ASSIMILATION IN THE PHONOLOGY OF A LIBYAN ARABIC DIALECT: A CONSTRAINT-BASED APPROACH

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Abstract

This study uses a constraint-based framework to investigate some assimilatory processes in one variety of Libyan Arabic. This is the variety spoken by the inhabitants of the city of Misrata, henceforth referred to as Misrata Libyan Arabic (MLA). Some of the assimilatory processes are so closely related that they can be accounted for using similar constraints. In this respect, the OCP is shown to play an important role in some of the processes. For example, assimilations of /l/ of the definite article prefix and the detransitivising prefix /t-/ are triggered by an OCP violation on the coronal tier. The OCP may have blocking or triggering effects; the two assimilatory processes just referred to are instances of the OCP triggering effects.

On the other hand, a blocking effect not involving the OCP involves guttural consonants, which block voicing assimilation of the imperfective prefix /t-/. This blocking of voicing assimilation will be shown to provide support to some researchers' proposal to classify gutturals as sonorant segments. Despite this blocking effect, some guttural segments devoice before suffixes that begin with /h/ and simultaneously cause this /h/ to agree with them in place of articulation.

Lateral assimilation has been claimed to be restricted solely to /l/ of the definite article /ʔil-/. However, some of the forms introduced in chapter (3) demonstrate that /l/ in the homophonous morpheme /ʔil-/ 'for/to' may assimilate totally to a following coronal sonorant.

The alveolar nasal /n/ assimilates partially (in place) to the obstruents /b/, /k/, /g/ and /f/. The segment /n/ assimilates totally to the sonorant consonants it immediately precedes. Partial assimilation takes place both within the same phonological word and across a word boundary. Total assimilation, by contrast, occurs only when two words

are involved. This is because /n/ cannot be followed by a sonorant consonant word-internally.

Declaration

The material contained within this thesis has not previously been submitted for a degree at Newcastle University or any other university.

Signed: 

Yousef Mokhtar Elramli

16/08/2012

Dedication

To the momory of my father, May Allah have mercy on him and grant him Paradise

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List of abbreviations

The following abbreviations are used in the text and gloss

Adj: adjective

C: Consonant

CA: Classical Arabic

cor: coronal

f: feminine

ELA: Eastern Libyan Arabic

EVAL:Evaluator

Gen: Generator

gutt: guttural

H: high

L: low

LA: Libyan Arabic

m: masculine

MLA: Misrata Libyan Arabic

MSA: Modern Standard Arabic

n: noun

OCP: Obligatory Contour Principle

OT: Optimality Theory

Pl: plural

s: singular

TC: Tier Conflation

V: Vowel

Contents

Part I PRELIMINARIES

Chapter 1 Introduction

The aim of this study is to present an Optimality Theoretic analysis (Prince and Smolensky 1993/2004) of some assimilatory processes in one variety of Libyan Arabic.

The thesis is divided into six chapters. Following this introductory chapter, the second chapter is allocated to introducing the topic of the current study (assimilation) and the framework within which the study is conducted (OT). The third chapter deals with assimilation of lateral /l/, particularly /l-/ of the definite article, whereas the fourth chapter is allocated to analysing assimilation of nasal /n/. Assimilation of imperfective /t-/ and detransitivising /t-/ is dealt with in chapter five; the former prefix assimilates in voicing to the following obstruent while the latter assimilates totally to the coronal obstruent it precedes. Chapter six deals with devoicing /ʕ/ and /ɣ/ and progressive place assimilation of /h/.

As can be seen, what these assimilatory processes have in common is that they are local. That is, they take place when the the segments involved are adjacent, unlike other processes, such as emphasis spread, which may take place even when the trigger and undergoer are separated by some other segment(s).

The dialect to be dealt with in this thesis is my mother tongue, so I have depended mainly on my knowledge as a native speaker and, for the most part, have used my own examples. In addition, I have interviewed and consulted other native speakers.

1.1 The Language Investigated

Arabic is a member of the Semitic division of the Afro-Asiatic (Hamito-Semitic) family of languages (Kaye 1997: 187; Ryding 2005: 1; Aoun *et al* 2010: 1). The linguistic situation in the Arabic-speaking countries is a diglossic one. That is, it is characterised by the coexistence of two varieties, a formal (i.e. classical or standard) variety and an

informal (i.e. colloquial or dialectical) one. Generally speaking, in all diglossic situations the formal variety is considered to be high (H), as opposed the informal version which is treated as being low (L). (The credit for publicising the term *diglossia* goes to Charles Ferguson, who used it in a 1959 paper bearing the same title *Diglossia*.)

The (H) variety is very prestigious, whereas the (L) variety has no official status, and the two varieties are "in complementary distribution with each other" (Freeman 1996: 1). The (H) variety is used in formal situations like news bulletins, university lectures, courts of law, religious ceremonies, formal reports, and the like. The (L) variety, on the other hand, is used informally as the everyday means of communication between family members, friends, work colleagues, and so on.

In the Arabic-speaking world, Classical Arabic (more recently Modern Standard Arabic (MSA) which is, so to speak, a simplified and modernised version of CA) is the variety that can be referred to as the (H) variety. Classical Arabic is looked up to by the entire Muslim world because it is the language of the glorious Qur'an. Thus it is also sometimes referred to as Qur'anic/Koranic Arabic. Arabic vernaculars, on the other hand, are (L) varieties.

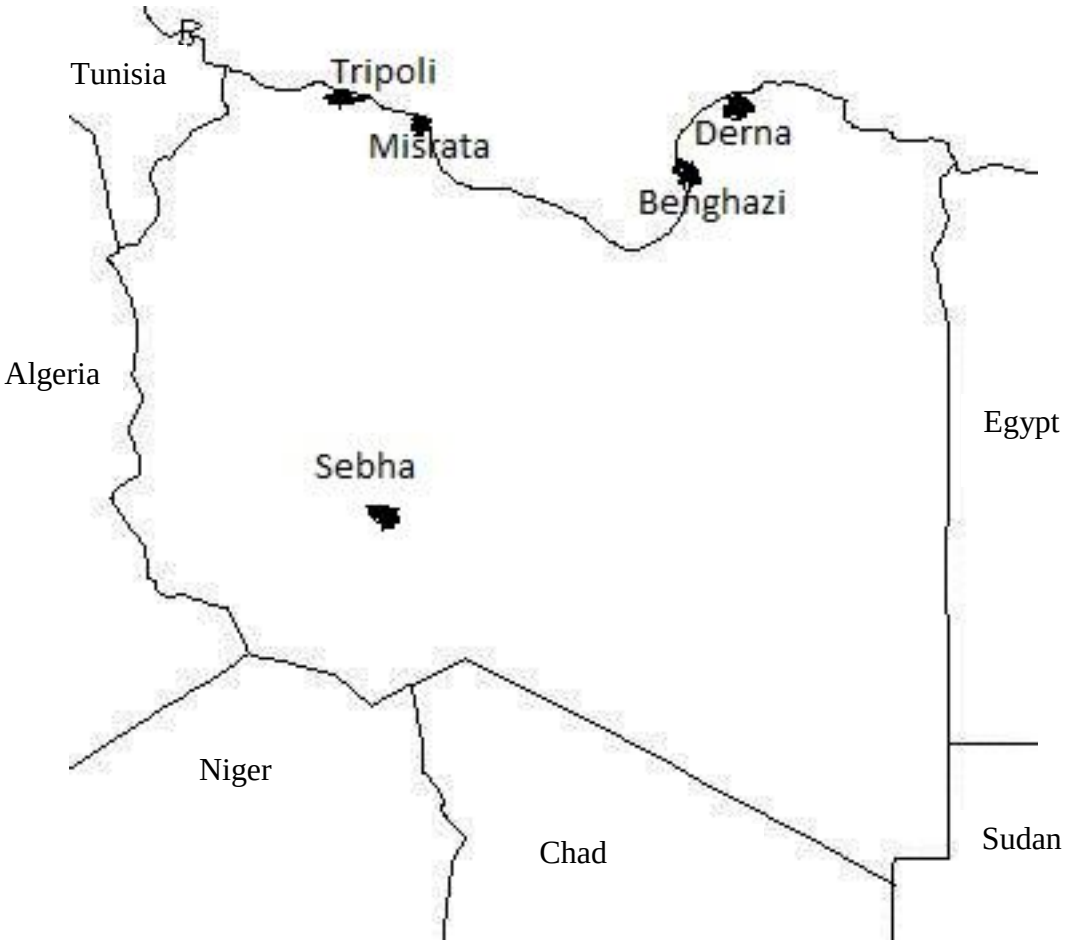
In this study, we will be concerned with one of the many Arabic vernaculars, namely Libyan Arabic (LA). More specifically, we will be dealing with a constraint-based analysis of some assimilatory processes in the variety of Libyan Arabic used in the city of Misrata, Libya.

As mentioned in the preceding paragraph, this work is an attempt to deal with Misrata Libyan Arabic (MLA). However, Misrata is a vast region and the number of inhabitants who dwell in this region is relatively big, about 300,000. This will undoubtedly give rise to linguistic variations among the speakers of this variety, depending on regional, socioeconomic and educational factors.

