈrab.na	-a, -ɛ ‘3sgm’	ðˤa.rab.ˈnɛ: ‘we hit him/it’
g.	ðˤa.ˈrab	/-tu/ ‘2pl.m’	ðˤa.ˈrab.tu	ðˤa.ˈrab.tu	-na ‘1plm’	ðˤa.rab.ˈtu:.na ‘you hit us’
h.	ðˤa.ˈrab	/-tan/ ‘2plf’	ðˤa.ˈrab.tan	ðˤa.ˈrab.tan	-hɪn ‘3plf’	ðˤa.rab.ˈtan.na ‘you hit them’

In table (2), the outputs of the stem level in (2 e-h) are used as inputs to the word level, when attaching object suffixes, as assumed in many studies. However, some of the object suffixes are not inputs to word-level phonology, as in the first four examples in (2 a-d) were potential outputs after applying word level phonology are ungrammatical as the starred forms show: */(ˈʃrə.b)a/, */(ðˤrə.ˈba).tak/, */(ðˤrə.ˈbo).ha/ and */(ðˤa.ˈra.bɪt).nɪ/.

Attaching object suffixes onto the base in the examples in (2 a-d) results in phonological processes like stress shift within the stem level domain. The behaviour of these object suffixes shows that there is cyclicity at the stem level. This is illustrated in (80) below.

(92) Stem Internal Cyclicity: -∅ + -∅ ‘3sgm’ → -at ‘3sgf’ + -ak ‘2sgm. acc’

Underlying form:	(ðˤa.ˈrab) ‘hit’	subject suffix - /-∅/ ‘3sgm’
Stem Level: 1st Cycle -	(ðˤa.ˈrab) ‘ he hit’	← subject suffix /-∅/ ‘3sgm’
Stem Level: 2nd Cycle ([-a] deletion & [-a] raising)	(ˈðˤrə.b-at) ‘she hit’	← subject suff -at ‘3sgf’
Word Level: (stress shifting & [a] lengthening)	**ðˤar.(ˈba:)-t-ak/** ‘she hit you’	← Object suffix -ak ‘2sgm. acc’
Surface form:	ðˤar.(ˈba:).tak	

The underlying form of the verb in (92), without any affix, expresses the bare stem: /ðˤa.ˈrab/ ‘to hit’. The form of the first cycle of stem-level phonology takes the same form of the underlying representation, but it also happens to take a (zero) subject suffix and which gets us the perfective 3sgm form ðˤa.ˈrab ‘he hit’. No phonological process take place, when mapping the underlying representation to the first cycle of the stem domain due to the stem level (zero) subject suffix /-∅/. The second cycle of the stem level involves a deletion of the unstressed vowel of the initial syllable, as well as the raising of the stressed vowel [a] to schwa [ə]. The output /ðˤrə.(ˈba:).tak/ shows stress shifting and the lengthening of the stem level subject suffix vowel from /-at/ to /-a:t/. The processes are applied simultaneously inside the stem level domain, despite the last attached object suffix /-ak/ being assumed to belong at the word-level phonology.

The behaviour of word level suffixes in defining the stem level cyclic domain is not unheard of in the literature on stratal phonology. Bermudez-Otero & Buckler (2012) present the well-known case of the complementary distribution of the German dorsal obstruents [ç] and [x] as in (93) below.

(93) Complementary distribution of [ç] and [x] (Bermudez-Otero and Buckler 2012)

(a)	**[x]**	following a back vowel		[buːx] Buch 'book'
(b)	**[ç]**	elsewhere, i.e.	following a front vowel	[kyːçə] Küche 'kitchen'
			following a consonant	[mɪlç] Milch 'milk'
			domain-initially	[çiːna] China 'China'

The dorsal obstruent is [x] when preceded by a back vowel, as in (93a) and [ç] when in the three different contexts in (93b). At the word-level, when the diminutive suffix *-chen* is preceded by a back vowel it surfaces an [ç], instead of a [x]. Consider the two examples in (94).

(94) German dorsal obstruent [ç] after back vowel.

(a)	**Kuchen 'cake'** **[kuːxn̩]**	**(b)**	**Kuh-chen 'cow-DIM'** **[kuː-çən]**

underapplication of dorsal fricative assimilation!

The attached word-level diminutive suffix -chen [ç] exceptionally occurs when preceded by the back vowel [u:] in (94b) Kuh-chen [kuː-çən] 'cow'. This is because it behaves as a 'mini-stem' (Bermudez-Otero and Buckler 2012).

Returning to the phonological processes of TLA stem-level internal cyclicity and the puzzle that arises when mapping from the stem-level to the word-level, as described in (92), we observe how the lengthening of [-a] to [a:], as shown in (92), from: /ðˤa.ˈbat/ to /ðˤ.ˈrə.bat/ to /ðˤar.(ˈba:).tak/, makes the word-level (object) suffix be treated as a stem-level affix, creating a cyclic domain within the stem. All the constraints at the stem level are needed to capture the cyclicity of the internal stem-level vowel lengthening and the mapping from the input, stem level cyclic domain, to the optimal word-level output. Consider tableau (95) below.

(95) Stem Level: 1st Cycle

(ðˤa.ˈrab) 'to hit/he hit'	HEAD-FOOT	*V:.V:.	*CV.CV.	FAITH-STRESS	NONFINALITY	Ident-[long]-V	TROCHEE	WSP	PARSE-σ	FT-BIN
a. (ðˤa.ˈrab)					*		*!			
b. (ˈðˤa.rab)				*!						
☞ c. ðˤa.(ˈrab)					*				*	*

Tableau (95) shows that candidate (b) is ruled out by a fatal violation mark of the constraint FAITH-STRESS. Both candidates (a) and (c) violate the constrain NONFINALITY. The decision according to which, a candidate becomes the winner cannot be taken by this constraint, so it is moved to the next constraint. The constraints *V:σ.V:σ and Ident-[long]-V are not applicable since there is no syllable with a long vowel in (a) and (c). Candidate (a) is ruled out by a fatal violation mark associated with the TROCHEE constraint. The winning candidate (c) shows three violated constraints in the first cycle: the constraint NONFINALITY, due to the final syllable being stressed, the constraint PARSE-σ, because the initial syllable /ðˤa-/ is left out of the foot, and the constraint FT-BIN, because the head foot (ˈrab) is composed of a light syllable.

The next cycle is motivated when the subject stem level perfective 3sgm suffix /-at/ is attached to the output of the previous cycle /ðˤa.(ˈrab)-at/. The second cycle involves additional phonological processes inside the stem level domain. Consider tableau (96) below.

(96) Stem Level: 2nd Cycle

ðˤa.(ˈrab) + at	HEAD-FOOT	FAITH-STRESS	NONFINALITY	*V:σ.V:σ	Ident-[long]-V	TROCHEE	WSP	PARSE-σ	FT-BIN
a.☞ (ˈðˤrə.bat)									
b. (ˈðˤrə).bat								*!	*
c. (ðˤ.ˈrə).bat						*!		*	
d. ðˤ.(ˈrə.bat)								*!	
e. ðˤrə.(ˈbat)		*!	*					*	*
f. ðˤ.(rə.ˈbat)		*!	*			*		*	
g. (ðˤrə.ˈbat)		*!	*			*			
h. (ˈðˤ.rə).bat		*!						*	

Tableau (96) shows that candidates (b) and (d) incur fatal violations of the constraint PARSE-σ, so they are ruled out of the competition. Candidate (c) is ruled out by a fatal violation of the TROCHEE constraint. Candidates (e-h) are also ruled out of the competition, since they fatally violate the constraint FAITH-STRESS. The winning candidate is (a), which satisfies all the constraints and shows two phonological processes, namely, vowel deletion and vowel raising. To analyse theses phonological processes, the constraints *Light$_{-\sigma}$#, Ident[low] and MAX are needed to get the final form of the second stem level cyclic domain. These additional constraints are defined below:

(97) Ident[low] (McCarthy 2002)

A violation mark for any changes of the input low vowel value.

(98) *Light$_{-\sigma}$# (Aburakhieh 2009)

A violation mark for more than one final light syllable.

(99) MAX (McCarthy & Prince 1995)

A violation for each input segment x such that x has no output correspondent. (Don't delete.)

(100) Stem level: 2nd cycle. The deletion and raising of [a]

(ˈðˤrə.bat)	*Light-σ#	Ident[low]	MAX-V
a. (ðˤa.ˈra)bat	*!		
b. ☞ (ˈðˤrə.bat)		*	*

Tableau (100) shows that candidate (a) is ruled out by the language specific constraint *CV.CV. The winning candidate (b) violates the constraint MAX and Ident[low]. The output of the stem level is then used as an input to the word level. Mapping from the stem level domain to the word level is triggered by word-level suffixes. Stem level constraints are expected to be ranked differently from word level constraints, as has already been illustrated. Accordingly, the word level object suffix /-ak/ is attached to the stem level output (ˈðˤrə.bat), as in tableau (101) below.

(101) Word level

ˈðˤrə.bat+-ak	HEAD-FOOT	*V:σ.V:σ	*Light-σ#	FT-BIN	WSP	TROCHEE	Ident-[long]-V	FAITH-STRESS	PARSE-σ	NONFINALITY
a. .☞ ðˤrə.(ˈba:).tak							*	*	**	
b. ðˤrə.ba:.(ˈtak)				*!	*		*	*	**	*
c. (ˈðˤrə).ba:.tak				*!	*		*		**	
d. (ðˤa.ˈra).tak			*!			*		*	*	
e. ðˤra:.(ˈba:).tak		*!								

At the word level, candidates (b) and (c) incur fatal violations of the high ranked constraint FT-BIN. Candidate (d) is ruled out by a fatal violation of the constraint *Light$_{-\sigma}$#. Candidate (e) also incurs a fatal violation of the constraint *V:σ.V:σ. The winning candidate (a) violates the constraints Ident-[long]-V, FAITH-STRESS and PARSE-σ.

5.7.4 Post Lexical Epenthetic Stressed Vowel

So far, I have addressed the distinction between lexical levels in TLA stem level. The motivation of the post lexical level and how it differs from the lexical level will now be discussed in this section. In TLA, the distinction between lexical and post lexical levels can be established by the stressed epenthetic vowel where the dialect allows a stressed epenthetic vowel post lexically. Consider the examples in (102) below.

(102) Stress-epenthesis interaction:

a.	ɡa:l	/ˈɡa:l/	'said'
b.	ɡa:l-t	/ˈɡɪ.lɪt/ */ɡa:.ˈlɪt/	'I said'
c.	ɡɪ.lɪ-t-l	/ˈɡɪl.tɪl */ɡɪ.ˈlɪtl/	'I said to'
d.	ɡɪ.lɪ-t-l-kam	/ɡɪl.ˈtɪl.kam/ */ˈɡɪl.tɪl+kam /	'I said to you. Plm.acc'

At the lexical level, stress falls on the right-most (long vowel) heavy syllable, as in (102a). When a stem level subject suffix is attached, the initial light syllable is stressed over the adjacent *CɪC*, since the nucleus in the latter is an epenthetic vowel, as in (102b) and (102c).[18] Thus, the epenthetic vowel does not receive stress at both the stem and word (lexical) levels because the epenthetic vowel is invisible to stress at the lexical level. Conversely, the epenthetic vowel receives stress post lexically as in (102d).

To account for the opacity of stressing the epenthetic vowel in the given example (102d), the constraint HEAD-DEP(O/I), which bans epenthetic vowels from being stressed is needed, along with the constraints DEP-IO, *-CC, WSP, and MAX, to establish the morphophonological situation where this epenthetic vowel is stressed. Accordingly, the first

[18] The epenthetic vowel in (102 b-c-d) is inserted to avoid coda complexity.

stratum will be the bare stem /ˈɡa:l/ 'said', with the attached stem level perfective 1sg subject suffix /-t/, as in tableau (104).

(103) HEAD-DEP(O/I). (Kager 1999b)

Every vowel in the output prosodic head has a correspondent in the input.

(104) Stem Level

(ˈɡa:l)+-t	*-cc	HEAD-DEP(O/I)	DEP-IO	WSP
a. (ˈɡılt)	*!			
b. (ɡı.ˈlıt)		*!		
c. ☞ (ˈɡı.lıt)			*	*

Tableau (104) shows that candidate (a) is ruled out by the constraint *-CC, as a complex coda is not permitted in the dialect unless a /-/ is involved as the second consonant. Candidate (b) incurs a fatal violation of the constraint HEAD-DEP(O/I) since the epenthetic vowel receives stress at the stem level. The winning candidate is (c) since how the constraints DEP-IO and WSP are low ranked at the stem level.

The winning candidate of the above tableau (stem level) will be used as an input to the next tableau (word level). Consider the tableau in (105) below.

(105) Word Level

(ˈɡı.lıt)+l	*-CC	HEAD-DEP(O/I)	WSP	DEP-IO	MAX
a. (ˈɡılt)	*!				
b. ɡı.lı. (ˈtıl)		*!	*		
c. (ˈɡı). lıt.ıl			*!		
d. ☞ (ˈɡıl). tıl				*	*

At the word level, candidate (a) is ruled out due to a fatal violation of the constraint *-CC. Candidate (b) is also ruled out by the constraint HEAD-DEP(O/I), since stress is assigned to the epenthetic vowel. Candidate (c) is ruled out because it violates the constraint WSP. The winning candidate is (d) since the violated constraints DEP(O/I) and MAX are low ranked at the word level.

So far in our discussion, we have established that the constraint HEAD-DEP(O/I) is undominated and very high ranked at the lexical level. As seen from the incremental word-formation process in (102), the epenthetic vowel can be stressed at the post lexical level. To establish this, consider the tableau of how post lexical stress is achieved in (106) below.

(106) Post Lexical stress

(ˈɡɪl).tɪl+kam/	DEP-IO	MAX	WSP	*cc	HEAD-DEP(O/I)
a. (ˈɡɪ).lɪt.la.kam	*!				
b. (ˈɡɪlt)lkam		*!			
c. (ˈɡɪ).lɪtl.k. am			*!	*	
d. ☞ ɡɪl.(ˈtɪl). kam					*

At the post lexical level, candidate (a) is ruled out of the competition by the constraint DEP(O/I), since a vowel is inserted in the input. Candidate (b) is ruled out of the competition by a fatal violation of the constraint MAX. Candidate (c) is ruled out by the constraint WSP given that a light syllable receives stress, over a heavy one. The winning candidate (d) shows that stress shifts to the epenthetic vowel at the post lexical level.