No claim is made here that this study will be comprehensive in the sense that it will cover all the 'subvarieties' used in Misrata. The study will mainly be based on the variety spoken in the area where the author was born and bred. This variety can be seen as representative of Misrata dialect because it is used in an area located near the heart of the city centre (the city centre itself is mainly a trading area full of shops and government offices.)

Misrata is the third largest city, located in the North West part of the country- about 210 km east of the capital, Tripoli. Libya was first a Turkish and later an Italian colony. As a result, Libyan Arabic came into contact with both Turkish and, to a greater extent, Italian. No wonder that many (notably Italian) loanwords exist in the dialect. It should also be noted that Berber[1] is also used alongside Arabic, but to a much lesser extent and in certain areas restricted to the city of Zwara (about 330 km west of Misrata) and some towns and villages in the Western Mountain (Nafosa Mountain). Some Berber loan words have also been in use by speakers of LA. However, the majority of the demotic forms used in this study can be traced back to their Arabic origins.

[1] Khushaim (1995) argues that Berber is a dialect of Arabic rather than a fully-fledged language.



Map of Libya indicating dialectal areas referred to in this study, modified from: http://geography.about.com/library/blank/blxlibya.htm (accessed on 10/7/2012).

1.2 Linguistic Aspects of LA

Arabic is basically a VSO language, "although it also seems to belong to a 'mixed' VSO/SVO type." (Fassi Fehri: 1993: 16). As is the case in other dialectal forms of Arabic, LA does not attach case endings to nouns and adjectives, nor does LA attach mood distinctions to verbs. Moreover, the dual is lacking from verbs, adjectives and pronouns; number distinction is mainly made between singular and plural.

Another distinctive feature of Arabic, both Standard and dialectal, is that present-tense sentences lack a copular verb (Al-Balushi 2012: 3). To take an example, consider the following sentence.

(1) ʔil-mudarris ɣaayib
the-teacher absent
'The teacher is absent'

Note that this is true only of sentences in the present; past tense sentences do have a copular in such a construction, e.g. *ʔil-mudarris* ***kaan*** *ɣaayib* 'the teacher was absent'.

Finally, note that some LA transitive imperfective verbs take the aspect particle *fi* 'in' before the object they precede, as can be seen in the following sentence.

(2) yaakil fi lmakruuna
eat 3s.m. in-the pasta
'he eats pasta'

This sentence also shows that the dialect under analysis is a pro-drop dialect, that is, a dialect in which a subject pronoun may be omitted: a characteristic of Arabic and some other languages.

1.3 Literature Review

A number of studies have been conducted that deal with LA. Pioneering studies on the dialect were carried out by western, non-native, authors. These include Panetta (1943) *L'arabo Parlato a Bengasi* 'The Arabic spoken in Benghazi'. This is a collection of texts with the aim of introducing the dialect spoken in Benghazi to the Italian colonizers. Another study that inspired other studies is that of Mitchell (1952) "The active participle in an Arabic dialect of Cyrenaica"; *Cyrenaica* is the former name of the eastern coastal region of Libya. Al-Fitouri's PhD thesis "A descriptive grammar of Libyan Arabic" (1976) makes use of a structural approach to describe LA. This study is concerned mainly with the Grammar of Tripolitanian Arabic. Aurayieth's (1982) thesis focuses on "the phonology of the verb in Libyan Arabic", particularly in Eastern Libyan Arabic, represented by the dialect spoken in the city of Derna. Swed's (1982) thesis, based on the framework of generative linguistics and entitled "The historical

development of the Arabic verb", sheds light on the historical changes of the Arabic verb as represented in three dialects: Tripoli dialect (Libya), Cairene dialect (Egypt) and Baghdadi dialect (Iraq).

Owens' book (1984) *A short reference grammar of Eastern Libyan Arabic* is a "general, non-technical introduction to Eastern Libyan Arabic" (Owens 1984: 1). Using basic data and informal terminology, Owens presents the phonology, morphology and syntax of the dialect used mainly in Benghazi. Being a non-native speaker, he bases his study on the dialect of a Libyan translator and some students in the English department at Garyounis University, Benghazi. This city is about eight hundred forty kilometres to the east of Misrata.

Owens also wrote a paper entitled "The syllable as prosody: a re-analysis of syllabification in Eastern Libyan Arabic" (Owens 1980). Here as well, Owens based his data on the dialect of the same Libyan translator with whom he collaborated in writing a grammar of Eastern Libyan Arabic. This translator, who comes originally from Sulug, a small town located about 50 kilometres south of Benghazi, but who has (by then) lived in Benghazi for about 25 years, considers his dialect to be a combination of Bedouin and urban speech (Owens 1980: 277).

Abumdas's (1985) "Libyan Arabic Phonology" is another PhD thesis that adopts the generative approach to deal with LA, with special focus on the Zliten dialect. Zliten is a city located fifty kilometres to the west of Misrata. Although this city is very near to, in fact bordering, Misrata, there are significant differences between the varieties spoken in the two regions.

Elgadi's (1986) "Tripolitanian Arabic Phonology and Morphology" is an attempt to provide a synchronic analysis of the dialect spoken in Tripoli. Like Abumdas (1985), Elgadi presents his thesis adopting SPE-type phonology as advocated by

Chomsky and Halle (1968). This was the prevailing trend in the 1970s, 80s and early 90s.

Harrama's (1993) thesis is an eclectic synchronic analysis of the morphology of the Libyan Arabic dialect spoken in al-Jabal al-Garbi (the Western Mountain). Rather than sticking to a particular school of thought, Harrama makes use of a number of approaches of modern linguistic analysis (Harrama 1993:14). Although Harrama's study is morphological in nature, one chapter (chapter II) is allocated to presenting a general overview of the phonological system of the dialect, in addition to some of the major phonological processes. Harrama justifies the inclusion of this chapter by the strong relation holding between morphology and phonology.

Al-Ageli's (1995) "Syllabic and metrical structure in Tripolitanian Arabic" is an attempt to present a "near-exhaustive analysis of stress and syllable structure" of the LA variety spoken in the Libyan capital. Al-Ageli's thesis also compares treatment of syllabic and metrical structure of the dialect in both derivational and optimality theory.

Abdunnabi's (2000) "a descriptive grammar of Libyan Arabic" is a two-volume, twenty-one-chapter PhD thesis. Written within the framework of structural linguistics, Abdunnabi's thesis deals with the Eastern Jabal 'mountain' Libyan Arabic (EJLA, more commonly known as *Al-Jabal Al-Akhdar* 'the Green Montain'). The first part of Abdunnabi's thesis deals with the phonological component of the grammar. Here, Abdunnabi presents a description of LA sounds, and then he moves on to deal with phonological processes like epenthesis, assimilation, gemination, pausal diphthongization, and some others. Part two of that study is concerned with the morphology of EJLA, while part three is devoted to syntactic aspects the dialect.

Finally, Ahmed's (2008) PhD thesis deals with the way native speakers of Libyan Arabic produce and perceive LA vowels and the relation between production

and perception. Thus Ahmed's study gives a thorough acoustic and articulatory description of the LA vowel system and compares between the phonetic features of LA vowels and those of other Arabic dialects.

This is a quick look at the studies that were mainly concerned with LA. However, many of the process dealt with in this study are widely attested. Therefore, in the relevant chapters before dealing with each phonological process we will sketch the same process in other languages and dialects, especially dialects of Arabic.

1.4 Significance of the Study

The discussion so far clearly shows that the majority of the studies conducted deal with one variety or another of Libyan Arabic, particularly with Tripoli or Benghazi Arabic and use either structural or derivational approaches (except for Al-Ageli's (1995) study). To the best of my knowledge, there are no studies that focus mainly on the phonology of the Libyan Arabic variety used in Misrata, be it adopting an Optimality Theoretic approach or otherwise.

This study will, consequently, be an attempt to deal with some assimilatory processes in this variety within an Optimality Theoretic framework. The present study is intended to contribute something to the studies on Arabic phonology, using the latest phonological theory, OT as introduced by Prince and Smolensky (1993/2004).

1.5 The Sound System of MLA

1.5.1 *Consonants*

There are twenty-eight consonants in the dialect under scrutiny. These can be classified according to their manner of articulation, place of articulation and phonation type (i.e. voiced vs. voiceless). Manner of articulation has to do with the way sounds are

produced. Place of articulation is concerned with where in the vocal tract a sound is articulated. Phonation type means whether the sound in question is voiced or voiceless, that is, whether the vocal cords are vibrating or at rest. (Arabic consonants can also be divided into the traditional categories of 'solar' sounds and 'lunar' ones, as we will see in chapter (3) below.)

In addition to this classification, consonants can be divided into obstruents and sonorants. Obstruents consist of plosives, fricatives and affricates, whereas sonorants incorporate nasals, liquids and glides.