The post lexical constraint ranking thus differs from the stem and word (lexical) level in that the constraint is violable and low ranked, since the epenthetic vowel is stressed post lexically.

At the lexical level, on the other hand, the epenthetic vowel never get stressed. The post level constraint hierarchy is given in (107) below.

(107) Post Lexical Level constraint hierarchy

HEAD-FOOT >> ONSET , *V:σ.V: , *cv.cv. >> DEP-IO >> MAX >> WSP >> *cc >> HEAD_DEP (OI)

5.8 Conclusion

In this chapter, a description of TLA stress, the role of syllable weight, extrametricality and the footing system of TLA have been discussed. Two constraint-based models, namely Classical and Stratal OT analyses were presented. It was illustrated that the complexity and opacity of syllable weight in assigning stress requires different levels with different constraint hierarchies, thereby supporting a Stratal OT account as being more superior. Classical OT requires different constraint hierarchies in order to account for the attested stress patterns, yet this solution is unavailable in standaed OT, since multiple constraints hierarchies are not allowed.

Stressing light syllables and long vowel shortening have been established as occurring at the lexical level. Vowel deletion and low vowel raising processes are applied cyclically at the stem level. This is conditioned by preserving stress inside the stem level domain. In contrast, phonological processes of short vowel lengthening and stress shifting occur at the word level. The process of short vowel lengthening applies to the stem level subject suffix when followed by a word level (object) suffix.

We have also shown how Stratal OT sufficiently handles the stress-epenthesis interaction in TLA. The process of stressing an epenthetic vowel occurs at the post lexical level.

At the stem level, the constraint NONFINALITY is highly ranked, whereas it is ranked low at the word level. The constraint FT-BIN is low ranked at the stem level, but it is high ranked at the word level. Accordingly, a light syllable can be parsed as a degenerate foot at the stem level. The summary of the constraint hierarchies employed at both the lexical and post lexical levels is as follows:

(108) Stem Level constraint hierarchy:

HEAD-FOOT >> NONFINALITY >> FAITH-STRESS >> *V:σ.V:σ >> Ident-[long]-V , TROCHEE >> WSP , PARSE-σ >> FT-BIN.

(109) Word level constraint hierarchy

HEAD-FOOT >> ONSET , *V:σ.V:σ >> FT-BIN >> WSP >> TROCHEE >> Ident-[long]-V >> FAITH-STRESS , PARSE-σ , NONFINALITY.

(110) Post-Lexical Level constraint hierarchy

HEAD-FOOT >> ONSET , *V:σ.V: , *cv.cv. >> DEP-IO >> MAX >> WSP >> *cc >> HEAD_DEP (OI)

Chapter Six: Syncope

6.1 Introduction

Deletion of unstressed short vowels is a phonological process that is observed in many languages. It has been observed that syncope is common in Arabic dialects, especially in unstressed open syllables. This has been noted in many previous studies: Libyan Arabic (Abumdas (1985), Harrama (1993); Al-Ageli (1995); Sheridi (2015), Jordanian Arabic (Abuabbas (2003); Aburakhieh (2009)); Algerian Arabic (Benyoucef 2013), three Sudanese dialects (Ali 2014), Cairene and San'ani dialects (Watson 2002), Iraqi Arabic (Rose 2000) and Sudanese Arabic (Ali 2014).

The purpose of this chapter is to introduce a phonological descriptive discussion of the deletion of such unstressed vowels in TLA. Section (2) introduces a brief discussion on the classification of vowel deletion in Arabic dialects and in TLA, in particular. The rest of section (2) discusses vowel deletion in monosyllabic words and in open and closed syllables in multi-syllabic words. It also emphasises three types of vowels that are subject to deletion, namely high short vowels, central and low vowels. Section (3) introduces a Stratal OT account of vowel deletion in open and closed syllables. Section (4) summarises the chapter.

6.2 The classification of syncope

The process of short vowel deletion is common in Arabic dialects. In the literature, some studies on the phonology of Arabic, divide the Arabic dialects into groups. This division is sometimes based on the complexity of the onset/coda. The first group classifies together dialects that allow for complex onset and codas, where syncope is ‘context-free’. These dialects include Tripolitanian Arabic (Al-Ageli 1995), Syrian (Cowell (1964); Adra (1999);

San'ani (Watson 2002), Jordanian (Abu-Abbas 2003), and Hadhrami (Bamakhramah 2009).[19] The second group involves dialects that do not allow a complex onset/coda. In these instances, the deleted vowel must be before an open syllable. If not, then there is no syncope. Examples of these dialects are Cairene (Broselow (1976); (1992); Kenstowicz (1980); Watson (2002); Sudanese (Hamid 1984) and Makkan (Abu-Mansour (1987); (2011); Gouskova (2003); Kabrah (2004); Bamakhramah (2009)).

Another type of classification that has been pointed for the Arabic dialects is based on vowel deletion. This differentiates between *differential* vs. *non-differential* dialects. Differential dialects involve deletion of high short vowels in open syllables, whereas non-differential dialects are ones in which high and low vowels are deleted in open syllables. Examples of non-differential dialects can be seen in Cairene (Watson (2002), Syrian (Adra 1999), Tripolitanian (Al-Ageli (1996); Sheridi (2015)). The deletion of low and high vowels in Cairene Arabic and Tripolitanian Arabic is exemplified through (1) below, where what we observe is both high and low vowels are subject to deletion.

(1) Examples of Non-Differential dialects

(a) Cairene Arabic (Watson 2002: 71-72)

	Input	**Output**	**Meaning**
Low vowel /a/:	/mitˤēwal/ -a	mitˤiwla	'elongates-sgf'
	/yisōraʔ/ -u	yisurʔu	'become unconscious plm'
	/ra:χar/ -a	raχra	'other-sgf.
	/baniʔa:dam/ -i:n	baniʔadmi:n	'people
High vowel /ɪ/:	/wɪħɪʃ/ -a	wɪħʃa	'bad-sgf'
	/sa:fɪr/ -u	safru	'they travelled'

[19] Tripolitanian Arabic (Al-Ageli 1995) is also classified as a non-differential dialect since both low and high vowels are subject to deletion.

(b) Tripolitanian Arabic (Sheridi 2015: 155-165)

	Input	Output	Meaning
Low vowel /a/:	/ma.tˤar/	mtˤar	'rain'
	/ʒabal/	ʒbal	'mountain'
	/faras/	fras	'hours'
	/nakad/	ŋkad	'sorrow'
High vowel /ɪ/:	/ħɪ.ma:r/	ħma:r	'donkey'
	/sɪ.la:ħ/	sla:ħ	'weapon'
	/kɪ.la:b/	kla:b	'dogs'
	/tɪʃu:f/	tʃu:f	'she sees'

Sheridi (2015) excludes Eastern Libyan Arabic from being classified as a non-differential dialect. She generalises somewhat and states that these dialects are of the differential type. In contrast to Sheridi's (2015) generalised claim about Eastern Libyan, I here claim that the Eastern Libyan Arabic dialect under investigation of this study, TLA, is a non-differential type dialect, since both high and low vowels can be deleted (See § (2.1)).

Differential dialects only delete high vowels, namely the high front short vowel /ɪ/ and high back short vowel /u/. Differential dialects include Maani Arabic (Aburakhieh 2009) and Makkan Arabic (Kabrah 2004), among others. For Makkan Arabic, the only deleted high vowel is the front short vowel /ɪ/, as in (2biii). Below are two illustrations of differential dialects.

(2) Examples of differential dialects

(a) Maani Arabic (Aburakhieh 2009:214)

Input	Output	Meaning
i. /kutub/ -u	kutbu	his books
ii. /ʃarɪb/ -ɪt	ʃar.bɪt	she drunk
iii. /ʕa:rɪf/ -u	ʕa:r.fu	I know him
iv. /fa:hɪm/ -ɪ	fa:h.mɪ	she understood

(b) Makkan Arabic (Kabrah 2004:132)

Input	Output	Meaning
i. /katab/ -u	ka.ta.bu	they wrote
ii. /kutub/ -u	kutubu	his books
iii. /mɪsɪk/ -u	mɪs.ku	they held

Example (2a) shows that Maani Arabic deletes both the high front (/ɪ/) and high back short (/u/) vowels in unstressed open syllables. In contrast, Makkan Arabic deletes high front vowel (/ɪ/) only as in (2b). In (2bi), and (2bii) deletion does not takes place because the vowels /a/ and /u/ are not subject to deletion in this dialect's phonological system.

The process of unstressed vowel deletion in the dialect under investigation, TLA, takes place in both open and closed syllables. Both high and low vowels are subject to deletion, i.e. the process is non-differential. Some other phonological processes, namely low vowel raising, stress and epenthesis interact with vowel deletion. In the next sub-sections, the classification of vowel deletion will be discussed in more detail.

6.2.1 The classification of vowel deletion in TLA

The classification of Eastern Libyan Arabic (ELA) by Sheridi (2015) is not appropriate for Tobruq Libyan Arabic (TLA), even though it forms part of ELA. In TLA, both high and low vowels are commonly subject to deletion. Unlike the dialects mentioned above, TLA is non-differential, since the dialect allows vowel deletion in both open and closed syllables and since both the low short vowel /a/ and the high short vowels /ɪ/ and /u/ can be subject to deletion.

6.2.1.1 High vowel deletion in monosyllabic words

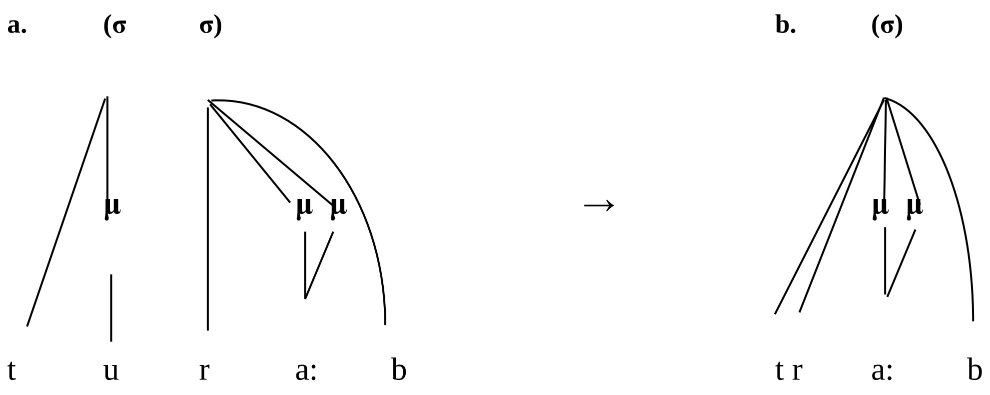
The deletion of high short vowels /ɪ/ and /u/ in TLA changes the CɪCVVC pattern of nominal, adjectival and verbal word-forms into monosyllabic CCVVC structures. The examples in (3) below show high short vowel deletion in monosyllabic verbal and nominal/adjectival forms in TLA.

(3) Monosyllabic High Vowel Deletion

Underlying form	Surface form	Meaning
CVCVVC	CCVVC	
a. /ħɪ.sˤa:n/	ˈħsˤa:n	‘horse’
b. /ħɪ.bɛ:l/	ˈħbɛ:l	‘rope. pl’
c. /sɪ.lɛ:ħ/	ˈslɛ:ħ	‘weapon’
d. /tu.ra:b/	ˈtra:b	‘land’
e. /tɪ.bi:ʕ/	ˈtbi:ʕ	‘she sells’
f. /tɪ.tˤi:r/	ˈtˤtˤi:ʕ	‘it flies’
h. /tɪ.ʕu:m/	ˈtʕu:m	‘swim. 2sgm’

In the examples in (3), the vowels [ɪ] and [u] in the underlying form are deleted respectively. The re-syllabification that occurs at the surface results in a complex onset, which consists of a cluster made up of two consonants which the dialect permits. The diagram in (4) explains the process of vowel deletion and the onset cluster creation that is reasonable for the monosyllabic word form rendering.

(4) Re-syllabification of CV.CVVC



/tu.ra:b/ → /tra:b/ ‘land’

6.2.1.2 Open syllable low vowel deletion (Ca.CVC & CV.Ca.CV)

Since the dialect is non-differential, the low short vowel /a/ can be deleted when located in an open syllable position. The process of syncopation is applied to this type of vowel when a vowel-initial suffix is attached to a bare stem, as shown below.

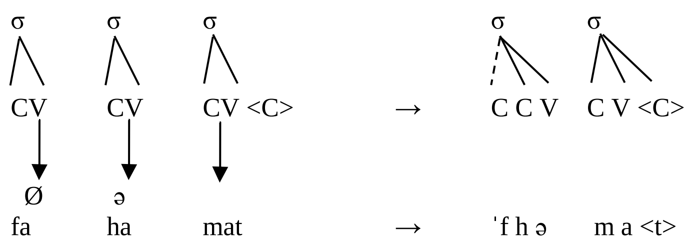
(5) Low vowel deletion in affixed CV.CVC open syllables

Underlying form	Surface form	Meaning
a. /ʕa.raf/ -na	ˈʕrə.fna *ʕa.ˈraf.na	‘we knew M/F’
b. /ɡa.mar/ -ak	ˈɡmə.rak *ˈɡa.ma.rak	‘your moon’
c. /ʕa.nab/ -ak	ˈʕnə.bak *ˈʕa.na.bak	‘your grapes’
d. /fa.ham/ -at	ˈfhə.mat *ˈfa. ha.mat	‘she understood’
e. /ʕa.nab/ -ak	ˈʕnə.bak *ˈʕa.na.bak	‘your grapes’

The set of examples in (5) show that the low vowel [a] is deleted in the underlying forms open syllable. The attached vowel-initial suffix results in the formation of three light syllables in the surface form. This violates the syllabification pattern in the dialect. As a result, a re-syllabification process is applied as in (6) below.

(6) Re-syllabification of multisyllabic CV.CaC.VC

Input **Output**



Given the non-permissivity of the consecutive presence of three light syllables, re-syllabification applies so as to repair the above undesired syllable form. The low vowel in the initial open syllable [fa] is always subject to deletion, as will be discussed later, in the case of inflectional suffixes. Moreover, the underlying stressed vowel [a] in the second syllable is kept in the same position, but is reduced to a schwa [ə].

Unlike in (6), the process of low vowel deletion is applied when the underlying form has tri-syllabic sequence of CV.CV.CV light syllables in a stem that has no attached morphological endings. Consider the examples in (7) below:

(7) /a/ deletion in un-affixed underlying forms with a CV.CV.CV pattern

Underlying form	**Surface form**	**Meaning**
a. /ħa.ra.ka/	ˈħrə.ka *ħa. ˈra.ka	‘movement’
b. /ba.ɡa.ra/	ˈbɡə.ra *ˈba.ɡa.ra	‘cow’
c. /ħa.tˤa.ba/	ˈħtˤə.ba *ˈħa.tˤa.ba	‘wood’
d. /ʃa̲.ʒa.ra/	ˈʃʒə.ra *ˈʃa̲.ʒa.ra	‘tree’
e. /sˤa.na.ba/	ˈsˤnə.ba *ˈsˤa̲.na.ba	‘rock’
f. /ʕa.na.ba/	ˈʕnə.ba *ˈʕa̲.na.ba	‘grape tree’

The examples in (7) show that the initial low vowel of the three light syllables in the underlying form is deleted, even in the case of un-affixed bare stems. This gives further evidence that complex onsets are tolerated and preferred over a surface form with three CV.CV.CV light syllables.

6.2.1.3 Closed syllable high vowel deletion in CV.CɪC word-form patterns

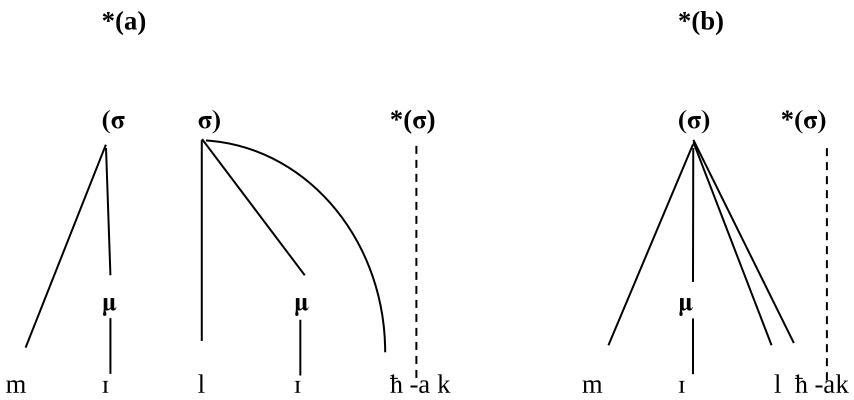
The deletion of an unstressed high vowel in a closed syllable is common in TLA. The process is applied to both nouns and verbs. The process usually involves moving the onset of the un-stressed syllable to a coda, after vowel deletion is applied, and which is motivated further by the addition of a vowel-initial suffix. Consider the examples in (8).

(8) High vowel deletion in closed syllables

Underlying form	Surface form	Meaning
a. /mɪ.lɪħ/ -ak	ˈmɪl.ħak *ˈmɪ.lɪ.ħak	‘your salt. sgm’
b. /ɡɪ.lɪt/ -ɪ	ˈɡɪl.tɪ *ˈɡɪ.lɪ.tɪ	‘you said. sgm’
c. /ʒɪ.bɪt/ -an	ˈʒɪb.tan *ˈʒɪ.bɪ.tan	‘you brought. plf’
d. /ʕɪ.tˤɪr/ -ɪk	ˈʕɪtˤ.rɪk *ˈʕɪ.tˤɪ.rɪk	‘you fragrance. sgf’
e. /mɪ.sɪk/ -ak	ˈmɪs.kak * ˈmɪ.sɪ.kak	‘your musk. sgm’

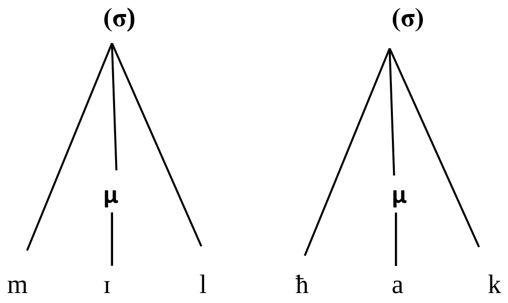
The underlying forms in (8) show the stems with initial open syllables. In the surface form, the initial open syllable is closed by moving the onset of the second syllable into the coda of the initial syllable, once a suffix is added.

(9) Re-syllabification option in CV.CɪC word-forms



The input in (9), /ˈmɪ.lɪħ/-ak, gives us two options. The first option, represented in (9a) preserves the high short vowel in the second syllable. The second option, in (9b) deletes the high short vowel of the second syllable. Both options give invalid forms; (9a) gives three light syllables, and (9b) gives a complex coda. The best option to avoid the undesired cases given above is to apply another re-syllabification as in (10) below:

(10) High vowel deletion in closed syllable



The re-syllabification in (10) is applied after the deletion of the high short vowel in order to avoid a complex coda [-lħ] since the dialect does not allow consonant clusters in coda position. The best choice is therefore /mɪl.ħak/as given in (10) above.

6.2.1.4 High front vowel deletion in Cɪ.CVC patterns

High vowel deletion in an initial open syllable is another process that resuts in onset complexity. The vowel [ɪ] is deleted in cases where a vowel suffix is attached to a bare stem. Consider the examples in (11) below.

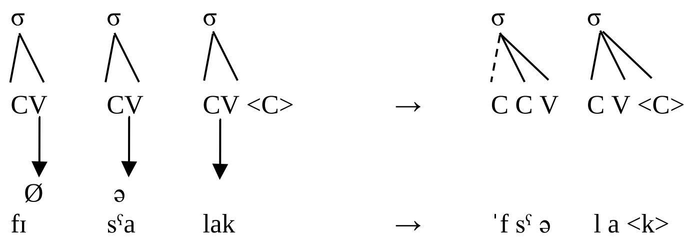
(11) High vowel deletion in open syllables

Underlying form	Surface form	Meaning
a. /fɪ.sˤal/ -ak	ˈfsˤə.lak *fɪ.ˈsa.lak	‘he separated you.sgm’
b. /mɪ.sak/ -at	ˈmsə.kat *ˈ.mɪ.sa.kat	‘she caught’
c. /fɪ.taħ/ -o	ˈftə.ħo *ˈfɪ.ta.ħo	‘you opened. plm’
d. /sɪ.raf/ -a	ˈsrə.fa *ˈsɪ.ra.fa	‘he spent it’
e. /sɪ.man/ -na	ˈsmə.nna *ˈ sɪ.man.na	‘we became fat’

Examples in (11) show two changes in the surface form, namely the deletion of the high vowel and the creation of a complex onset. The reason of this re-syllabification is to avoid three light syllables in a sequence in the surface form. Example (11a) is expanded upon in (12) below.

(12) Re-syllabification of multisyllabic Cɪ.CVC.VC word-forms/patterns

Input **Output**



The re-syllabification in the output in (10) shows simultaneous reduction of the vowel /a/ to a schwa, and a complex onset creation, following the initial high vowel deletion. Consonant clusters in an onset position are tolerated in TLA, so this is preferred over three light syllables in a row.

6.2.1.5 High front vowel deletion in CVV.CɪC patterns

Another position that allows for vowel deletion in TLA is the unstressed high short vowel [ɪ] in closed syllables. In most cases, the stem which has a closed syllable with [ɪ] starts with a long vowel initial syllable. Therefore, any long vowel suffix that's attached causes shortening of the base's long vowel. Consider the examples in (13) below.

(13) High vowel deletion in affixed closed syllables

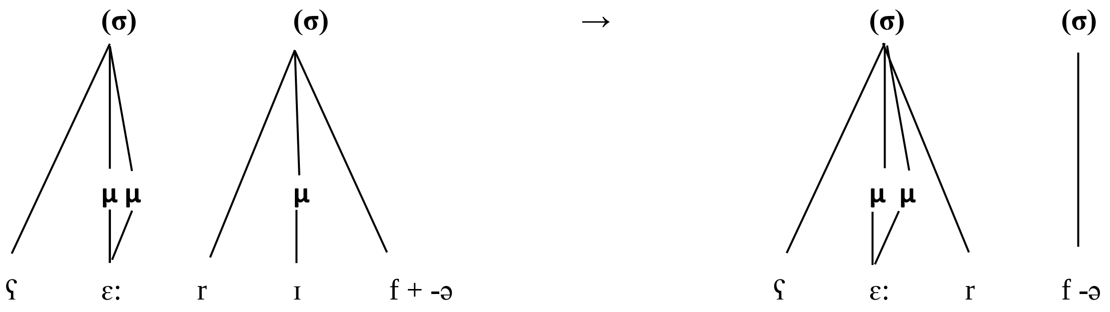
Underlying form	**Surface form**	**Meaning**
a. /ʕɛ:rɪf/ -ə	ˈʕɛ:r.fə *ˈʕɛ:.rɪ.fə	'she knows'
b. /gɛ:ʕɪd/ -i:n	gɛʕ.ˈdi:n *ˈgɛ:ʕɪ.di:n	'we sit/are sitting'
c. /ra:.gɪd/ -ɛ:t	rag.dɛ:t *ˈgɛ:ʕɪ.di:n	'they. plf are sleeping'
d. /sˤa:.jɪm/ -i:n	sˤaj.ˈmi: *ˈsˤa:.jɪ.mi:n	'we are fasting'

The examples in (13), except for (13a) show instances that involve the shortening of the stem's long vowel in the initial syllable. In examples (13b-d) the long vowel in the initial syllable is shortened, since a word with two long vowels is not tolerated in TLA. The process is simultaneously applied with the deletion of the high short vowel [ɪ]. In the case of (13a), only high vowel deletion is applied, since the affixed vowel is short, showing that shortening is a result of the long affix vowel interacting with the stem one. Consider vowel deletion and shortening in (14) below:

(14) [ɪ] Deletion and stem vowel shortening

(a) Deletion of [ɪ] without stem shortening

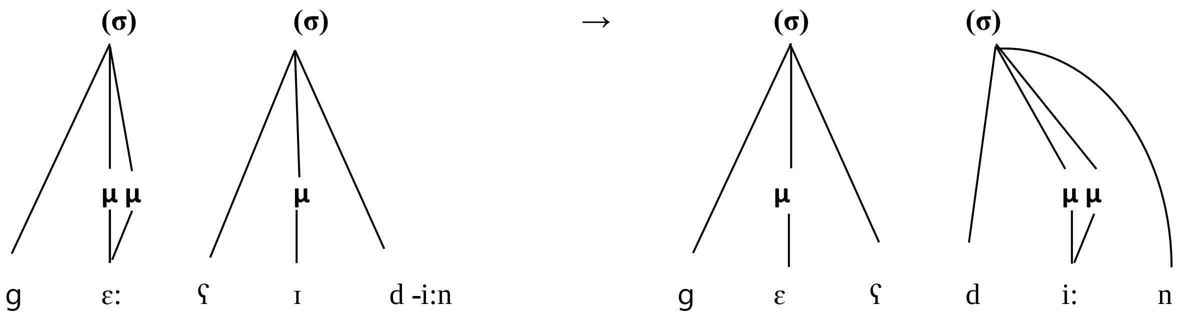
Input **Output**



/ʕɛ:.rɪf/-ə → /ʕɛ:.rfə/ 'know. sgf'

(b) Deletion of [ɪ] with stem long vowel shortening

Input **Output**



/ɡ:ʕɪd/+ -i:n → /ɡɛʕdi:n/ 'set/are setting. 1plm/f'

The illustrations in (14) show that in (14a) the initial long vowel [ʕɛ:] of the input is maintained from the output, since there is only one long vowel. The only change that takes place in (14a) is the deletion of the high vowel [ɪ]. In (14b), the initial long vowel [gɛ:] is shortened to [gɛ] in the context of the long vowel suffix [i:n] expressing plm is attached to the stem. The shortening process and the deletion of the high short vowel are applied when a long vowel suffix is attached to a bare stem that contains a long vowel.

6.2.1.6 Closed syllable low vowel deletion CVC.CV.CaC

Deletion of the low vowel /a/ in the syllable pattern CVC.CV.CaC is applicable when attaching a dual suffix to the bare stem. In TLA, this pattern occurs only with nouns. There is no other word class that involves a tri-syllabic pattern. Consider the examples in (15) below.

(15) Low vowel deletion in affixed closed syllables

Underlying form	Surface form	Meaning
a. /mɪs.tɪ.kat/ -e:n	mɪs.ˈtɪk.te:n *ˈmɪs.tɪ.ka.te:n	‘two chewing gum’
b. /kɪn.dɪ.rat/ -e:n	kɪn.ˈdɪr.te:n *ˈkɪn.dɪ.ra.te:n	‘two pairs of shoes’
c. /mak.tɪ.bat/ -e:n	mak.ˈtɪb.te:n *ˈ mak.tɪ.ba.te:n	‘two library’
d. /bɪn.dɪ.gat/ -e:n	bɪn.ˈdɪg.te:n *ˈ bɪn.dɪ.ga.te:n	‘two guns’
e. /mas.tˤɪ.rat/ -e:n	mas.ˈtˤɪr.te:n *ˈmas.tˤɪ.ra.te:n	‘two rulers’

In examples (15), the phonological change is in terms of syllable structure at the output. The output form involves the presence of three syllables. Three syllables are also present in the underlying bare stem form, yet differ in terms of structure. After the affixation of the dual suffix, the deletion process is triggered and causes changes to the last syllable in which the target vowel is located. To explain the process, the re-syllabification of example (15a) is exemplified in the diagram in (16) below.

(16)

Input				**Output**			
σ	σ	σ		σ	σ		σ
μ μ	μ	μ	μ	μ μ	μ μ		μ
		[a]					
ˈmɪs	tɪ	kat	-e:n	mɪs	ˈtɪk	[Ø]	te:n

/ˈmɪs.tɪ.kat/-e:n /mɪs.ˈtɪk.te:n/ 'two chewing gum'

The diagram in (16) illustrates the deletion of the low vowel, followed by the shift of stress from the initial syllable to the second one, but not to the dual suffix since it is not stress attractor, which changes from CV to CVC following the attachment of the dual suffix /-e:n/.