1.5.1.1 *Plosives*

The production of plosives entails complete stopping of the airflow at different parts of the vocal tract, followed by abrupt release of air. According to Abumdas (1985: 27), the release of voiceless plosives is much clearer than that of their voiced counterparts. The following plosives exist in MLA: bilabial [b], dental-alveolar [d, ḍ, t, ṭ] velar [k, g], uvular [q], and glottal [ʔ]. The latter two sounds are common casualties in the dialect we are dealing with in that they are often replaced or omitted. Uvular [q] is most frequently replaced by velar [g]; it survives only in direct borrowings from MSA in words like *qabiila* 'tribe', *qanuun* 'law', *qunbula* 'bomb', etc. The glottal stop is often dropped, especially in word-medial and final positions. (This dropping may be accompanied by compensatory lengthening.)

1.5.1.2 *Fricatives*

Fricatives are made by bringing two organs close together so that the air forced out between them causes audible friction. The hiss-sound of different fricatives varies as regards both frequency and intensity (Abumdas 1985: 30). For example, [s] has a

frequency of 4000 Hz, and higher. The frequency of [ʃ], by contrast, ranges between 2000 and 2500 Hz. MLA fricatives include two labiodentals /f, v/, four alveolars /s, z, ṣ, ẓ/, two post-alveolars /ʃ, ʒ/, two uvulars /x, ɣ/, two pharyngeals /ḥ, ʕ/, and one laryngeal /h/.

Note that the voiced labiodental /v/ is not originally Arabic and that it is not a frequently occurring sound; it can only be found in foreign loans in words like *veranda*, *video*, *Vietnam*, and it is frequently replaced by its voiceless counterpart.

1.5.1.3 *Nasals*

Articulating nasal sounds requires lowering the velum so that the airstream goes out through the nose rather than through the mouth. Only two nasal phonemes can be found in the dialect we are dealing with. These are alveolar /n/ and bilabial /m/. As we will see in chapter (4) below, /n/ may undergo regressive place assimilation to surface as labiodental [ɱ] or velar [ŋ]. This is in addition to being realised as [n] and [m].

1.5.1.4 *Liquids*

There are two liquids in MLA: /l/ and /r/. Articulating /l/ involves contact between the tongue blade and the alveolar ridge. The contact between these two articulators allows the air to pass freely through both sides. /l/ has an emphatic counterpart (Watson 2002: 16). This can be a separate phoneme /ɫ/, or simply an allophone [l]. The former occurs mainly in the word *Allah* [ʔaɫɫaah] 'name of God'.[2] The latter, on the other hand, occurs in the vicinity of emphatic consonants as in the following examples: *ʒaḷṭa* 'thrombosis',

[2] Note that this is no longer emphatic when it is preceded by /i/, as in [bismillaah] 'in the name of Allah'.

sulṭa ‘authority’, *ḷaṣga* ‘glue’, etc. Of course, Plain [l] enjoys much more frequency of use than emphatic [ḷ].

/r/ is the second MLA liquid. This can be a trill or flap. When producing trill [r], the tongue tip hits the alveolar ridge several times. By contrast, only momentary contact between the tongue and alveolar ridge is needed when flap [r] is produced. Trill [r] can be heard in geminates or in word-final positions; flap is found elsewhere (Abumdas 1985: 37-38; Muftah 2001: 33)

1.5.2 *Glides*

As is the case in many languages, the only two glides in MLA are labiovelar /w/ and palatal /y/. The production of /w/ entails raising the tongue dorsum towards the soft palate. This is accompanied by rounding of the lips, hence the term *labiovelar* (Muftah 2001: 34). During the articulation of /y/, on the other hand, the tongue back is raised to get close to the soft palate, but without being accompanied by lip rounding.

Abumdas (1985: 40) says that all Libyan Arabic consonants (with the exception of the glides /w/ and /y/, which do not exist in the environment Ca_C#) can be found in all word positions, i.e word-initially, medially or finally, and before or after vowels. However, as we saw in section (1.5.1.1) above, the glottal stop is retained only word-initially, but is often deleted in word-internal and word-final positions. As for the glides and their non-occurrence in the environment Ca_C#, we will have more to say about them in section (1.5.3.1). There we will see that the glides are part of diphthongs and that (under certain conditions) they undergo a process known as ‘monophthongization’.

Table 1 Consonantal phoneme inventory for MLA

Place of articulation	Manner of articulation				
	Obstruents		Sonorants		
	plosives	fricatives	nasals	liquids	glides
	vd vl	vd vl			
Bilabial	b		m		
Labio-dental		v f			
Dental-alveolar	d, ḍ t, ṭ				
Alveolar		z, ẓ s, ṣ	n	l/r	
Post-alveolar		ʒ ʃ			
Palatal					y
Velar	k				w
Uvular	q	ɣ x			
Pharyngeal		ʕ ħ			
Glottal	ʔ				
Laryngeal		h			

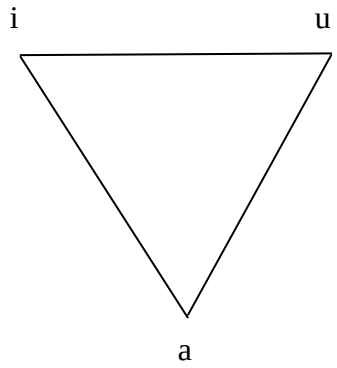
1.5.3 *Vowels*

Comparatively speaking, Arabic has a small number of vowels. Just three main vowel qualities can be found in this language. These are low central /a/, high front /i/, and high back /u/. According to Maddieson (2009), these are the essential or principal qualities and are most commonly found in the world's languages. Mitchell (1993: 138) says that each of these vowel qualities is realised in two forms: a short form and a long one. With the aim of finding out how unique the Arabic Language is within the languages of the world, Newman (2002) carried out a study, adopting the IPA framework used within the UCLA Phonological Segment Inventory Database (UPSID). Newman's study revealed that the vowel inventory of Arabic "is well below the mean within the UPSID languages in terms of vowel quality" (p. 70). As has just been mentioned, however, these vowel qualities (i.e. /i, u, a/) are the most common as they are found in,

respectively, 91%, 83.9% and 88% of the languages documented in the database (ibid; see also Ahmed (2008: 57-58).)

Researchers frequently represent the three main vowels comprising the Arabic vocalic system by means of "a sort of inverted triangle, with apex low at ɑ, and raised base i-u" (Gairdner 1925, p.33, quoted in Ahmed 2008: 58), as can be seen in figure (1).

(3) Basic vowels in Arabic



Following Kaye (1997) and Ahmed (2008), I replace Gairdner's symbol /ɑ/ for the low central vowel with the symbol /a/. This is because the former symbol is conventionally used to indicate the emphatic realisation of the vowel, which is articulated at a more back and lower position than the plain realisation of this vowel. Therefore, it is more appropriate to use /a/ as a cover symbol that incorporates the two (plain and emphatic) allophonic versions (Ahmed 2008: 58).

As we said in the first paragraph of this section, each of the three main vowel qualities has a short form and along one. There is slight change in vowel quality apart from the observation that the tongue is tenser during the articulation of long vowels than during that of their short counterparts (Muftah 2001: 82). Vowel length is phonemic in Standard as well as in dialectal Arabic. The following examples from MLA show that

vowel length has a phonemic status.

(4)	short vowels	long vowels
	galib ‘heart’	gaalib ‘mould/template’
	gasim ‘luck/share’	gaasim ‘sharing adj.’
	ḍarib ‘hitting n.’	ḍaarib ‘hitting adj.’
	ħamil ‘pregnancy’	ħaamil ‘pregnant’
	samin ‘ghee’	saamin ‘gaining weight s.m.’

The examples in (4) show that length is contrastive. Length is the only feature that distinguishes these words from one another (ibid: 83).

1.5.3.1 *MLA vowels*

Looking at the literature on LA vowels clearly shows that the number of vowels in this variety of Arabic is not agreed on by researchers. To take some examples, according to (Abumdas 1985: 41), Panetta (1940: 9) says that nine vowels can be found in LA; the same author says in another book (Panetta 1943: 2, 16) that the number of LA vowels is eight. Griffini (1913: xxiv) lists as many as 15 vowels, while Abumdas (1985: 41) argues that there are ten. More recently, however, Ahmed (2008: 83-84) says that besides the six vowels mentioned in the previous section, there exist two more vowels: long mid front vowel /e:/ and long mid back /o:/. This brings the total number of LA vowels to eight. These two vowels exist only in dialectal varieties of Arabic, never in the standard variety. As was hinted at in section (1.5.2), these are in fact a combination of the a short vowel and a glide; /e:/ is made up of /a/ and /y/, while /o:/ is an amalgam consisting of /a/ and /w/. We should add that in addition to the eight vowels listed thus far, the mid short vowel /ə/ can also be heard in unstressed syllables.

Aurayieth (1982: 23) says that the short rounded vowel /o/ is used as a phoneme in the North East of Libya, and he cites the following examples:

(5) [ʔilbiso] ‘they got dressed’, [ʔimsiko] ‘they held’, and [ʔigsimo] ‘they shared.’

Ahmed (2008: 84), tries to refute Aurayieth’s claim, saying that this is just an allophone of the mid back phoneme /o:/. The short version of this phoneme can only be heard word-finally, and gets lengthened in other word positions. For instance, if we add the third person singular feminine object pronoun /-ha/ to the words in (5), the vowel becomes longer and the following forms result.

(6) [ʔilbiso:ha] ‘they wore it’, [ʔimsiko:ha] ‘they held it’, [ʔigsimo:ha] ‘they shared it.’

However, it is not sufficient to say that /o/ occurs only word-finally and /o:/ occurs elsewhere. Aurayieth’s claim can be supported by the observation that minimal pairs do exist in the dialect he deals with. For example, the three forms cited in (5) contrast respectively with [ʔilbis**a**] ‘he wore it m.’, [ʔimsik**a**] ‘he held him’, and [ʔigsim**a**] ‘he divided it m.’

Botagga (1991) deals with LA vowels as heard in the variety spoken in the southern city of Sebha. He leaves out /o:/ from the list of LA vowels and adds /ʌ/ as an autonomous phoneme in words like /bʌṭṭɑ/ ‘duck’, /gʌṣr/ ‘palace’, and /ṣʌbr/ ‘patience’. But, as Ahmed (2008: 85-86) indicates, a glance at these words clearly shows that all of them contain emphatic consonants which could have caused the adjacent vowel to be realized as [ʌ]. Ahmed insists that the examples cited by Botagga obviously show that the vowel [ʌ], if it exists in Sebha Libyan Arabic, is just an allophone realising the low

central phoneme /a/.[3] Ahmed further points out that Botagga holds two contradictory opinions when the latter says, in another part of his thesis, that "/æ/ and /ʌ/ are two variants of the same phoneme /ɑ/." (Botagga 1991: 70, quoted in Ahmed 2008: 86)

Another researcher who claims that the emphatic forms of LA vowels are phonemes on their own not just allophones is Abumdas (1985). Abumdas lists some minimal pairs that contain emphatic and plain variants of /a/[4] to support his claim that they are phonemes rather than allophones, as the following examples show:

(7)

Plain	*Gloss.*	*Emphatic*	*Gloss.*
/ballah/	he wet	/bɑllɑh/	by God
/baabah/	his door	/bɑɑbɑh/	father
/baalah/	his mind	/bɑɑlɑh/	bale/bundle
/ʒaari/	running	/ʒɑɑri/	my neighbour
/baħħa/	hoarseness	/bɑħħɑ/	it is finished (baby talk)

However, as Ahmed (2008) indicates, except for the last example, where both the plain and emphatic realisations of the vowel are contiguous to the guttural consonant /ħ/, all the other vowels are adjacent to plain consonants. On the face of it, this seems to lend support to the claim that these are separate phonemes and their acoustic status is not because they occur in the vicinity of emphatic sounds.

Despite this apparent support to the opinion that both plain and emphatic variations of /a/ can be treated as independent phonemes, an important question should

[3] In fact, Ahmed (2008) says that [ʌ] is an allophone that realises the low central vowel /ɑ/. I think that this is a typo and that he probably means the phoneme /a/. This becomes clear when we take into account Ahmed's argument that [ɑ] is simply an allophone existing only adjacent to emphatic consonants and cannot be an independent phoneme.

[4] Ahmed (2008: 86) also refers to Abumdas's argument. Here again he uses the symbol /ɑ/ to, most likely, mean /a/ (see footnote 2).

be asked at this point. This question is that since the emphatic form of the low central vowel is treated as an autonomous phoneme because it exists in the vicinity of plain consonants, the reverse situation (i.e. the existence of the plain form of this vowel near emphatic consonants) should also be expected to happen. However, this reverse situation is not witnessed in LA; the plain version of the low central vowel appears only in plain environments in this dialect. This leads to the conclusion that [a] and [ɑ] are allophones realising the phoneme /a/. Support to this argument can be obtained from the observation that the emphatic version of the vowel occurs contiguous to plain consonants only in a very limited number of examples (Ahmed 2008: 85-86).[5]

The following examples indicate that /a/ surfaces as [ɑ][6] when it occurs next to emphatic consonants.

(8)	*Plain*	*Gloss.*	*Emphatic*	*Gloss.*
	baat	he stayed overnight	bˌɑɑtˌ	armpit
	naamit	she slept	nˌɑɑdˌit	she got up
	gaadi	align!	g̱ɑɑdˌi	judge
	nad	aloeswood	nˌɑtˌ	he jumped
	faal	omen	dˌɑɑl	stray (adj)
	taabit	she repented	tˌɑɑbit	it (f) ripened/ is done

[5] It should be pointed out that some of these examples are not originally Arabic, as can be seen by looking at /bɑɑbɑh/ 'father' and /bɑɑlɑh/ 'bale/bundle' in the examples in (7).

[6] In fact, all vowels, not just /a/, are affected by being in the vicinity of emphatic consonants. However, as Muftah (2001: 81) indicates "the auditory difference between these allophonic variations is clearer in the case of [a, ɑ] than that of [i, i̱] and [u, u̱] because the qualitative difference is greater between the plain [a] and the emphatic [ɑ] than between [i] and [i̱] or [u] and [u̱]." This might be the reason why the emphatic form of /a/ is symbolised as [ɑ] while emphatic versions of /i/ and /u/ are indicated solely by placing a dot underneath them.

Note that the existence of an emphatic consonant affects not only the realisation of vowels but also that of other consonants. Thus we see that the initial consonant of all the examples in (8) becomes emphatic. Note also that emphasis in these words spreads leftwards (as can be seen by looking at the first four words included in the column of emphatic words), which is an instance of anticipatory assimilation, in accordance with the general tendency that regressive assimilation is more frequently attested than its progressive counterpart.

Let us now have a quick look at the three basic vowels represented in figure (3) above.

/i/, /ii/

This is a high front vowel. Articulating this vowel requires raising the tongue to a position that is somewhat more retracted from and lower than the cardinal vowel number one. Here the lips are spread and the tongue is lax in its short form but tense in its long form (Muftah 2001: 79). It can be found in words like *bint* 'girl', *sibb* 'insult!', *diin* 'religion', *biiʕ* 'sell!'.

/u/, /uu/

A high back vowel. Here the tongue is raised to a position that is a little lower than cardinal vowel number eight. The lips are rounded and the tongue is lax in its short form but becomes tense when producing the long form of the vowel (ibid). Some examples are: *dubb* 'bear', *rudd* 'reply!/ return!', *ʃuuf* 'look!', *xuut* 'brothers'.

/a/, /aa/

This is a low central vowel during whose production the tongue is maintained in "a fully open position" (ibid). The lips are neutral and the tongue is lax in its short form but

slightly tense when producing its long form. The following are some examples: *xadd* 'cheek', *bass* 'only', *gaal* 'he said', *faas* 'axe'.[7]

We have said that all vowels may become emphatic when they are adjacent to emphatic consonants. Therefore, the vowels in these examples are not exactly the same: *liff* 'wrap!' vs *lịṣṣ* 'thief', *dull* 'ignominy/lowness' vs *ḍụll* 'shade', and so on. However, the differences between allophones of the high vowels are not as obivious as the difference between the allophonic variations of the low vowel (see footnote (6)).

Finally, it should be pointed out that diphthongs also occur in the dialect under investigation. However, the only two diphthongs in this dialect are /aw/ and /ay/. As can be seen, these consist of a vowel /a/ followed by a glide /w/ or /y/. Diphthongs occur only in word-final position, e.g. *ʒaw* 'weather', *law* 'if', *ħay* 'alive', *nay* 'raw/undercooked'. Word-internally, however, as is the case in many modern dialects of Arabic[8] as well as other Semitic languages, diphthongs frequently underwent a process of diachronic monophthongization whereby a diphthong changed into a long monophthong. Thus /aw/ and /ay/ become /oo/ and /ee/, respectively. The examples in (9) illustrate this process.

(9)

a.	i. sayf → seef	'sword'
	ii. kayf → keef	'how'
	iii sayl → seel	'flood'
	iv. zayt → zeet	'oil'
b.	i. xawf → xoof	'fear'
	ii. ħawl → ħool	'year'
	iii. lawm → loom	'blame'
	iv. jawm → yoom	'day'

[7] Abumdas (1985: 47) lists the vowel /Ā/ as an independent phoneme and says that the phonemes /ā/ and /Ā/ can be used contrastively before the suffix /-k/ of the second fem. sg. object pronoun *ʒāk* 'he came to you f.' vs *ʒĀk* 'he came to you m.'.

[8] The realisation of the monophthong may sometimes vary in different dialects of Arabic. In Lebanese Arabic, for example, *kayf* is realised as [kiif] rather than [keef] which is the realisation in MLA (Ghada Khattab, p.c.). Moreover, a native speaker of Tunisian Arabic told me that *kayf* surfaces as *kifaash* in TA.