6.2.1.7 Deletion of schwa

The unstressed central vowel /ə/ is subject to deletion in both closed and open syllables in TLA. In the case of the initial syllable, the process creates complex onsets changing the word from a disyllabic into a monosyllabic. This process is applied in the case of adjectival forms in the contexts of a change from singular to plural. Consider the examples in (17) below.

(17) Schwa deletion creating monomoraic adjectives.

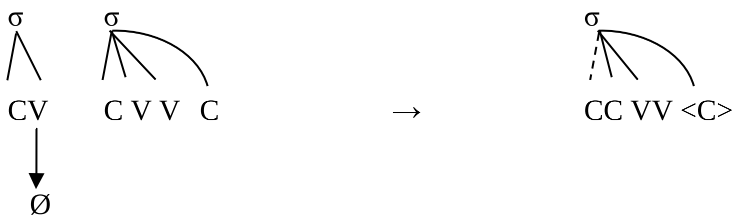
Underlying form	**Surface form**	**Meaning**
a. /sə.mi:n/	ˈsma:n	'fat. pl'
b. /kə.bi:r/	ˈkba:r	'big. pl'
c. /ɡə.di:m/	ˈɡdɪmm	'old. pl'
d. /bə.ʕi:d/	ˈbʕɛ:d	'far. pl'
e. /kə.ri:m/	ˈkra:m	'generous. pl'

The schwa in the adjectival syllable pattern Cə.CVVC in the sgm underlying form the forms in (17), is deleted in the surface form. The deletion results in a monosyllabic word with a long vowel in a different position, in the surface form. The long vowel /i:/ internal to the second syllable in the input above, is changed to another long vowel or a geminate, as in

(17c), in the output as a compensation of the deleted vowel. This is conditioned by the application of schwa deletion of the input's first syllable. Consider the diagram in (18) below.

(18) Re-syllabification of multisyllabic Cə.CVVC adjectival forms

Input		**Output**



k ə b i: r	→	kb a:r
/kə.bi:r/		ˈkba:r 'big pl. m/f.'
/sə.mi:n/		ˈsma:n 'fat pl.m/f'

The output in (18) shows that the deletion of schwa does not affect the bimoraic nucleus in the input. The affiliated dotted line in the output is representative of the initial consonant that precedes the deleted schwa. In other words, the deletion causes re-syllabification from a two syllable-word to a monosyllabic word with a complex onset.

Another position that triggers schwa deletion is in a final closed syllable such as that in CV.CəC structures. The process is applicable in both adjectives and nouns with this pattern when possessive vowel-intial or dual suffixes are attached to them. Consider the examples in (19) below.

(19) Schwa deletion in bisyllabic words of a CV.CəC structure

Underlying form	**Surface form**	**Meaning**
a. /ka.ləb/ -ak	ˈkal.bak *ka.ˈlə.bak	'your dog. sgm'
b. /ʃa.məs/ -ak	ˈʃam.sak *ˈʃa.mə.sak	'your sun. sgm'
c. /ʕə.rəf/ -ɪ	ˈʕə.rfɪ * ʕə.rə.fɪ	'my custom'
d. /ðˤa.rəb/ -ɪk	ˈðˤar.bɪk *ðˤa.rə.bɪk	'your hitting. sgf'
e. /ka.bəd/ -ɛ:n	ˈkab.dɛ:n *kab.dɛ:n	'two livers'

The examples in (19) show how in the case of a vowel-initial suffix attachment in parallel to the data above in (15), the schwa is always deleted when it occurs in an unstressed closed syllable as in ˈCV.CVC.

Up till now, what we have done is identified the syllable types and positions where syncope is applied in the syllable structure of TLA. Four types of vowels that undergo syncope have been identified: the two high short vowels: the high front /ɪ/ and high back [u]; one central short vowel /ə/; and one low short vowel [a]. Vowel deletion in initial open syllables results in a massive variety of two consonant clusters in onset positions, and in many cases, these clusters violate the Sonority Sequencing Principle (SSP) as discussed in chapter 2. Further processes happen simultaneously, along with vowel deletion, namely: vowel reduction, long vowel shortening and vowel lowering. Since this chapter focuses on vowel syncope and its interaction with other processes, a set of examples are chosen in tables (1-3) below to represent the types of deleted vowels, in the different syllable positions available, as considered.

The first process of vowel deletion that will be analysed is that involving the central vowel [ə]. There are two possible positions from which schwa can be deleted; in an initial open syllable and in a final closed syllable. Table (1) below shows examples of input and output forms of schwa in both open and closed syllables.

Table (1) Central vowel /ə/ deletion

Vowel position	Input	SL-Affix	SL output	WL-Affix	WL Output
Schwa in Initial open syllable	a. /tˤə.wa:l/	-na ‘1pl.gen’	/tˤwa:l.na/ ‘we fold’	-na Obj- suff ‘us’	tˤə.ˈwal-na ‘he fold for us’
	b. /mə.sak/	-at ‘perfective-3sgf’	/ˈmsə.kat/ ‘she caught’	-na Obj- suff ‘us’	/məsˈkat-na/ ‘she caught us’
Schwa in Final closed syllable	c. /ka.ləb/	-a(ə) ‘sgf’	/ˈkal.bə/ ‘dog. sgf’	-	-

The second set of vowels is the high-front and high-back short vowels [ɪ] and [u]. The high-front vowel [ɪ] can be deleted from both open and closed syllables, whereas the high-back vowel [u] can only be deleted from an open syllable. Consider the examples in table (2) below.

Table (2) High vowel /ɪ/ + /u/ deletion

Vowel position	Input	SL-Affix	SL output	WL-Affix	WL Output
High front [ɪ] in initial open syllable	a. /ħɪsˤa:n/	-ɪ ‘derivational suffix’	ˈħsˤa:nɪ horse-related’	-	-
	b. /sɪ.raf	-at ‘perfective 3SGF’	ˈsrə.fat ‘she spent’	-hin ‘3PLF.ACC’	sɪr.ˈfat.hin ‘she spent them’
High front [ɪ] in final closed syllable	c. /ʕɛ:rɪf/	-ə(a) ‘SGM’	ˈʕɛ:r.fə ‘he knows’	-na	ʕɛ.ˈrɪf.na ‘he knows us’
High back [u] in initial open syllable	d. /tu.ra:b/	-ɪ ‘derivational suffix’	tra:b.ɪ ‘land-related’	-	-

The third vowel is the low vowel [a], which can be deleted from an initial open syllable and from a final closed syllable. Consider the examples in table (3) below.

Table (3) Low vowel /a/ deletion

Vowel position	**Input**	**SL-Affix**	**SL output**	**WL-Affix**	**WL Output**
Initial open syllable	a. /ɣa.lab/	-na '1PL'	ˈɣləb.na 'we hit'	-hım '3PLM.ACC'	ɣa.lab.ˈnaː.hım 'we hit them'

In the examples given in tables (1-3) above, vowel deletion is applied to the unstressed vowel within the stem level. The deletion of unstressed vowels in open syllables creates complex onsets at this level. At the word level, on the other hand, deletion is not applied if this is to create a complex onset of two consonants. Accordingly, the constraint DEP is expected to be low ranked at the word level. This is supported on example such as /ˈsrə.fat/ 'she spent' (table 2, e.g.b) surface as /sır.ˈfat.hin/ 'she spent them' at word level. In contrast, at the stem level the constraints *-CC and MAX-IO are expected to be violable and low ranked, since vowel deletion is allowed at this level. The long vowel of the bare stem is shortened at the word level output /ʕɛːrıf/ in (table 2, e.g,) which surfaces as ʕɛ.ˈrıf.na 'he knows us'. At the stem level, the long vowel bare stem remains the same as in the stem level output: ˈʕɛːr.fə 'she knows'. Accordingly, the constraint IDENT-IO $_{\text{Long (v)}}$ is expected to be highly ranked at the stem level, and low ranked at the word level. The rest of the chapter will be a discussion of TLA vowel deletion, based on a Stratal OT account using the set of data given in the above tables (1-3).

6.3 A Stratal OT account for TLA syncope

The following sections present the OT analysis of unstressed vowel syncope and vowel shortening for the TLA facts. Since syncope in TLA is non-differential, both high and low vowels are subject to deletion. To account for vowel deletion in the dialect at both the stem and word levels, the following constraints will be used: *CC-, IDENT-IO (Low v), SSP, *COMPLEX-CODA, MAX-IO, ONSET, *μμμ, License-μ, FT-BIN, IDENT-IO (Long v) and *Light-$_{\sigma}$#. The constraint *CC- prohibits consonant sequences in onset position. The constraint IDENT-IO (Low v) preserves low vowels in the input from being raised. The constraint SSP ensures segments follow the sonority sequencing principle. The constraint *COMPLEX-CODA, prohibits consonant cluster in coda position. The constraint MAX-IO prevents input segments from being deleted in the output form. The output of the stem level will be used as an input at the word level, following the affix ordering generalisation.

(20) *COMPLEX-ONSET (Prince & Smolensky 1993)

A syllable must not have more than one onset segment.

(21) IDENT (High) Beckman (1998)

An input segment and its output correspondent must have identical specifications for the feature [high].

(22) *COMPLEX-CODA (Prince & Smolensky 1993)

Complex codas are prohibited.

(23) MAX-IO

Every segment of the input has a correspondent in the output

(24) ONSET McCarthy (2008)

A syllable must have an onset.

(25) *[μμμ]$_{\sigma}$ McCarthy (2008)

No syllable of three moras. (Assign one violation mark for every superheavy syllable.

(26) License-μ (Kiparsky 2003)

A mora must be affiliated to a syllable.

(27) FT-BIN (McCarthy and Prince (1993); Kager (1999)

Feet are binary under moraic or syllabic analysis.

(28) IDENT-IO (Low v) McCarthy (2002)

A low vowel in the input must have a correspondent in the output.

(29) *Light$_{-\sigma}$#

A violation mark for more than one final light syllable.

(30) NONHEAD (ə) (Cohn & McCarthy 1994)

Schwa syllables cannot be heads of feet.

(31) *i]σ (Kenstowicz 1995)

High short unstressed vowels in open syllables are not allowed.

(32) *C^{unsyll} (McCarthy 2008)

Assign one violation mark for every unsyllabified segment.

(33) *Unstressed/ə (*Unstr-ə) (Crosswhite 2001:39)

Schwas are not found in unstressed positions.

(34) *VVC- (Kiparsky, 2003)

Nonfinal long closed syllables or long open syllables which are followed by a moraic consonant are not allowed.

6.3.1 Central vowel deletion (schwa)

The position of stress is important for investigating the deletion of schwa in TLA, since the unstressed vowel only, is subject to deletion. We discussed in chapter 4 that verbs of CV.CVC pattern have final stress. This therefore helps us move to further a discussion as to when one can attach the assumed stem and word level suffixes. The above constraint *Unstr-ə is expected to be high ranked at the stem level, while MAX-IO is expected to be violable and ranked low. The deletion of the unstressed schwa of the syllable pattern Cə.CVC, as in /mə.ˈsak/, is considered in the subsection below.

6.3.1.1 Stem-level central vowel in open syllable

In the examples in table (1b), the stem level input /mə.ˈsak/-at 'she caught' is changed to /ˈmsə.kat/ in the optimal output form. This shows some phonological changes, including the reduction of the input's stressed vowel, and the deletion of the central vowel of the initial syllable. Accordingly, to account for schwa deletion in an open syllable, as in /mə.ˈsak/, the constraints *Unstressed/ə, MAX-IO, *Light$_{\sigma}$#, FT-BIN and ONSET are needed to account for such schwa deletion in open syllables at the stem level. The example in table (1b), /mə.ˈsak/, establishes a dominant relationship between MAX-IO and *Unstressed/ə. The constraint *Unstressed/ə must outrank MAX-IO, since the optimal output does not result in three light syllables in a row. Consider tableau (35) below.

(35) Stem Level: /mə.ˈsak/-at

/mə.ˈsak/-at	*Unstr-ə	MAX-IO
a.☞ (ˈmsə).kat		*
b. mə.(ˈsak.at)	!*	

Tableau (35) shows that candidate (b) loses, because it incurs a fatal violation of *Unstressed/ə. The winning candidate is (a), since the constraint *Unstressed/ə ranks higher than MAX-IO.

At the stem level, the ranking of *Unstressed/ə above MAX-IO ensures that schwa is stressed in a case like the above syllable pattern of the optimal candidate. A hypothetical candidate like /(ˈmə.sa).kat/ could have won if the constraint *Light$_{\sigma}$# was not included in the stem level hierarchy. Consider tableau (36) below.

(36) Stem Level: /mə.ˈsak/-at

/mə.ˈsak/-at	*Light$_{-\sigma}$#	*Unstr-ə	MAX-IO
a.☞ (ˈmsə).kat			*
b. mə.(ˈsak.at)		!*	
c. (ˈmə.sa).kat	*!	*	

Tableau (36) shows that candidate (c) is ruled out, since the final CVC /kat/ is light, and because the phonology of TLA does not like three light syllables in a row. Accordingly, the constraint *Light$_{-\sigma}$# outranks *Unstressed/ə, and hence the winning candidate is (a). Thus, the constraint *Light$_{-\sigma}$# outranks MAX-IO.

However, an additional candidate, namely (ˈmsək).at, could win the competition if the constraint ONSET is excluded from the constraint hierarchy. The constraint ONSET should thus be ranked above *Light$_{-\sigma}$#, as in (37):

(37) Stem Level: /mə.ˈsak/-at

/mə.ˈsak/-at	ONSET	*Light$_{-\sigma}$#	*Unstr-ə	MAX-IO
a.☞ (ˈmsə).kat				*
b. mə.(ˈsakt)			!*	
c. (ˈmə.sa).kat		*!		
d. (ˈmsək).at	*!			*

Tableau (37) shows that both candidate (a) and (d) have the same number of segments at the onset, but the markedness ONSET constraint is fatally violated by candidate (d). Lastly, given the deletion of the schwa in the open syllable of the input, a complex onset results, and hence the formation of a monomoraic foot, which renders (a) as the optimal candidate. This thus implies that the constraints *CC- and FT-BIN should be tolerated and ranked low at the stem level. Through tableau (38), we can observe how there is no domination relationship between the low ranked constraint MAX-IO, FT-BIN and *CC- at the stem level.