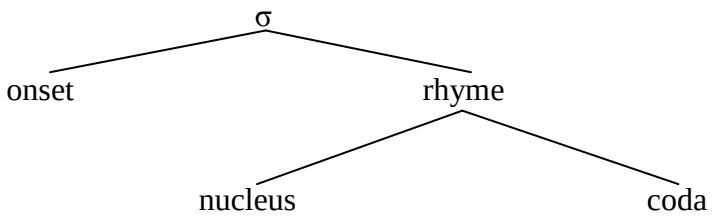
Owens (1984:10)[9] says that "all occurrences of *e:* and *o:* are from Classical Arabic *ay*/*aw*." (*e:* and *o:* are equivalent to our *ee* and *oo*, respectively. *ay* is equivalent to our *aj*). For the purpose of this study, the examples listed so far suffice to illustrate diphthongs and monophthongization.

1.6 The Syllable

The syllable is an important notion in linguistic analysis. In spite of this importance, however, Ladefoged and Johnson (2010) believe that "there is no agreed phonetic definition of a syllable" (p. 243). Thus definitions of the term *syllable* vary considerably. Crystal (2008) defines the syllable as "a unit of pronunciation typically larger than a single sound and smaller than a word" (p. 467). Finegan (2012: 127) says that "… technical definitions are challenging. Still, there is agreement that a syllable is a phonological unit consisting of one or more sounds and that syllables are divided into two parts– an onset and a rhyme".

The onset is the consonant that precedes the syllable nucleus. The coda is the consonant that follows the nucleus. (Onsets and codas can be simple or complex. In the former case, they consist of only one consonant; in the latter case, by contrast, an onset or a coda may comprise more than one consonant.) In fact, as we will see below, the coda is optional rather than obligatory in MLA and in Arabic in general. The syllable structure is usually represented as follows:

[9] See also Abu-Mansour (1992: 49) who says that in most Arabic varieties the long mid vowels *ee* and *oo* have been developed from the diphthongs *ay* and *aw*, respectively.



In some languages, a consonantal segment may occupy the syllable nucleus (e.g. English *button, little*). In the variety under analysis, however, the syllable nucleus must be a vowel.

We have said in the previous paragraph that onsets and codas may consist of more than one consonant. That is, they may be either C or CC. In onset position, the first member of the CC cluster may be more sonorous than the second, in violation of the Sonority Sequencing Principle (SSP). This principle requires more sonorous segments to be closer to the syllable nucleus than less sonorous segments. The flouting of SSP results from diachronic syncope, whereby a short high vowel is deleted in a non-final, open, unstressed syllable; such a syllable is referred to as a "weak" syllable (McCarthy 2007: 168). Thus the dialect contains forms like *lsaan* 'tongue', *msaafir* 'travelling s. m.', *rbaaṭ* 'ligature/bond'. These are historically linked to *lisaan*, *musaafir*, and *ribaaṭ*, respectively.

As for Coda clusters, Abumdas (1985: 86) believes that "[i]n both L.A. [Libyan Arabic] and S.A. [Standard Arabic], the first C in a CC coda must be a continuant, usually *n*, *r*, or *l*.". Probably Abumdas means a "sonorant" instead of a "continuant", since these three segments are sonorants and since a sonorant is more sonorous than an obstruent and is thus more likely to occupy a position that is nearer to the syllable head. Even if Abumdas meant to say "sonorant", however, his generalisation is not precise. In Standard Arabic, consonants of rising or falling sonority can be heard in coda clusters,

e.g. *ʔism* ‘name/noun’, *mahr* ‘dowry’ *barq* ‘lightning’, *ħarb* ‘war’. In the dialect under scrutiny (as well as in many other varieties of Libya Arabic), the coda cluster should obey the SSP; otherwise a vowel is inserted and the SSP violation is avoided.

Abumdas adds that in a form like *gaʕmaz-t-ha*, the *t* may be associated with the preceding or the following syllable (ibid). However, this *t* is preferably linked to the following syllable. This association of *t* with the following syllable is in accordance with the observation that consonants tend to affiliate to the following segment more than with the preceding segment. In addition, treating this *t* as a part of the preceding syllable would result in a superheavy syllable (mazt) in a non-final position, a position where Arabic superheavy syllables are disallowed. Syllables in Arabic are maximally bimoraic (Broselow 1992: 10; Watson 2002: 50). Therefore, *t* attaches to the following rather than the preceding syllable.

The following syllable patterns occur in the dialect.

(10)

	Syllable	Pattern	Gloss
1.	CV	**fi**.ham	‘he understood’
2.	CVV	**faa**.him	‘understanding m. s.’
3.	CVC	**kun**.dra	‘a pair of shoes’
4.	CVCC	gird	‘monkey’
5.	CCVV	**traa**.fig	‘you accompany’
6.	CVVC	laam	‘he blamed’
7.	CCV	xab.**bra**	‘inform him!’
8.	CCVVC	blaad	‘country’
9.	CCVCC	smint	‘cement’
10.	CCVC	sbiħ	‘beads’

As these examples show, the syllable nucleus must be a vowel. No syllable begins with a vowel, that is, onset is essential. The coda, on the other hand, can either be present or absent, thus reflecting the widely attested syllable structure CV(C).

1.7 Gemination

MLA consonants may be geminated in initial or in medial position. Initial gemination is mainly morphophonological, resulting from total assimilation of a consonantal prefix to the first consonant in the stem, as will be detailed in the relevant chapters below. Medial gemination, by contrast, "carries with it a sense of intensification in Arabic" (Watson 2002: 139). For example, form II verbs frequently indicate action on a plural object. Less frequently, these verb forms indicate that the action is carried out by a plural subject. This can be seen in perfective verbs like *dibaħ* 'he slaughtered' versus *dabbaħ* 'he slaughtered many …', *nixaṣ* 'he poked' as opposed to *naxxiṣ* 'he poked many times' (cf. Greenberg 1991: 580; Watson 2002: 139).

In addition to this sense of intensification function, gemination is also used to derive the causative form of verbs (see the following section). By doubling the second radical of the first form (faʕal), we obtain the second form (faʕʕal) (Wright 2007: 31). Thus many words are distinguished on the basis of whether they contain a geminate or not. Three examples are:

(11)	[siˈmaʕ]	'he heard'	[ˈsammaʕ]	'he made someone hear'
	[fiˈham]	'he understood'	[ˈfahhim]	'he made someone understand'
	[ṣiˈbar]	'he became patient'	[ˈṣabbir]	'he caused sb to become patient'

Geminates are ambisyllabic: the first segment of the geminate is parsed as a coda to the preceding syllable, while the second segment is attached to the onset position of the

following syllable. As these examples show, gemination causes the first syllable to become closed and thus to receive primary stress.

1.8 Root-and-pattern Morphology

In this thesis, mention will be frequently made of Arabic verb forms. It is, therefore, essential to shed some light on these forms. Arabic has a root-and-pattern morphological system. Derivational verbs are good examples of the root-and-pattern morphology of Arabic (Watson 2002: 125). Generally speaking, roots in all varieties of Arabic give the general meaning of the word while patterns provide the derived meaning (Elgadi 1986: 85-6). The verb forms of the dialect are listed below. Wright (2007) lists fifteen Classical Arabic verb forms, four of which are "of very rare occurrence" (p. 29). Here, however, we will mention only the eight forms that can be heard in MLA.

(12) **verb patterns**

Form	Verb Pattern	Example	Trilateral Root	Gloss
I.	fiʕal CVCVC	ʃirab	ʃ-r-b	'to drink'
II.	faʕʕil CVCCVC	darrib	d-r-b	'to train'
III.	faaʕil CVVCVC	saafir	s-f-r	'to travel'
IV.	NA			
V.	tfaʕʕil[10] tCVCCVC	tsallif	s-l-f	'to borrow'
VI.	tfaaʕil tCVVCVC	tsaanid	s-n-d	'to support'
VII.	nfaʕal nCVCVC	nkasar	k-s-r	'to be broken'
VIII.	ftaʕal CtVCVC	ltabas	l-b-s	'to be worn'
IX.	NA			
X.	stafʕil stVCCVC	stafsir	s-f-r	'to enquire'

[10] As we will see below (section 5.2), the prefix /t-/ in this verb form assimilates totally to the following coronal obstruent.

It should be stressed that while this classification is based mainly on that of Wright (2007), the verb forms are written as they are pronounced in MLA. Thus vowel qualities may be different from those used by Wright. Moreover, primary stress may on occasion be placed on a syllable which is not primarily stressed in CA (Wright does not indicate which syllables are stressed and which ones are not, but stress facts are not the same in CA and the dialect under analysis.)

As the examples show, pattern I is the simplest pattern, generally described as the "simple conjugation or nonderived class" Elgadi (1986: 87). Pattern II, by contrast, is a bit more complex. It is derived from pattern I by doubling the middle radical. The third pattern is characterised by the occurrence of a long vowel /aa/ after the first radical. Pattern V is derived from pattern II by prefixing /t-/, while pattern VI is formed by attaching /t-/ to pattern III (more on these two verb pattern in chapter (5) below). Pattern VII is mainly distinguished by the presence of the prefix /n-/, which indicates a passive voice and sometimes a "reflexive signification" (Wright 2007: 40). The distinguishing feature of pattern VIII verbs is the occurrence of the infix /-t-/ between the first and second radicals. This pattern is "properly the *reflexive* or *middle voice* of the first" (ibid: 42). The tenth pattern is derived by attaching the prefix /st-/ to the first. The /s-/ has a "causative meaning, while the /t-/ has a reflexive connotation" (Elgadi 1986: 99).