(38) Stem Level: /mə.ˈsak/-at

/mə.ˈsak/-at	ONSET	*Light$_{-\sigma\#}$	*Unstr-ə	MAX-IO	*CC-	FT-BIN
a. ☞ (ˈmsə).kat				*	*	*
b. mə.(ˈsakt)			!*			
c.(ˈmə.sa).kat		*!				
d. (ˈmsək).at	*!			*	*	

The constraint hierarchy for schwa deletion in open syllables is as in (39) below.

(39) Stem level schwa deletion in open syllable pattern Cə.CVC-VC:

ONSET >> *Light$_{-\sigma\#}$ >> *Unstressed/ə >> MAX-IO , *CC- , FT-BIN.

The other example of schwa deletion in open syllable positions can be observed internal to Cə.CVVC-CV patterned word-forms, such as is as given in table (1a), e.g. /tˤə.ˈwa:l/-na. This syllable pattern contains a closed long syllable. Accordingly, the additional constraints IDENT-IO (Long v), *C^{unsyll} and *VVC- are required to account for this pattern at the stem level. The constraint *C^{unsyll} is a useful filter to get rid of some hypothetical candidates that have unsyllabified consonants. The constraint *VVC- bans long vowel closed syllables in word-internal position. Consider the tableau in (39) below.

(39) Stem Level: /tˤə.ˈwa:l/ -na 'we lengthened'

/tˤə.ˈwa:l/-na	*Unstr-ə	*CC-	MAX-IO
a.☞(ˈtˤwa:)lna		*	*
b. tˤə.(ˈwa:).lna	*!		

Tableau (39) shows that candidate (b) is ruled out as a result of a fatal violation of Unstressed/ə. Thus, the low ranked constraints *CC- and MAX-IO favour candidate (a) over (b). An unstressed schwa in an open syllable is not deleted if it causes an unsyllabified consonant. A hypothetical candidate like /(ˈtˤwa:).l.na/ could win if the constraint *C^{unsyll} is excluded from the stem level phonology. Consider tableau (40) below.

(40) Stem Level: /tˤə.ˈwa:l/ -na ‘we lengthened’

/tˤə.ˈwa:l/-na	*C^{unsyll}	*Unstr-ə	*CC-	MAX-IO
a.☞(ˈtˤwa:)lna			*	*
b. tˤə.(ˈwa:).lna		*!		
c. (ˈtˤwa:).l.na	*!			

Tableau (40) shows that candidate (a) is still optimal, since candidate (c) incurs a fatal violation of the constraint *C^{unsyll}. In other words, candidate (c) /(ˈtˤwa:).l.na/ could have been favoured over (a), if the constraint *CC- is ranked higher than C^{unsyll}.

In TLA, an internal long vowel within a closed syllable is not allowed. This is filtered out by the constrain *VVC-, which is always ranked high in the phonology of TLA. Accordingly, the constraint *VVC- rules out any candidate that has this type of internal syllable, as in tableau (41) below.

(41) Stem Level: /tˤə.ˈwa:l/ -na ‘we lengthened’

/tˤə.ˈwa:l/-na	*VVC-	*C^{unsyll}	*Unstr-ə	*CC-	MAX-IO
a.☞(ˈtˤwa:)lna				*	*
b. tˤə.(ˈwa:).lna			*!	*	
c. (ˈtˤwa:).l.na		*!		*	*
d. (tˤwa:l).na	*!				

Tableau (41) shows that candidate (d) incurs a fatal violation of the high ranked constraint *VVC-. If this constraint is not in the constraint hierarchy, we would not be in a position to decide whether the winning candidate is (a) or (d). Thus, the losing candidate (d) helps us to establish a steady stem level constraint ranking.

At the stem level, the last constraint needed to get a full constraint hierarchy is IDENT-IO (Long v). This constraint is expected to be ranked high, at least at the stem level. Consider tableau (42) below:

(42) Stem Level: /tˤə.ˈwa:l/ -na ‘we lengthened’

/tˤə.ˈwa:l/-na	IDENT-IO (Long v)	*VVC-	*C^unsyll	*Unstr-ə	*CC-	MAX-IO
a.☞(ˈtˤwa:)lna					**	*
b. tˤə.(ˈwa:).lna				*!	*	
c. (ˈtˤwa:).l.na			*!		*	*
d. tˤə.(ˈwa:l).na		*!				
e. (ˈtˤwal).na	*!					

Tableau (42) shows that constraint IDENT-IO (Long v) is ranked high at the stem level. Accordingly, candidate (e) is ruled out of the competition because it incurs a fatal violation mark with respect to constraint IDENT-IO (Long v). As will be shown later, the constraint IDENT-IO (Long v) is crucial for the stem and word level contrast, since it is low ranked, at the word level.

With that we conclude the distribution of unstressed schwa deletion in open syllables. The stem level constraint hierarchy for CV.CVVC.CV patterns is given in (43) below.

(43) Stem level schwa deletion in open syllable pattern Cə.CVVC-CV:

IDENT-IO (Long v) >> *VVC- >> *C^{unsyll} >> *Unstressed/ə >> *CC- , MAX-IO

6.3.1.2 Stem-level central vowel in closed syllable

At the stem level, deletion of schwa in closed syllables could result in a consonant cluster, if the underlying form CV.CəC-V is re-syllabified, as CVCC-V. Accordingly, the constraint COMPLEX-CODA is required for the stem level input, given in table (1), /ˈka.ləb/-a/. Apart from *CC- and FT-BIN, the other constraints that we used for schwa deletion in open syllables above will be used for schwa deletion in closed syllables, as represented in tableau (44) below.

(44) Stem Level: /ˈka.ləb/-a 'dog. SGF'

/ˈka.ləb/-a	COMPLEX-CODA	ONSET	*Light$_{-\sigma}$#	*Unstr-ə	MAX-IO
a. ☞ (ˈkal) ba					*
b. (ˈkal).bə				!*	*
c. (ˈka.lə).ba			*!	*	
d. (ˈka.ləb).a		*!		*	
e. (ˈkalb)	*!				**

Tableau (44) shows that candidate (b) incurs a fatal violation mark of the constraint *Unstressed/ə. Candidate (c) loses the competition since it fatally violates the constraint *Light$_{-\sigma}$#. Candidate (d) is also ruled out because it incurs a fatal violation of the constraint ONSET. The optimal candidate is thus (a), since it satisfies all the given constraints, apart from the low ranked violable constraint MAX-IO. The constraint hierarchy of schwa deletion in closed syllable position is given in (45) below.

(45) Stem level schwa deletion in closed syllable pattern: CV.CəC-V

COMPLEX-CODA , ONSET >> *Light$_{\sigma\#}$ >> *Unstressed/ə >> MAX-IO.

The established stem level constraint hierarchies for the deletion of schwa in open and closed syllables are integrated as shown in tableaux (46) below:

(46) Stem Level: Deletion of schwa

1. /tˤə.ˈwa:l/-na ‘ we lengthened’	COMPLEX-CODA	ONSET	*Light$_σ$#	IDENT-IO (Long v)	*VVC-	*C^{unsyll}	*Unstr-ə	*CC-	FT-BIN	MAX-IO
1.a ☞(ˈtˤwa:)lna								**		*
1.b tˤə.(ˈwa:).lna							*!	*		
1.c (ˈtˤwa:).l.na						*!		*		*
1.d tˤə.(ˈwa:l).na					*!		*			
1.e (ˈtˤwal).na				*!				*		

2. /mə.ˈsak/-at **‘she caught’**	COMPLEX-CODA	ONSET	*Light$_σ$#	IDENT-IO (Long v)	*VVC-	*C^{unsyll}	*Unstr-ə	*CC-	FT-BIN	MAX-IO
2.a☞ (ˈmsə).kat								*	*	*
2.b mə.(ˈsakt)							*!			
2.c (ˈmə.sa).kat			*!							
2.d (ˈmsək).at		*!						*	*	

3. /ˈka.ləb/-a **‘dog. SGF’**	COMPLEX-CODA	ONSET	*Light$_σ$#	IDENT-IO (Long v)	*VVC-	*C^{unsyll}	*Unstr-ə	*CC-	FT-BIN	MAX-IO
3.a ☞ (ˈkal).ba										*
3.b (ˈkal).bə							*!			*
3.c (ˈka.lə).ba			*!				*			
3.d (ˈka.ləb).a		*!					*			
3.e (ˈkalb)	*!							*		**

The integration of the possible examined syllable patterns which exemplify schwa deletion in open and closed syllables shows that the stem level desired output is successfully produced. With that I summarise the stem level constraint hierarchy is summarised in (47) below.

(47) Stem Level: schwa deletion.

COMPLEX-CODA , ONSET >> *Light$_{-\sigma}$# >> IDENT-IO (Long v) >> *VVC- >> *C^{unsyll} >> *Unstressed/ə >> *CC- , FT-BIN , MAX-IO

6.3.1.3 The Schwa at the Word level

At the word level, the stem level optimal output in tableau (46) is candidate (a), /(ˈtˤwa:)lna/ 'we lengthened'. This is then will be used as an input for the attachment of the object suffix /-na/ '1PL.GEN', which belongs to the word level phonology (as illustrated in chapter 5 §5.2.4).

Schwa is not expected to be subject to deletion at the word level. Instead, the processes of long vowel shortening, and vowel insertion are applied. To investigate how the constraints *C^{unsyll}, IDENT (Long v) and DEP play out the interaction, consider the following tableau.

(48) Word Level: /(ˈtˤwa:)lna 'he lengthened … for us'

(ˈtˤwa:)l + /-na/	*C^{unsyl}	IDENT-IO (Long v	DEP
a. ☞ tˤə.(ˈwal).na		*	*
b. tˤə (ˈwa:).l.na	*!		

At the word level, candidate (b) is ruled out by the constraint *C^{unsyll}. Candidate (a) thus wins the competition as it satisfies *C^{unsyll} over DEP and IDENT (Long v). This shows that the processes of vowel shortening, and epenthesis belongs to word level phonology. The complex onset is broken up by inserting a schwa in between the initial consonants. Accordingly, the constraints DEP and IDENT (Long v) are violable and low ranked at the word level. The looser candidate (b) is a good start for the stem and word levels crucial distinct.

To ensure the optimal candidate surfaces as /tˤə.(ˈwal).na/ and not as /(ˈtˤwal).na/ at the word level, the constraint *CC-, which bans consonant clusters at an onset position and the constraint MAX-IO which bans deletion must be promoted. Consider tableau (49) below.

(49) Word Level: /(ˈtˤwa:)lna ‘he lengthened … for us’

(ˈtˤwa:)lna	*CC-	MAX-IO	*C^unsyll	IDENT-IO (Long v	DEP
a. ☞ tˤə.(ˈwal).na				*	*
b. tˤə (ˈwa:).l.na			*!		
c. (ˈtˤwal).na	*!	*			

Tableau (49) shows that candidate (c) is ruled out of the competition, as it fatally violates the constraint *CC-. At the word level, the optimal candidate (a) satisfies the constraints *CC- and MAX-IO. There is no domination relationship between the constraints MAX-IO and *CC-. A hypothetical candidate such as /tˤə.(ˈwa).lna/ could turn out to be optimal if the constraint FT-BIN is not included in the hierarchy. At the word level, the constraint FT-BIN is ranked highly. Consider tableau (50) below.

(50) Word Level: /(ˈtˤwa:)lna ‘he lengthened … for us’

(ˈtˤwa:)lna	FT-BIN	*CC-	MAX-IO	*C^unsyll	IDENT-IO (Long v)	DEP
a. ☞ tˤə.(ˈwal).na					*	*
b. tˤə (ˈwa:).l.na				*!		*
c. (ˈtˤwal).na		*!	*		*	
d. tˤə.(ˈwa).lna	*!	*			*	*

Tableau (50) shows that candidate (d) fatally violate the constraint FT-BIN. The optimal candidate (a) satisfies FT-BIN. At the word level, an epenthetic schwa is involved to create an initial open syllable. This is through the constraint ranking: *CC- and MAX-IO. The following constraint hierarchy established for the word level output Cə.CVC.CV e.g. as in /tˤə.(ˈwal).na/ is given in (51) below.

(51) Word level: schwa insertion of CCVV.CCV.

FT-BIN >> *CC- , MAX-IO >> *C^{unsyll} >> IDENT-IO (Long v) , DEP.

At the word level, the example /mə.sak/-at 'she caught', which surfaces at the stem level as (ˈmsə).kat, will be used as an input in tableau (52). Onto this word-form we attach the object suffix -na '1PL. GEN', which belongs to the word level, to the stem level output. The constraint hierarchy in (51) is used in (52) to evaluate whether it can be used for this different syllable structure. Consider the tableau below.

(52) Word Level: (ˈmsə).kat + -na 'she caught us'

(ˈmsə).kat -na	FT-BIN	*CC-	MAX-IO	*C^{unsyll}	IDENT-IO (Long v)	DEP
a. ☞ məs.(ˈkat).na						*
b. (məs.ˈka).t.na				*!		*
c. (ˈmsə.ka)t.na		*!	*			
d. məs.(ˈka).tna	*!	*				*

Tableau (52) shows that, at the word level, the constraints *CC- , MAX-IO and FT-BIN are also ranked high for the pattern CəC.CVC.CV. They outrank the constraint DEP. The outputs of tableaux (50) and (52) thus share the immunity against schwa deletion and a stressed schwa. Even though the two examples have different syllable patterns, they share the fact that schwa repels stress. Both examples are integrated in tableau (53) below to examine the low ranked stem level constraint *Unstressed/ə.

(53) Word Level: Schwa insertion/stress repulsion

1. (tˤˈwa:l).na	FT-BIN	*CC-	*Unstr-ə	MAX-IO	*C^{unsyll}	IDENT-IO (Long v)	DEP
1.a ☞tˤə.(ˈwal).na						*	*
1.b tˤə (ˈwa:).l.na					*!		*
1.c (ˈtˤwal).na		*!		*		*	
1.d tˤə.(ˈwa).lna	*!	*				*	*
1.e (ˈtˤə.wa).lna			*!				
2. (ˈmsə).kat -na	FT-BIN	*CC-	*Unstr-ə	MAX-IO	*C^{unsyll}	IDENT-IO (Long v)	DEP
a. ☞ məs.(ˈkat).na						*	*
b. (məs.ˈka).t.na					*!		*
c. (ˈmsə.ka)t.na		*!	*	*		*	
d. məs.(ˈka).tna	*!	*				*	*
e. (ˈməs).kat.na			*!				