As mentioned above, this study will present phonological analyses of some assimilatory processes in Libyan Arabic within the framework of Optimality Theory (OT). The following chapter is therefore allocated to dealing with the phenomenon of assimilation and the framework within which this study is conducted.

Chapter 2. Topic and Framework

2.1 Assimilation

The phenomenon of assimilation was dealt with by the early Arab grammarians. The linguistic study by Arabic scholars dates back to the first century of Islam in the seventh century AD (Al-Nassir 1993: 1).

The interest to study Arabic linguistics, particularly the study of the sound system and pronunciation, originated mainly as an endeavour to "preserve an unaltered text and an authentic oral presentation of the Qur'an" (Alfozan 1989: 11).

2.1.1 *Types of assimilation* [1]

Assimilation can be classified both in terms of directionality and in terms of the degree of similarity between the assimilant and the assimilator. Taking the direction of assimilation into account, assimilations are generally classified into the following types.

2.1.1.1 *Regressive assimilation*

Regressive (also called anticipatory, backward, or right-to-left) assimilation is probably the most frequently occurring type of assimilation. In fact, Pavlík (2009: 8) says that regressive assimilation takes place in all languages. Here a sound undergoes change under the influence of a following sound. That is, in a sequence of segments AB, segment B affects segment A and makes it acquire some or all of its features. This is to say that segment B is the assimilator whereas segment A is the assimilee: schematically A ⇐ B. For example, a vowel occurring before a nasal will most likely become nasalised, as in *chin* [tʃĩn].

[1] This section draws mainly on Pavlík (2009). For further information and references, refer to Pavlík's paper.

2.1.1.2 *Progressive assimilation*

Progressive (also called carry-over, preservatory, forward, or left-to-right) assimilation has the opposite directionality of regressive assimilation. Here, in a sequence of segments AB segment A affects segment B. Segments A and B swap the roles they have in regressive assimilation, with segment A functioning as the assimilator and segment B the assimilee: schematically A ⇒B (Pavlík 2009: 8). Consider, for example, emphasis spread in MLA. Appending a t-initial suffix to a stem ending in emphatic /ṭ/ causes the former to get emphasis from the latter, e.g. /ɣalaṭ+ -tu/ → [ɣalaṭṭu] 'you m.p. made a mistake'.

It should be pointed out here that regressive assimilation is cross-linguistically more common than progressive assimilation (Kreidler 1997: 116[2]; Jun 2004: 58). This is because in the former type "the vocal tract anticipates the following sound" (Abumdas 1985: 116).

2.1.1.3 *Reciprocal (mutual) assimilation*

In this type of assimilation, two contiguous segments A and B simultaneously exert influence on each other. Thus both segments are assimilators and assimilees at the same time. This can be represented as A ⇔ B. This type of assimilation can be broken up into two sub-types: non-coalescent and coalescent.

(A) Non-coalescent (autonomous) reciprocal assimilation

[2] Kreidler seems to be mixing up the terms *regressive* (or anticipatory) *assimilation* and *progressive assimilation*. He refers to the process whereby a segment is affected by a preceding segment as "regressiver assimilation". Kreidler adds that a more frequently-occuring type of change is "progressive (or anticipatory) assimilation in which a phoneme takes on some features of a following phoneme". This is clearly not the case.

This is the case when two sounds exert mutual influence on each other, and consequently both sounds get some feature(s) reciprocally. Despite this reciprocal influence, however, both sounds remain relatively independent. This can be diagrammed as: A ⇔ B → $A^{B}B^{A}$. That is, the interaction between the two sounds still results in two independent sounds that have received some features reciprocally. In *nuṭṭ* [n^{w}ũṭṭ] 'jump!', for example, [n] spreads nasality to the following vowel, which in turn spreads lip-rounding to the nasal whose production would otherwise require neutral lips.

(B) Coalescent reciprocal assimilation

In this process two segments fuse into one, and a qualitatively new sound emerges that includes features of both. For example, an affricate sound can be heard in the English phrases *what you* and *did you*, which can be transcribed as [wɒʧu] and [dɪʤu], respectively. This can be schematised as A ⇔ B → X. Note that voiceless [ʧ] agrees with voiceless [t] while voiced [ʤ] agrees with voiced [d] of the original phrases.

2.1.1.4 *Total assimilation*

Total assimilation occurs when the assimilee takes on all the phonetic features of the assimilator. That is to say, the assimilator and the assimilee become identical, resulting in a sequence of geminate sounds. This can be diagrammed as AB → AA or AB → BB. In MLA, for example, adding a t-initial agentive suffix to a d-final stem results in total assimilation of the last sound of the stem to the initial sound of the suffix, as when *haddid* + *-ta* surfaces as [hadditta] 'I/you threatened him.'

2.1.1.5 *Partial assimilation*

This is the situation when the assimilee receives only some feature(s) from the assimilator. This brings about a sequence of partially similar (i.e. non-identical) segments: schematically AB →$A^{B}B$ or AB → AB^{A}. For example, the underlined alveolar nasal in the phrase *mi<u>n</u>* + *fraansa* 'from France' is realised with a labiodental articulation [ɱ], which it gets from the following fricative.

2.1.1.6 *Partial and total assimilation in different languages*

It should be pointed out that partial and total assimilatory processes may behave differently in different languages. Crystal (2008: 40) cites the English phrase *ten bikes* [tɛ**n** baɪks] changing to [tɛ**m** baɪks], where /n/ assimilates the place feature of the following /b/ to surface as [m], and says that assimilation here has to be partial rather than total. A pronunciation where /n/ acquires both bilabiality and orality of /b/, as in /teb bikes/ would be unlikely unless "one had a severe cold!"

This, however, is only because English preserves the nasal and because blockage of the nasal passage is charesteristic of having a cold. In other words, what is true of some languages may not be true of some other languages. For example, although Arabic and Hebrew belong to the same family, they behave somewhat differently when it comes to assimilation. Thus, in spite of the observation that these two languages have the same morphemes {min} 'from' and {bayit}[3] 'house', when these words are adjacent partial assimilation takes place in Arabic to yield *mimbayt* while total assimilation is attested in Hebrew to produce *mibbayit*. (Gleason 1961: 84; Alfozan 1989: 53).

[3] Note that this is {bayt} in Arabic, i.e. without the high front vowel. This, however, does not affect the assimilatory process at hand, since this process takes place at the left periphery of the word.

Alfozan (1989) further says that in many languages assimilations are optional rather than compulsory. “They are not “mostly obligatory” in English” (p. 56). In this respect, distinction is made between class i and class ii affixes. The former type fully assimilates to sonorants, e.g. *in- + legal → illegal*, not **inlegal*. On the other hand, attaching *un-*, which is a class ii affix, to a sonorant-initial stem, does not result in assimilation of /n/ to the sonorant, e.g. *un- + lawful → unlawful*, not **ullawful*.

Finally, note that total assimilation does not necessarily entail altering a greater number of features than required in partial assimilation. It can be the case that partial assimilation requires altering more features than in total assimilation. For example, let us take a look at the total assimilation of the lateral sound in the definite article /ʔil/ to [+coronal] segments in words like *ʔir-rub* ‘the date syrup’, as opposed to the partial assimilation of the alveolar nasal to the velar it precedes, as can be seen in the word *ʕaŋkabuut* (Abu-Salim 1988: 54; Owens 1984: 46). The segments /l/ and /r/ have the same SPE distinctive features, except for the feature [lateral]; /l/ is [+lateral] while /r/ is [-lateral]. Thus the total assimilation of /l/ to /r/ entails spreading the feature [-lateral] onto and, at the same time, removing the feature [+lateral] from the feature matrix of /l/. By contrast, the partial assimilation of /n/ to the following velar consonant requires spreading a minimum of four features from the feature matrix of the velar obstruent to the feature matrix of the alveolar nasal. This is, of course, accompanied by simultaneous removal of the corresponding features (having the opposite values) from the feature matrix of the nasal. The features that need to be spread are [+high], [+back], [-ant] and [-cor]. This clearly shows that total assimilation does not mean extending all the features from feature matrix of the assimilator to that of the assimilee; nor does it

mean altering more features than those altered in partial assimilation (Abu-Salim 1988: 54).

2.1.1.7 *Optional and compulsory assimilation*

In Arabic, assimilation has to be dealt with taking two different perspectives into account. The first perspective is that of the Arabic language in general; the second is that of the recitation of the Qur'an (Alfozan 1989: 56). Regarding the first perspective, Alfozan says that some kinds of assimilation are compulsory, which implies that some other kinds are optional. However, he only cites examples of compulsory assimilation, as when the /l/ of the definite article fully assimilates to the following 'solar' sound, e.g. /ʔil + tiffaaħ/ → [ʔittiffaaħ] 'the apples' (more will be said about this in chapter (3)). Regarding the second perspective (i.e. that of the recitation of the Qur'an) Muslims on the whole, and specially the Qurraaʔ (Qur'an reciters) pay particular attention to this; some assimilations that are optional in casual speech are mandatory in the recitation of the Qur'an. This is because the reciters of the Qur'an believe that it is their responsibility to adorn the Qur'an and read it in the best way possible (ibid: 57).

2.1.1.8 *Basic definitions*

In this section we will deal briefly with defining the segments involved in assimilation as well as defining assimilation itself. Concerning the segments involved, at least two segments are required for assimilation to take place. These segments affect each other and change their phonetic properties. The segment that is influenced by assimilation can be referred to as the *assimilee*; the segment that causes another segment to undergo

assimilation can be dubbed the *assimilator*.[4] The resultant segment, the segment produced through a particular assimilatory process, can be termed the *assimilant* (Pavlík 2009: 4). For example, as we will see in the nasal assimilation in chapter (4), in the word *ʕanbar* [ʕambar] 'ward' the segment [b] is the assimilator; the segment [n] is the assimilee, while the segment [m] is the assimilant, resulting from the [n] acquiring the place of articulation of following [b]. It should, however, be borne in mind that the issue is a bit more complex than this simplification of facts. Generally speaking, adjacent segments may affect each other reciprocally. For instance, in the bimorphemic word *ħafaḍ + -ta* [ħafaṭṭa] 'I/you learnt it by heart', stem-final [ḍ] and suffix-initial [t] affect one another to yield geminate [ṭṭ].

We will now have a look at some definitions of the term *assimilation*. Alfozan (1989: 48-50) gives four definitions introduced by some other researchers and tests each of them against certain examples. Testing the definitions against those examples shows that each of the definitions Alfozan presents has some sort of incompleteness or inaccuracy. Consider, for example, D. Abercrombie's (1967) definition "changes in pronunciation which take place under certain circumstances at the ends and the beginnings of words".

Alfozan says that this definition is incomplete in that it does not list the middle of the word as a possible environment in which assimilation may occur. Thus examples like /idtaʕa / → [iddaʕa] 'he claimed', /waṣtabir/ → [waṣṭabir] 'and be patient' are excluded from the definition. So Alfozan combines some of the definitions he presents to produce a more precise definition: "assimilation is the process in which sounds

[4] Alternative terms to *assimilator* and *assimilee* are the *trigger* and the *undergoer*, respectively (e.g. Mohanan 1993: 89; Watson 2002: 214). Gleason (1961: 83) calls them the *conditioning sound* and the *assimilated sound*, respectively.

become identical or more alike under the influence of a third sound or that of one, upon the other. It may occur at the beginning, in the middle, or at the ends of words." (p.50)

Different types of assimilation taking place at different positions are included in this definition. The word *identical* here refers to total assimilation, while the phrase *more alike* refers to partial assimilation.

Pavlík (2009: 2-3) says that besides the term *assimilation*, a number of related terms have emerged in the literature during the last five decades or so, with similar or slightly different meanings. Some of these terms are: *similitude*, *coarticulation*, *feature spreading*, *coproduction*, *gestural coordination*, etc. Several of these terms are used interchangeably, but some may pose compatibility problems. For example, there has been a debate about the difference between assimilation and coarticulation. This matter is connected with the debate regarding the difference between phonetics and phonology and whether there is or there is no interface between the two disciplines. In this respect, distinction is made between connected speech phenomena that are planned before the actual articulation and those that take place "during the articulation as a biomechanical result of human psychology" (ibid). The former processes are frequently treated as instances of *assimilation*, whereas the latter are referred to as coarticulations. (For more details on this point, see Pavlík (2009) and references therein).

In this respect, Heselwood *et al* (2011: 63) say that researchers do not always agree if a distinction should be made between the terms *assimilation* and *coarticulation*[5], or how this distinction should be drawn in case it exists. As pointed out by Farnetani & Recasens (2010: 321-323) both terms indicate that there is a change in the pronunciation of the affected word due to the influence of the context in which it occurs. Laver (1994: 153) uses the term *coarticulation* to designate phonetic adjustment

[5]Heselwood *et al* (2011) follow Laver (1994) in his use of these two terms.

across a word boundary and *assimilation* to refer to phonetic adjustment inside the word.

Likewise, Alfozan (1989: 51-2) differentiates between assimilation and similitude. He cites Jones (1950) insisting on distinguishing between these two terms and saying "[S]imilitude is the use of a certain variety of sound at the present time. Assimilation is the process of replacing one sound by another under particular conditions." (p. 128) Hartmann (1972) defines similitude as "the pronunciation of one segment being influenced by the pronunciation of an adjacent segment"

Alfozan goes on to say that these definitions indicate that the key difference between the two processes is that similitude involves comparing a sound with itself in different places, whereas assimilation entails comparing a sound to adjacent sounds. As an example of similitude, the voiceless velar stop /k/ has an advanced (i.e. more forward) articulation before front vowels, e.g. *keep* [ki:p]; its articulation is further back when it occurs before a back vowel, as in *caught* [kɔ:t].

This means that similitude yields allophonic variation, while assimilation gives rise to phonemic alternation. "Similitude, however, may perhaps still be considered as a branch of assimilation." (Alfozan 1989: 52) In this study, the term *assimilation* will be used as a cover term to include all the terms mentioned above.

Pavlík (2009: 5) classifies assimilation into phonemic and phonetic (i.e. allophonic), a classification that is based on the -emic/-itic distinction. Phonemic assimilation gives rise to the existence of a new phoneme. For example, the alternation between [n] and [ŋ] in the phrase *in Canada* can be treated as an instance of phonemic assimilation. This assimilation, however, is always restricted to a specific language (or language variety), since the same assimilatory process in some other language may give

rise to the production of an allophone. In the dialect under analysis [ŋ] is simply an allophone of the phoneme /n/ not a phoneme in its own. Allophonic assimilation, by contrast, results in the production of an assimilant that is not a separate phoneme in a certain language. An example of this is the case of the advanced and retracted versions of the voiceless velar stop mentioned in the paragraph just before the preceding paragraph.

Having considered some general aspects of assimilation, we now turn in the next section to the analytic framework of this thesis, OT.

2.2 Framework

The core idea of OT is that Universal Grammar is, for the most part, composed of "a set of constraints on representational well-formedness, out of which individual grammars are constructed" (Prince and Smolensky 1993: 2). These constraints are ranked in accordance with their importance. As its title (*Optimality Theory*: *Constraint Interaction in Generative Grammar*) indicates, OT is fundamentally regarded as an extension of generative phonology, and thus it still upholds the essential distinction between underlying and surface levels of representation, even though through a different perspective (Honeybone 2009: 146). OT rejects the use of rules and derivations, replacing them with well-formedness constraints which interact to choose the actual output (Lombardi 2001: 1).

The standard phonological theory that was dominant during the 1970s and 1980's developed from Chomsky and Halle's (1968) *The Sound Pattern of English* (SPE). This theory was mainly transformational or rule-based. It mainly made use of rewrite rules of the form A→B/ C__D. This rule can be read as '*A* becomes or is realised as *B* in the environment of a preceding *C* and a following *D*.' This is to say that

an SPE-type theory of phonology applies a certain process to the input to produce an output (McCarthy 2002: 3; 2008: 1). Rewrite rules apply in a serial fashion with the output of one rule being the input for the next rule, and so forth until the final output is produced. But the problem with rewrite rules of this type is that they are mainly descriptive rather than analytical. As McCarthy (2008: 1) puts it, they "can describe lots of phenomena, but they do a poor job of explaining how phonological systems fit together."

Another serious problem with rule-based phonology is that it fails to predict the functional unity of rules. This is the situation when a set of rules work together to yield the same result of getting rid of disfavoured constructions. Such a situation was first dealt with by Kisseberth (1970), who termed it a 'conspiracy', as rules 'conspire' to produce the desired output (Kisseberth 1970; McCarthy 2008; Bakovic N.d.). Consider, for example, the following set of rules (Kager 1999: 56).

(13) A set of functionally coherent rules

a. A→ B /X__Y	d. Y→ Z /XA__
b. A→ C / X__Y	e. Ø→ B /XA__Y
c. A→ Ø /X__Y	f. X→ Ø /__AY

It is obvious that all of these rules aim at eliminating the ill-formed sequence *XAY. Nonetheless, the functional unity of these rules (i.e. the fact that they avoid the configuration *XAY) is not explicitly expressed through the rules themselves. Pater (1999) presents such conspiratorial relation between the rules in (2) as it is manifested in the African languages Umbundu and Si-Luyana.

(14) The nasal + voiceless consonant conspiracy

a. [+nas] → Ø /__ [-voi, +cont]

b. [+nas] → [x place] /__ [x place]

c. [-voi] → Ø / [+nas] __

To clarify the picture, consider the following data:

(15) Nasal fusion and deletion (Umbundu (a) and Si-Luyana (b)) (Pater 1999: 326)

a. /N+ tuma/ [numa] 'I send'
/N+ seva/ [seva] 'I cook'

b. /N+ tabi/ [nabi] 'prince'
/N+ supa/ [supa] 'soup'

Once again, these data indicate that a sequence of a nasal and a voiceless obstruent is avoided. As Pater says, however, the rules in (14) do not reflect this conspiratorial relation (see also Bakovic n.d.). Such cases "provide a strong motivation for the formal recognition of output constraints" (Pater 1999: 328). Pater insightfully captures the conspiratorial behaviour of the data in (15) above within OT by positing the markedness constraint *NÇ, where N= unspecified nasal and Ç= voiceless consonant.