At the word level therefore, the deletion of an unstressed schwa fails, both in open and closed syllable positions since the constraints MAX-IO, *Unstressed/ə and *CC- are highly ranked, at the word level. This shows that deletion is not permitted if it results in consonant clusters at the word level. Accordingly, the undominated constraints DEP and IDENT-IO (Long v) are ranked low at the word level. The constraint hierarchy at the word level is as in (54) below.

(54) Word level: schwa insertion.

FT-BIN >> *CC- >> *Unstressed/ə >> MAX-IO >> *C^{unsyll} >> IDENT-IO (Long v) >> DEP.

6.3.2 High short vowel deletion.

6.3.2.1 High short vowel at the stem level

To account for high vowel deletion given in table (2), the constraints *i]σ, ONSET, *μμμ, IDENT-IO (Long v), ONSET, *Light$_{σ}$# and MAX-IO are needed. The constraint *i]σ bans the high short vowel in an open syllable from being deleted. The constraint *μμμ bans any trimoraic syllable. The constraint ONSET bans any onset-less syllable. The constraint MAX-IO preserves the input segments to appear the same as in the output form. The constraint IDENT-IO (Long v) bans the long vowel from shortening. The counterexample of table (1b) where /ʕɛ:rɪf/-ə(a) 'she knows' surfaces as ˈʕɛ:r.fə, will be used as an illustration of high short vowel deletion at the stem level. Consider tableau (55) below.

(55) Stem Level: /ʕɛ:rɪf/ -ə(a) 'he knows'

ʕɛ:rɪf -ə	*i]σ	MAX-IO
a. ☞ (ˈʕɛ:) rfə		*
b. (ˈʕɛ:).rɪfə	*!	

Tableau (55) shows that the winner candidate (a) favours the violation of the constraint * i]σ over the violation of MAX-IO. Candidate (b) fatally violates the constraint * i]σ. At the stem level, the constraint *i]σ outranks MAX-IO. However, a third candidate like (ˈʕɛ:r).fə, which is a combination of (a) and (b) would win the competition if the high ranked constraint *μμμ were not part of the dialect's phonological system. Consider tableau (56) below.

(56) Stem Level: /ʕɛːrɪf/ -ə 'he knows'

ʕɛːrɪf -ə	*μμμ	*i]σ	MAX-IO
a. ☞ (ˈʕɛː) rfə			*
b. (ˈʕɛː).rɪfə		*!	
c. (ˈʕɛːr) fə	*!		*

As shown in tableau (56), candidate (c) is ruled out of the competition because it incurs a fatal violation of the constraint *μμμ. The constraint *μμμ dominates *i]σ. At the stem level, the constraint IDENT-IO (Long v) dominates *μμμ. This is because stem level phonology bans any output like (ˈʕɛr) fə. Consider tableau (57).

(57) Stem Level: /ʕɛːrɪf/ -ə 'he knows'

ʕɛːrɪf -ə	IDENT-IO (Long v)	*μμμ	*i]σ	MAX-IO
a. ☞ (ˈʕɛː) rfə				*
b. (ˈʕɛː).rɪ.fə			*!	
c. (ˈʕɛːr) fə		*!		*
d. (ˈʕɛr) fə	*!			*

At the stem level, the additional candidate (d) incurs a fatal violation of the constraint IDENT-IO (Long v). Long vowel shortening is banned at the stem level. Accordingly, the constraint IDENT-IO (Long v) dominates *μμμ.

The last two candidates needed for the deletion of a high vowel are ONSET and *Light$_{-\sigma}$#. Consider tableau (58) below.

(58) Stem Level: /ʕɛ:rɪf/ -ə ‘he knows’

ʕɛ:rɪf -ə	ONSET	*Light-σ#	IDENT-IO (Long v)	*μμμ	*i]σ	MAX-IO
a. ☞ (ˈʕɛ:) rfə						*
b. (ˈʕɛ:).rɪfə					*!	
c. (ˈʕɛ:r) fə				*!		*
d. (ˈʕɛr) fə			*!	*		*
e (ˈʕɛ).rɪ.fə		*!	*		*	
f. (ˈʕɛr).ɪfə	*!				*	

Tableau (58) shows that candidate (f) is ruled out by the constraint ONSET, since it has a syllable that starts with a vowel. Candidate (e) is also ruled out of the competition as it incurs a fatal violation of the constraint *Light-σ#. However, the aforementioned phenomenon shows that the deletion of high unstressed vowels in the syllable pattern CVV.CɪC-V [ʕɛ:.rɪfə] surfaces as [ʕɛ:.rfə], which does not affect the stem level long vowel, since the constraint IDENT-IO (Long v) ensures that vowel length is maintained after high vowel deletion.

Another position that involves high short vowel deletion will be considered. This is through the adjectival example in table (2) /ħɪ.sˤa:.n/-ɪ ‘horse-related’, where the /ɪ/ is an adjectival suffix that changes the noun into an adjective, which surfaces as (ˈħsˤa:).nɪ. The same constraints that have been used in the above example will be used with the additional constraint *-CC, since the deleted high short vowel results in a complex onset in the surface form. Consider the tableau in (59) below.

(59) Stem Level: /ħɪ.sˤa:.n/-ɪ 'horse-related'

/ħɪ.sˤa:.n/-ɪ	ONSET	*Light-σ#	IDENT-IO (Long v)	*μμμ	*i]σ	MAX-IO	*cc-
a. ☞ (ˈħsˤa:).nɪ					*	*	*
b. ħɪ.(ˈsˤa:).nɪ					**!		
c. ħɪ.(ˈsˤa:nɪ)				*!	**	*	
d. ħɪ.(ˈsˤanɪ)			*!	*	**	*	
e ħɪ.(ˈsˤa).nɪ		*!	*		**		
f. (ˈħɪsˤ)a:.nɪ	*!				*		

Tableau (59) shows that the optimal candidate (a) has three violations of the low ranked constraints *i]σ, MAX-IO and *CC-.

Before concluding and illustrating the stem level high vowel deletion constraint hierarchy that applies in TLA, an additional constraint, namely FT-BIN, is needed, in order to account for the deletion of high vowels in the syllable pattern CV.CVC-CV /sɪ.raf /-at 'she spent' given in table (2b), that surfaces as CCV.CVC (ˈsrə) fat. Consider the following tableau.

(60) Stem Level: /sɪ.raf /-at

sɪ.raf -at	ONSET	*Light-σ#	IDENT-IO (Long v)	*[μμμ]σ	*i]σ	*CC-	MAX-IO	FT-BIN
a ☞ (ˈsrə) fat						*	*	*
b. sɪ.(ˈraf)at	*!				*			
c. (ˈsɪ) ra.fat		*!						
d. sɪ.(ˈra:fat)			*!					
e. sɪ.(ˈra:)fat				*!				

Tableau (60) shows that candidate (b) is ruled out of the competition as it violates the undominated constraint ONSET. Candidate (c) incurs a fatal violation of *Light$_{-\sigma}$# as three light syllables in a row are not allowed in the dialect. Candidate (d) is also ruled out by IDENT-IO (Long v). Candidate (e) is ruled out through its violation of the constraint *[μμμ]$_{\sigma}$. The winning candidate is (a).

The last example involving a stem level unstressed high vowel deletion is the back unstressed short vowel [u], given in table (2.d) as illustrated in the word-form /tura:b/-ɪ**.** This example basically surfaces as monosyllabic /tra:b/ in TLA. Again, the influence of an unstressed high vowel deletion does not affect the long vowel at the stem level, since the constraint IDENT-IO (Long v) actively rules out any candidate that shows shortening of the stem's long vowel. Consider tableau (61) below.

(61) Stem Level: /tura:b/-ɪ 'land-related'

tu.ra:b-ɪ	ONSET	*Light$_{-\sigma}$#	IDENT-IO (Long v)	*[μμμ]$_{\sigma}$	*i]σ	*CC-	MAX-IO	FT-BIN
a tu.(ˈra:b).ɪ	*!			*				*
b. tu. (ˈra).bɪ		*!	*					*
c (ˈtra.bɪ)			*!			*	*	
d (ˈtra:b).bɪ				*!		*	*	*
e ☞(ˈtra:).bɪ					*	*	*	

As shown in tableau (61), candidate (a) violates the undominated constraint ONSET. Candidate (b) incurs a fatal violation of the constraint *Light$_{-\sigma}$#. Candidate (c) is ruled out by IDENT-IO (Long v). Constraint *μμμ then rules candidate (d) out of the competition. The winning candidate is (e) since the constraints *CC- and *i]σ is low ranked at the stem level.

As for the rest of the constraints, it has been already established that, at the stem level, the constraints MAX-IO, *i]σ and *CC- are outranked by the constraints ONSET, *Light$_{-\sigma}$#, IDENT-IO (Long v) and *µµµ. The different syllable patterns are integrated in tableaux (62) as below.

(62) Stem Level: High short vowel deletion

1. ʕɛ:rɪf -ə 'he knows'	ONSET	*Light$_{\sigma}$#	IDENT-IO (Long v)	*[μμμ]$_{\sigma}$	*i]σ	MAX-IO	*CC-	FT-BIN
1. a. (ˈʕɛ:r).ɪfə	*!			*				*
1. b. (ˈʕɛ:r).fə				*!	*	*		*
1. c.☞(ˈʕɛ:).rfə						*	*	*
1. d. (ˈʕɛ)rfə			*!		*	*	*	*
2. ħɪsˤa:n -ɪ 'horse-related'	ONSET	*Light$_{\sigma}$#	IDENT-IO (Long v)	*[μμμ]$_{\sigma}$	*i]σ	MAX-IO	*CC-	FT-BIN
2.a (ˈħɪsˤ)a:nɪ	*!							*
2.b (ˈħsˤa).nɪ			*!		*	*	*	*
2.c ħɪ. (ˈsˤa:nɪ)				*!				*
2.d ☞(ˈħsˤa:).nɪ					*	*	*	
3. sɪ.raf -at 'she spent'	ONSET	*Light$_{\sigma}$#	IDENT-IO (Long v)	*[μμμ]$_{\sigma}$	*i]σ	MAX-IO	*CC-	FT-BIN
3.a (ˈsɪr) afat	*!							
3.b ☞ (ˈsrə) fat					*	*	*	*
3.c (ˈsɪ.ra).fat		*!						
3.d. sɪ.(ˈra:)fat			*!					
4. tu.ra:b-ɪ 'earth-related'								
4.a tu.(ˈra:b).ɪ	*!							
4.b tu. (ˈra).bɪ			*!		*	*	*	
4.c (ˈtra.bɪ)				*!	*	*	*	
4.d ☞ (ˈtra:b).bɪ					*	*	*	

In short, the deletion of the unstressed high back vowel [u] at the stem level is regulated by the same constraints that condition the deletion of the unstressed high front vowel [ɪ]. Accordingly, the low ranked constraint *i]σ works for both back and front high short vowels. The stem level constraint hierarchy for high vowel deletion is as in (63) below.

(63) Stem level: high vowel deletion

ONSET , *Light$_{-\sigma}$# >> IDENT-IO (Long v) >> *μμμ >> *i]σ >> MAX-IO , FT-BIN , *CC-.

6.3.2.2 Word level high short vowel

At the word level, both high front and high back vowels have immunity against deletion. The input of the stem level in table (2.b) /ˈʕɛː.rɪf/ ‘to know’ surfaces as /ˈʕɛːrfə/ ‘he knows’, and will be used as an input in tableau (64) once the word level object suffix /-na/ ‘1pl.GEN’ is attached.

To address the distinction at the TLA lexical level, I will make use of the same stem level constraints at the word level as illustrated in the following tableaus. As expected, however, the same constraints are ranked differently. In the above analysis of schwa deletion, the stem’s long vowel is shortened at the word level. Consequently, an epenthetic vowel is inserted inside the stem domain. Moreover, the inserted schwa in the word level output, /ˈʕɛːrfə/-na, is not part of the stem so it will be treated by the constraint *Light$_{-\sigma}$#. To account for the changes that take place internal to the stem form, at the word level, the constraints DEP, IDENT (Long v) and *i]σ will be used as illustrated in tableau (64) below.

(64) Word Level: /ˈʕɛːr.fə/-na ‘he knows us’

/ˈʕɛːr.fə/-na	*i]σ	IDENT (Long v)	DEP
a. ☞ ʕɛ.ˈrɪf.na[20]		*	*
b. ˈʕɛː.rɪ.fna	*!		*

Tableau (64) shows that candidate (b) is ruled out by the constraint *i]σ. Candidate (64a) violates the constraint IDENT (Long v) and the constraint DEP. This demonstrates how the optimal candidate at the word level prefers to satisfy the constraint *i]σ over IDENT (Long v). However, a candidate like /ʕɛ.ˈrɪ.fna/ could win, if the constraint *CC- is not part of the word level constraint hierarchy. The constraint *i]σ should thus be outranked by the constraint *CC-, as in (65) below.

(65) Word Level: /ˈʕɛːr.fə/-na ‘he knows us’

/ˈʕɛːr.fə/-na	*CC-	*i]σ	IDENT (Long v)	DEP
a. ☞ (ʕɛ.ˈrɪf).na			*	*
b. (ˈʕɛː).rɪ.fə.na		*!		*
c (ʕɛ.ˈrɪ).fna	*!		*	*

The high short vowel is not deleted at the word level, if such deletion is to result in a trimoraic syllable. For this reason, the constraint $*[\mu\mu\mu]_\sigma$ is highly ranked, and militates against trimoraic syllable forms not only at the word level, but within TLA phonology in general. Consider tableau (66) below.

[20] The optimal candidate at the word level violates the input stress position. This follows from what has been discussed in § 5.7.3, where the stress shifts after attaching a word level suffix.

(66) Word Level: /ˈʕɛ:r.fə/-na ‘he knows us’

/ˈʕɛ:r.fə/-na	*[μμμ]$_σ$	*CC-	*i]σ	IDENT (Long v)	DEP
a. ☞ (ʕɛ.ˈrɪf).na				*	*
b. (ˈʕɛ:).rɪ.fna:			*!	*	*
c ʕɛ:.ˈrɪ.fna		*!			*
d. (ˈʕɛ:r). fna	*!	*			

At the word level, the deletion of high short vowels is also banned in the case of candidates with a foot that consists of one light syllable. Accordingly, the constraint FT-BIN is activated at the word level. The constraint FT-BIN should in turn outrank *[μμμ]$_σ$. Consider tableau (67) below.

(67) Word Level: /ˈʕɛ:r.fə/-na ‘he knows us’

/ˈʕɛ:r.fə/-na	FT-BIN	*[μμμ]$_σ$	*CC-	*i]σ	IDENT (Long v)	DEP
a. ☞ (ʕɛ.ˈrɪf).na					*	*
b. (ˈʕɛ:).rɪ.fə.na:				*!	*	*
c ʕɛ:.(ˈrɪ.fna)			*!			*
d. (ˈʕɛ:r). fə.na		*!				
e ʕɛ:.(ˈrɪ).fna	*!				*	

The constrains ONSET and *Light$_{-σ}$# are high ranked in TLA phonology, at both the stem and word level. In the case of a resyllabification from various phonological processes, the violation of one of these constraints is not tolerated.

(68) Word Level: /ˈʕɛː.r.fə/-na ‘he knows us’

/ˈʕɛːr.fə/-na	ONSET	*Light$_{-\sigma}$#	FT-BIN	*[μμμ]$_{\sigma}$	*CC-	*i]σ	IDENT (Long v)	DEP
a. ☞ (ʕɛ.ˈrɪf).na							*	*
b. (ˈʕɛː).rɪ.fə.naː						*!		*
c. ʕɛː.ˈrɪ.fna					*!			*
d. (ˈʕɛːr). fə.na				*!				
e. (ˈʕɛ).rəf.na			*!				*	
f. (ˈʕɛːr). fə.na		*!		*				
g. (ʕɛr.ˈɪf).na	*!						*	*

Tableau (68) above shows that candidate (f) is ruled out by the constraint *Light$_{-\sigma}$# due to the unacceptable syllable pattern of two light syllables in a row. Candidate (g) also incurs a fatal violation of the constraint ONSET.

The last example which I use to illustrate the behaviour of high vowel deletion at the word level, is /ˈsrə.fat/ ‘she spent’ + /hɪn/ ‘perfective 3PLF.ACC’, that surfaces as /sɪr.ˈfat.hɪn/. The same constraints as the above tableau will be used for the illustration of this word level behaviour, except that the constraints IDENT (Long v) and *[μμμ]$_{\sigma}$ are not involved here, given that there is no long vowel in this input form. Consider tableau (69) below.

(69) Word Level: /ˈsrə.fat-hɪn/ ‘she spent them’

ˈsrə.fat-hɪn	ONSET	*Light$_σ$#	FT-BIN	*[μμμ]σ	*CC-	*i]σ	IDENT (Long v)	DEP
a. ☞ (sɪr.ˈfat).hɪn								*
b. sɪ.(ˈrɪ.fat).hɪn						*!		*
c. (sɪ.ˈrfat).hɪn					*!	*		*
d. sɪr.(ˈfat).hɪn			*!					*
e. srɪ(ˈfa).thɪn		*!	*		**	**		
f. (sɪr.ˈfa). tɪh.ɪn	*!							

To validate the word level constraint hierarchies that we have discussed so far, the two examples I have provided as word level inputs are integrated in tableaux (70) below, in order to get the complete constraint hierarchy that is employed at the word level.

(70) Word Level:

1. /ˈʕɛːr.fə/-na	ONSET	*Light$_{\sigma}$#	FT-BIN	*[μμ]$_{\sigma}$	*CC-	*i]σ	IDENT (Long v)	DEP
1.a ☞ (ʕɛ.ˈrɪf).na							*	*
1.b (ˈʕɛː).rɪ.fə.naː						*!		*
1.c (ˈʕɛː). rɪ.fna					*!	*		*
1.d (ˈʕɛːr). fə.na				*!				
1.e (ˈʕɛ).rəf.na			*!				*	
1.f (ˈʕɛːr). fə.na		*!		*				
1.g (ʕɛr.ˈɪf).na	*!						*	*
2. /ˈsrə.fat/-hɪn	ONSET	*Light$_{\sigma}$#	FT-BIN	*[μμ]$_{\sigma}$	*CC-	*i]σ	IDENT (Long v)	DEP
2.a ☞ (sɪr.ˈfat).hɪn								*
2.b sɪ.(ˈrɪ.fat).hɪn						*!		*
2.c (sɪ.ˈrfat).hɪn					*!	*		*
2.d sɪr.(ˈfat).hɪn			*!					*
2.e srɪ(ˈfa).thɪn		*!	*		**	**		
2.f (sɪr.ˈfa). tɪh.ɪn	*!							

Having established the constraint hierarchy for high short vowel deletion at the word level, I now turn to compare this with what we had at the stem level. At the word level, epenthesis and vowel shortening are motivated in order to bring about changes to the otherwise undesired stem level output. The stem and word level constraint hierarchies are given in (71) and (72) below.

(71) Stem Level High Vowel deletion:

ONSET , *Light$_{-\sigma}$# >> IDENT-IO (Long v) >> *μμμ >> *i]σ >> MAX-IO , FT-BIN , *CC-.

(72) Word Level High Vowel deletion:

ONSET , *Light$_{-\sigma}$# >> FT-BIN >> *[μμμ]$_{\sigma}$ >> *CC- >> *i]σ >> IDENT (Long v) , DEP

6.3.3 Low Vowel Deletion

Since the dialect under investigation is non-differential, the unstressed low vowel [a] is also subject to deletion. In this section, the deletion of the unstressed low vowel will be considered in open syllable position. This is the case for the data in table (3a), including forms such as /ɣa.lab/-na, that surfaces as /ˈɣləb.na/ 'we hit' at the stem level and /ɣa.lab.ˈna:.hɪm/ 'we hit them. PLM' at the word level, and /ʕa.raʒ/-at, which surfaces as /ˈʕra.ʒat/ 'she lamed' at the stem level and as /ʕar.ˈʒat.nɪ/ 'she lamed me'. The addition of /hɪm/ '3PL.ACC' attached to the same stem, at the word-level to result in /ɣa.lab.ˈna:.hɪm/ 'we hit them. PLM' shows that at this same word level, low vowel deletion does not apply. Instead, it is the perfective stem level suffix /-na/ 'PL' that gets lengthened, and consequently stress shifts out of the stem. Clearly, these processes are a consequence of the interaction between the word level phonology and morphology. In what follows we first consider low vowel deletion and schwa stressing at the stem level. Then we consider discussions that perform to stress shifting.

6.3.3.1 Stem Level Low Vowel Deletion

To account for the deletion of the low vowel at the stem level, we need the constraints IDENT-IO (Low v), MAX-IO, *Light$_{-\sigma}$#, IDENT-IO (Long v), *CC-, FAITH-STRESS and

*Unstressed/ə. /ɣa.lab-na/ 'we hit' will the form that we use first to account for the phenomenon. The constraint MAX-IO is expected to be outranked by FAITH-STRESS since we have a stressed verb as an input.[21] The constraint is defined in (73) below.

(73) FAITH-STRESS: (Hyde 2012)

A stress in the input occurs on the same syllable in the output.

The tableau in (74) below demonstrates the constraint behaviour involved, given such a stem level input.

(74) Stem Level: /ɣa.ˈlab/-na 'we hit'

/ɣa.ˈlab/-na	FAITH-STRESS	MAX-IO	IDENT-IO (Low v)
a. ☞ (ˈɣləb).na		*	*
b. ˈɣa.lab.na	*!		

Tableau (74) illustrates how satisfying the constraint FAITH-STRESS is preferred over satisfying IDENT-IO (Low v) and MAX-IO. Accordingly, the winning candidate is (a). However, a hypothetical candidate like (ɣə.ˈlab).na, which satisfies the high ranked constraint FAITH-STRESS, would win, if the constraint *Unstressed/ə is not included in the stem level phonology.

[21] As mentioned in chapter 5 the CV.CVC verb pattern must always take final stress, given how they are in contrast with nominal and adjectival forms.

(75) Stem Level: /ɣa.ˈlab/-na ‘we hit’

/ɣa.ˈlab/-na	*Unstr-ə	FAITH-STRESS	MAX-IO	IDENT-IO (Low v)
a. ☞ (ˈɣləb).na			*	*
b. (ˈɣa.lab).na		*!		
c. (ɣə.ˈlab).na	*!			

As shown in tableau (75), constraint *Unstressed/ə is ranked higher than FAITH-STRESS. Candidate (a) is still favoured over (b) and (c). Given that the optimal output of the word level, as shown through the surface form: /ɣa.lab.ˈna:/, for example has a long vowel, the constraint IDENT-IO (Long v) is needed to see how it ranks at the stem level. Consider tableau (76).

(76) Stem Level: /ɣa.ˈlab/-na

/ɣa.ˈlab/-na	IDENT-IO (Long v)	*Unstr-ə	FAITH-STRESS	MAX-IO	IDENT-IO (Low v)
a. ☞ (ˈɣləb).na				*	*
b. (ˈɣa.lab).na			*!		
c. (ɣə.ˈlab).na		*!			
d. ɣa.lab.(ˈna:)	*!				

Tableau (76) shows that candidate (d) is ruled out of the competition as it incurs a fatal violation of IDENT-IO (Long v). To get a full hierarchy of low vowel deletion at the stem level, the constraints *CC- and *Light$_{\sigma}$# must be included. The former is expected to be low ranked, and the latter is expected to be ranked high, and should thus be satisfied by the optimal candidate. Consider tableau (77) below.

(77) Stem Level: /ɣa.ˈlab/-na ‘we hit’

/ɣa.ˈlab/-na	*Light-σ#	IDENT-IO (Long v)	*Unstr-ə	FAITH-STRESS	MAX-IO	*CC-	IDENT-IO (Low v)
a. ☞ (ˈɣləb).na					*	*	*
b. (ˈɣa.lab).na				*!			
c. (ɣə.ˈlab).na			*!				
d. ɣa.lab.(ˈna:)		*!					
e. (ɣə.ˈla).bna	*!		*			*	*

Tableau (77) shows that candidate (e) is ruled out as it fatally violates the highly ranked constraint *Light-σ#. Candidate (a) is still the optimal one at the stem level, since the constraint *CC- is ranked low.

Following the affix ordering generalisation, which really has to do with the fact that subject inflection expressed as suffixes in the perfective paradigm, comes first, and attached straight onto the stem-form, OBJ attached pronominal forms, which follow these subject inflections. Accordingly, the word level suffix /-hɪm/ ‘they. 3PLM.ACC’ will be attached onto the output of the above stem level, as will be shown in § 6.3.3.2 below. This will be done by taking into consideration the stem level constraint hierarchy given in (78) below.

(78) Stem level low vowel deletion in open syllable:

*Light-σ# >> IDENT-IO (Long v) >> *Unstressed/ə >> FAITH-STRESS >> MAX-IO , *CC- >> IDENT-IO (Low).

6.3.3.2 Word Level Low Vowel Deletion

As we already know from our data in table (3), the input complex onset is not allowed in TLA word level phonology. As a result, an epenthetic vowel is inserted to break up the onset consonant cluster. This tells us that, at the word level, the unstressed low vowel has immunity against deletion. Moreover, the stem level perfective subject suffix /-na/ '1PL' is lengthened and stressed, at the word level. Accordingly, the constraints FT-BIN, IDENT-IO (LONG V), *Unstressed/ə, FAITH-STRESS, *CC-, IDENT-IO (LOW), and DEP are needed. At the word level, the constraint *CC- is expected to outrank FAITH-STRESS. Consider tableau (79) below.

(79) Word Level: /ˈɣləb.na/-hɪm 'we hit them. PLM'

/ˈɣləb.na/-hɪm	*CC-	FAITH-STRESS
a. ☞ɣa.lab.(ˈna:).hɪm		*
b. ˈɣləb.na. hɪm	*!	

Tableau (79) shows that candidate (a) prefers to satisfy the constraint *CC- over FAITH-STRESS. Thus, candidate (b) is ruled out by *CC-, since a complex onset is not allowed at the word level. At the word level, the optimal candidate should satisfy the constraint FT-BIN. Which is expected to outrank *CC-. Consider this hierarchy in tableau (80).

(80) Word Level: /ˈɣləb.na/-hɪm 'we hit them. PLM'

/ˈɣləb.na/-hɪm	FT-BIN	*CC-	FAITH-STRESS
a. ☞ɣa.lab.(ˈna:).hɪm			*
b. ˈɣləb.na. hɪm		*!	
c. ɣlab.(ˈna).hɪm	*!		*

Tableau (80) shows that candidate (c) is ruled out as it incurs a fatal violation of FT-BIN. The winning candidate is thus (a) since it satisfies the word level high ranked FT-BIN. At the word level, stress goes to the right most heavy syllable. A candidate that involves a stressed light syllable is expected to be ruled out by the constraint WSP. Consider the tableau (81) below.

(81) Word Level: /ˈɣləb.na/-hɪm 'we hit them. PLM'

/ˈɣləb.na/-hɪm	WSP	FT-BIN	*CC-	FAITH-STRESS
a. ☞ɣa.lab.(ˈna:).hɪm				*
b. ˈɣləb.na. hɪm			*!	
c. ɣlab.(ˈna).hɪm		*!		*
d. (ˈɣa).la. bna:.hɪm	*!		*	

As shown in tableau (81), candidate (d) fatally violates the constraint WSP, so it gets ruled out of the competition.

The last constraints that are needed for the word level constraint hierarchy are DEP, *Light$_{-\sigma}$# and IDENT-IO (Long v). The constraint *Light$_{-\sigma}$# is highly ranked at both the stem and word levels, whereas the constraint IDENT-IO (Long v) and DEP are low ranked at word level. There is no domination relationship between *Light$_{-\sigma}$# and WSP. Consider tableau (82) below.

(82) Word Level: /ˈɣləb.na/-hɪm ‘we hit them. PLM’

/ˈɣləb.na/-hɪm	*Light-σ#	WSP	FT-BIN	*CC-	FAITH-STRESS	IDENT-IO (Long v)	DEP
a. ☞ɣa.lab.(ˈna:).hɪm					*	*	*
b. ˈɣləb.na. hɪm				*!			
c. ɣlab.(ˈna).hɪm			*!		*		
d. (ˈɣa).la. bna:.hɪm		*!		*			*
e. (ˈɣa.la).bna.hɪm	*!						*

Tableau (82) shows that candidate (e) fatally violates the constraint *Light-σ#. The constraint DEP is low ranked at the word level, since the winning candidate (a) breaks up the stem level complex onset by inserting the low vowel [a].

With this description we have accounted for the constraint hierarchy at the word level that establishes the immunity of low vowel deletion. The constraint hierarchy as it applies at the word level is in (83) below:

(83) Word level hierarchy application to disallow low vowel deletion:

*Light-σ# WSP >> FT-BIN >> *CC- >> FAITH-STRESS, IDENT-IO (Long v) , DEP

6.4. Conclusion

In this chapter I have essentially considered the study of TLA syncope which I have divided in two main parts. The first part introduced a description of syncope, doing with on account of the type of deleted vowel that is allowed. The second part on the other hand provided an analysis of syncope using Stratal OT. Primarily, from the outset I have characterised TLA to be a non-differential dialect type when it comes to syncope, i.e where both high and low unstressed short vowels are subject to deletion. In my account of syncope in TLA, both the stem and word levels have been examined, and we have observed the deletion of three types of vowels; namely; high short unstressed vowels [ɪ] and [u], the central vowel [ə], and the low vowel [a], in two different positions: Open and closed syllables. Both high [ɪ, u] and central vowel [ə] undergo deletion in open and closed syllable positions. The unstressed low vowel [a] undergoes deletion in only open syllables position. The analysis posited shows that at the stem level, the deletion of all the vowels in open syllable positions results in complex onsets. At the word level, the dialect breaks up the complex onset that as a result of the very syncope, by inserting a vowel. The summary of the TLA syncope constraint hierarchies posited and argued for in this chapter, at both the stem and word levels, depending on the vowel type and the syllable position it occupies, are as follows:

(84) Stem level schwa deletion in open and closed syllables:

COMPLEX-CODA , ONSET >> *Light$_{-\sigma}$# >> IDENT-IO (Long v) >> *VVC- >> *C^{unsyll} >> *Unstressed/ə >> *CC- , FT-BIN , MAX-IO.

(85) Word level schwa deletion in open and closed syllables

FT-BIN >> *CC- >> *Unstressed/ə , MAX-IO >> *C^{unsyll} >> IDENT-IO (Long v) , DEP.

(86) Stem level high vowel deletion in open and closed syllables:

ONSET , *Light$_{-\sigma}$# >> IDENT-IO (Long v) >> *μμμ >> *i]σ >> MAX-IO , FT-BIN , *CC-.

(87) Word level high vowel deletion in open and closed syllables:

ONSET , *Light$_{-\sigma}$# >> FT-BIN >> *[μμμ]$_{\sigma}$ >> *CC- >> *i]σ >> IDENT (Long v) , DEP

(88) Stem level low vowel deletion in open syllable:

$*Light_{-\sigma}\#$ >> IDENT-IO (Long v) >> *Unstressed/ə >> FAITH-STRESS >> MAX-IO , *CC- ,

IDENT-IO (Low)

(89) Word level low vowel deletion immunity:

$*Light_{-\sigma}\#$ WSP >> FT-BIN >> *CC- >> FAITH-STRESS, IDENT-IO (Long v) , DEP

Chapter Seven: Conclusion

7.1 A summary

Here I summarise this study on aspects of TLA phonology while evaluating once again the findings in the light of the analytical framework employed. In this study, I have started off by a description of the dialect sound system and its syllable structure, incorporating phonetic/phonological and morphophonological perspectives, where the syllable structure of nominal and verbal morphological forms was introduced. I have opted to zoom in somewhat and focus on two major phonological processes: stress and syncope. Chapter five took on the task to describe and analyse TLA stress, based on the participants' production. The reason for the description, primarily helped me assert the dialect stress patterns so as to help me deal with the task of accounting for other processes like stress shift and vowel shortening/deletion that require an accurate generation of TLA stress. Next we considered the process of syncope, which we accounted for via a ranking of stratal OT constraints. Syncope was considered as a stem level process. This restriction was particularly illustrated in chapter six. In a similar manner, it was shown in chapter 5 how a light syllable is a stress attractor at stem level, even though a heavier syllable occurs in both monomorphemic and complex words. Another apparent conflict between the phonology and the morphology is the fact that an epenthetic vowel is inserted within the stem, in the context of an attachment of suffixes that belong to the word level. It was also shown how other processes, namely stress shift, epenthesis and vowel shortening, apply at the word level. In contrasting the different level, given the interaction of morphology and phonology, and how this affects the stem vs. word levels, we have seen how it is the stem level that provides a motivation for the postulation of a degenerate foot. This has been ascertained in a number of examples that involved the attachment of stem level suffixes. This was taken to suggest that the constraint FT-BIN is low ranked at the stem level, whereas it is high ranked at the word level. In contrast, the constraint

WSP is low ranked at the stem level yet high ranked at the word level. Accordingly, a light syllable was shown to be able to be parsed as a degenerate foot at the stem level. The establishment of this property within the phonology of TLA was further enhanced by the fact that TLA allows monomorphemic CVC syllabled word-forms, such as: /χaðˤ/ 'took', /ʒat/ 'came', /hal/ 'family', as well as /kal/ 'he ate', etc. The coda in these word forms is extrametrical, and hence a degenerate foot is formed. This strongly supports the analysis of the stressed light syllable as a degenerate foot. When discussing foot types in TLA, it was shown how these are variable. In other words, the foot asymmetry is inconsistent, due to the fact that its metrification and directionality can be applied from both left-to-right and right-to-left. Since metrification directionality is not well-grounded in TLA given the bi-directionality that can apply, a single consistent alignment for foot directionality cannot be established. As a result, the foot type in TLA can be moraic trochee, syllabic trochee and/or iamb. Below I provide the main findings related to stress placement and syncope in TLA.

In discussing syllable structure, I developed an OT account for the coda weight and foot type of CV.CVC syllable patterns of verbs, nouns and adjectives in TLA. The consequences of the phonology and morphology interactions were shown to cause further variable ground in the stress patterns employed in TLA, as well as the position of vowel deletion and vowel epenthesis. The key point of these variations included the type of morphological endings that attached to the stem. Stratal OT was used as a means with which to revolve or provide a solution for these conflicts.

7.1.1 Stress

The analysis of stress patterns in TLA was shown to illustrate that addressing onset complexity, vowel shortening, epenthetic vowel stress and stressing the light syllable instead of the heavy one requires different levels of analysis with different constraint hierarchies. Accordingly, a Stratal OT account was shown to be more superior and sufficient than a

Classical OT one. Classical OT was unable to generate the different stress patterns of TLA along with the stress that can occur on epenthetic vowels.

We have also seen that a monomoraic foot occurs in nominal and adjectival stems that take a CV.CVC form. Consequently, at the stem level, stress is assigned on the light syllable in the presence of other heavy syllables in order to preserve the stem stress. There are two types of CV.CVC nouns. One has initial stress while the other has final stress.

In discussing stress placement, we have seen that Stratal OT sufficiently handles the stress-epenthesis interaction in TLA. This process was shown to only occur at the post lexical level.

7.1.2 Syncope

In the discussion of syncope in chapter six, both schwa unstressed short high vowels were shown to be able to be deleted in open and closed syllable positions at the stem level. Low vowels, by contrast, are shown to only be subject to deletion in unstressed open syllable position. At the word level, syncope is blocked, as an epenthetic vowel is inserted to break the complex onset that results from the first stratum. Other processes were shown to result from vowel deletion. These include: stem vowel shortenings, and stem internal domain stress shifts, that apply at the word level. In contrast, these same processes fail to apply at the stem level, given how the constraints FAITH-STRESS and IDENT-IO (Long v) are inviolable at stem level. These contrasts thus brought to the fore how while some constraints apply at the stem and word levels, completely distinct constraint hierarchies apply, when it comes to vowel syncope. The distinct constraint hierarchies are provided below.

(1) Stem level vowel deletion in open and closed syllables:

COMPLEX-CODA , ONSET >> *Light$_{-\sigma}$# >> IDENT-IO (Long v) >> *VVC- >> *C^{unsyll} >> *Unstressed/ə >> , *i]σ >> *CC- , FT-BIN , IDENT-IO (Low) , MAX-IO.

(2) Word level vowel deletion immunity:

ONSET , *Light$_{-\sigma}$# >> FT-BIN >> *[μμμ]$_{\sigma}$ >> FT-BIN >> *CC- >> *i]σ >> *Unstressed/ə , MAX-IO >> IDENT (Long v) , FAITH-STRESS , DEP

7.3 The contributions and limitations of this study

What I have provided here in this study is the first contribution of the phonology of TLA, which has not been studied from within rule-based phonology nor any other constraint-based phonology. The study provides a motivation into the research of the phonological field that never received attention in the literature of Libyan dialects, particularly showing the further need to not link all Eastern Libyan dialects together and considering Benghazi Libyan Arabic to be such a representative dialect. We have here seen a number of instances where the Tobruq variety behaves differently, even though it is an Eastern variety. One such instance was in showing how vs. the claim in Sheridi (2015) that TLA is a non-differential dialect, when it comes to vowel syncope, as the unstressed high, central and low vowels are all subject to deletion. Moreover, the study also has an interesting theoretical contribution, illustrating how classical OT fails to account for the opacity and differences of stress patterns in TLA. The analysis was shown to require different levels and intermediate steps in order to solve the problems caused at the phonology-morphology interface. Consequently, Stratal OT was shown to successfully handle such data.

While this study has indeed looked at stress-placement and syncope in detail, further phonological research must be undertaken for a true complete picture, particularly the need to investigate the CVC coda weight at the word internal position.

Other phonetic investigations are also required, to compare the nature of glides, and see if these are diphthongs or frictionless consonants preceded by a vowel. In a similar vein, additional studies are needed to explore assimilation, particularly to assess if word initial gemination exists, resulting from the deletion of the definite article prefix /ɪl-/ ‘the’, as in the word /ɪl-/ + ʃɛː.rɪʕ ‘street’ → ʃʃɛː.rɪʕ ‘the street’.

No matter the additional research that needs to be done, this study as it stands, has its own limitations. Initially, it should be reiterated here that I have considered perfective forms in more detail than the imperfective verbal morphological forms, for instance, particularly because I chose to focus on the phenomenon of stress placement, since the affixation of inflectional morphology onto the stem in the imperfective verbal paradigm does not have any effect on the stress placement at the stem level. Nevertheless, clearly, if I wanted to give a complete picture of the morphology-phonology interface, then indeed, I should have included this part of the verbal paradigm in more detail. Furthermore, I have also been quite selective in my use of inflectional and pronominal affixes attached to the different verbal and nominal stems, and for this reason, I have not provided the full array of morphophonological effects that construct the whole paradigms. Nevertheless, despite these limitations, I hope to have provided a first step and attempt towards an initial detailed characterisation and understanding of several phonological phenomena and morphophonological interactions in TLA.

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Appendices

Appendix (1): List of constraints

***VORAL N**

No oral vowel may precede a nasal consonant.

***[ŋ**

No word –initial velar nasals.

***V NASAL**

Vowels must not be nasal.

ONSET

Syllables must have onsets.

NO-CODA

Syllables are open.

***CLASH**

No adjacent stressed syllables

ALIGN-R

The right edge of a Grammatical Word coincides with the right edge of a syllable.

ALIGN-L

The left edge of a Grammatical Word coincides with the left edge of a syllable.

FAITH-STRESS

A stress in the input occurs on the same syllable in the output.

Weight-to-Stress Principle (WSP)

Heavy syllables must be stressed. (If heavy, then stressed.)

FT-BIN

Feet are binary under moraic or syllabic analysis.

***Light$_{-\sigma}$#**

A violation mark for more than one final light syllable.

NONHEAD(ə)

Schwa syllables cannot be heads of feet

MAX

Every segment of the input has a correspondent in the output

DEP

Every element of S2 has a correspondent in S1 (No epenthesis).

IDENT(Place)$^{[\text{-EMPHATIC}]}$: (ID-Place$^{[\text{-EMPH}]}$)

The consonantal feature in the input must have a correspondent in the output (no emphatic [s] in the output)

IDENT(Place)$^{[\text{+EMPHATIC}]}$: (ID-Place$^{[\text{+EMPH}]}$)

The emphatic consonant in the input must have a correspondent in the output.

HEAD-DEP(O/I)

Every vowel in the output prosodic head has a correspondent as in the input.

NUC

Syllables must have nuclei

***COMPLEX onset (or *CC)**

Syllables must not have more than one onset segment

***COMPLEX coda**

Syllables must not have more than one coda segment.

***Final-C-μ**

Word-final coda is weightless.

MORAICCODA

All coda consonants must be dominated by a mora.

HEAD-FOOT (H-F)

Every prosodic word has a head foot.

PARSE-SYLLABLE (PARSE-σ)

Every syllable is parsed into a foot.

INITIAL GRIDMARK

The initial syllable of a prosodic word is stressed.

ALLFEETR

The right edge of every foot is aligned with the right edge of some prosodic word.

ALLFEETL

The left edge of every foot is aligned with the left edge of some prosodic word.

CLUSTER-CONDITION (CL-CON)

Nonfinal Coda clusters are not allowed.

DEP-IO

Every segment of the output has a correspondent in the input (no epenthesis)

***V:σ.V:σ**

No adjacent syllables with long vowels.

Ident-[long]-V

Long vowel in the input has a correspondent in the output.

NONFINALITY

No head of PrWd is final in PrWd.

TROCHEE

Assign a violation for a foot whose head is on the right.

Ident[low]

A violation mark for any changes of the input low vowel value.

MAX-IO

Every segment of the input has a correspondent in the output

$*[\mu\mu\mu]_\sigma$

No syllable of three moras. (Assign one violation mark for every superheavy syllable.

License-μ

A mora must be affiliated to a syllable.

IDENT-IO (Low v)

A low vowel in the input must have a correspondent in the output.

NONHEAD (ə)

Schwa syllables cannot be heads of feet.

$*i]\sigma$

High short unstressed vowels in open syllables are not allowed.

$*C^{unsyll}$

Assign one violation mark for every unsyllabified segment.

***Unstressed/ə** (*Unstr-ə)

Schwas are not found in unstressed positions.

***VVC-**

Nonfinal long closed syllables or long open syllables which are followed by a moraic consonant are not allowed.