It can be seen from the examples in (15) that the unspecified nasal sound undergoes fusion with voiceless stops but deletes before voiceless fricatives. This means that two tableaux will be needed to see the evaluation process. In order to select the correct output form, *NÇ should be ranked at the top of the hierarchy. This is shown by tableaux (16) and (17), from Pater (1999: 327).

(16) Fusion with voiceless stops

Input: N_1+$t_2$abi	*NÇ	IDENT-IO[CONT]	MAX	LINEARITY
a. $n_1t_2$abi	*!			
b. ☞ $n_{1,2}$abi				*
c. $t_2$abi			*!	

(17) Deletion with voiceless fricatives

Input: N_1+s_2 upa	*NÇ	IDENT-IO[CONT]	MAX	LINEARITY
a. n_1s_2 upa	*!			
b. $n_{1,2}$upa		*!		*
c. ☞ $s_2$upa			*	

These tableaux show that LINEARITY is outranked by the other constraints.

A similar situation arises in the dialect investigated in this thesis. In MLA, when /n/ occurs in coda position and it is immediately followed by an obstruent, this /n/

usually takes on the place of articulation of the following obstruent. Alternatively, a vowel may be inserted between the two members of the offending cluster. For example, a word like /ʒanb/ may surface either as [ʒamb] or [ʒanib]. The markedness constraint ***CLASHPLACE[nas+obs]** elegantly accounts for this observation.

2.2.1 *Markedness*

The concept of markedness plays a pivotal role in OT. All linguistic structures have two values; one of these values is marked, whereas the other is unmarked. Languages generally favour unmarked structures over marked ones. In fact, languages tend to avoid marked structures but generate unmarked structures (Kager 1999: 2; de Lacy 2006: 1). The notion of markedness is relative rather than absolute. This is to say that a certain linguistic configuration is not marked by itself but only with respect to other configurations. For instance, nasalised vowels cannot be treated as inherently marked; they are marked only with respect to oral vowels (Kager 1999: 44). Likewise, syllables with a consonant in the coda position are regarded as marked only when CV syllables are taken into account.

Bear in mind that markedness distinctions may be ignored or overridden by other concerns. However, they can never be reversed. For example, one language may consider *x* as being more marked than *y*; yet another language may consider *x* and *y* to be equally marked. But no language will regard *y* as less marked than *x*[6] (de Lacy 2006: 1).

[6] de Lacy says that this statement is subject to the following proviso, which he dubs *Hierarchy conflict*: "Markedness hierarchies can conflict: one hierarchy may favour *x* over *y* while another favours *y* over *x*."

2.2.2 *OT constraints*

Three main sets of constraints are recognised in OT. Markedness constraints are output constraints; they assign violation marks to marked candidates. For example, a syllable beginning with a cluster of two, or more, consonants gets a violation mark from the markedness constraint *COMPLEX[7] (Prince and Smolensky 1993: 87; Kager 1999: 288; van Oostendorp 2005: 5; McCarthy 2008: 261) which rules out syllables with complex margins (onsets and codas). In some languages such as German, Polish and Russian, voiced obstruents are intolerable in coda position. As a result, in German, for example, underlying /bad/ surfaces as [bat] or [baḍ̥] 'bath' with the final obstruent devoid of the feature [voice]. This is another case in which a markedness constraint (*VOICED-CODA) occupies the top of the hierarchy (Kager 1999: 14; McCarthy 2002: 112; 2008: 275).

Markedness constraints are active both at segmental and suprasegmental levels. For example, the *NÇ̥, introduced in section (2.2) above, operates at the segmental domain. At a higher level of prosodic structure, the constraint FTBIN calls for the binarity of feet "under syllabic or moraic analysis" (McCarthy and Prince 1993: 46).

These markedness constraints are distinguished from faithfulness constraints, which strive to prevent any difference between input and output forms. To exemplify, input forms with coda consonant clusters that rise in sonority trigger epenthesis to get rid of these undesirable clusters. Such epenthesis violates the faithfulness constraint DEP, which disfavours the insertion of segments in the output that do not have input correspondents. In MLA, for example, SONSEQ is a highly ranked constraint. As a

[7] Note that *COMPLEX is a cover constraint which can have different forms. Thus *COMPLEXONS militates against complex onsets; *COMPLEXCOD, on the other hand, penalises output forms with more than one coda consonant.

result, an input form like /faʒr/ ‘dawn’ surfaces as [faʒir], with an epenthetic [i] breaking up the cluster in the coda position. DEP prefers [faʒr] to [faʒir], whereas SONSEQ prefers [faʒir] to [faʒr]. However, the selection of [faʒir] as the actual output form means that SONSEQ dominates DEP.

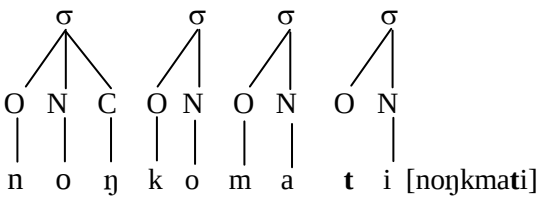
Alignment constraints also play a pivotal role in OT. These constraints require that “constituent edges coincide” (McCarthy 2002: 17). Sometimes the right edges of constituents are required to coincide; other times the left edges of constituents are not allowed to misalign. These requirements are stated in the following constraints, respectively (Kager 1999 111-13).

(18) ALIGN-R
The right edge of a Grammatical Word coincides with the right edge of a syllable.

(19) ALIGN-L
The left edge of a Grammatical Word coincides with the left edge of a syllable.

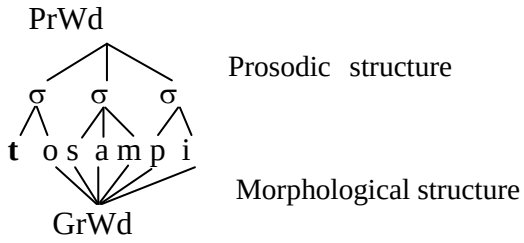
For example, many languages require syllables to have onsets and, as a result, epenthesise a consonant at the beginning of each otherwise onset-less syllable. To have an example, let us consider the case of Axininca Campa. This is one of the languages that prefer not to have onset-less syllables. To meet this requirement, Axininca Campa inserts an epenthetic [t]. However, epenthesis is restricted only to word-internal positions and fails to apply word-initially. Consider, for example, the underlying form /no-N-koma-i/ which surfaces as [noŋ.ko.ma.**t**i] with an extra [t] added to the otherwise onset-less final syllable. This is shown in the following diagram (Kager 1999: 99).

(20)



No epenthesis is witnessed, however, when the onset-free syllable occupies a word-initial position. Thus an input form like /osampi/ surfaces as [osampi] 'ask', rather than *[**t**osampi]. This is because [t]-epenthesis gives rise to misalignment between the Grammatical Word and the Prosodic Word. Diagram (21) schematises this non-coincidence (ibid: 111).

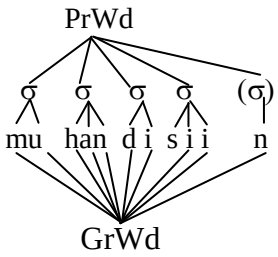
(21)



Epenthetic /t/ is part of the Prosodic Word but not part of the Grammatical Word. [t] occurs at the left edge of the Prosodic Word, while [o] occurs at the left edge of the Grammatical Word. This is a violation of ALIGN-L.

A somewhat similar situation can be found in MLA. However, since all syllables in this dialect obligatorily begin with a consonant, avoidance of onset-less syllables has priority over alignment. The plural in this dialect may be formed by adding the suffix /-iin/ to the singular noun stem. For example, attaching this suffix to a word like *mu.han.dis* 'engineer' results in *mu.han.di.siin* ('.' is conventionally used to indicate syllable boundary). The suffix is vowel-initial, and this causes the coda of the final syllable of the stem to re-syllabify as onset to the suffix. This, of course, brings about non-coincidence between the Grammatical Word and the Prosodic Word, since the *s* is originally part of the stem. Re-syllabification of this *s* and the resulting misalignment is shown by diagram (22).

(22)



Prosodic structure

Morphological structure

The alignment constraints we have introduced can be included in one family of well-formedness constraints, which McCarthy and Prince (1993: 2) dub *Generalized Alignment*.

(23) Generalized Alignment
Align (Cat_1, $Edge_1$, Cat_2, $Edge_2$) $=_{def}$
$\forall$ Cat_1 $\exists$ Cat_2 such that Edge1 of Cat_1 and $Edge_2$ of Cat_2 coincide.

Where
Cat_1, Cat_2 $\in$ PCat $\cup$ GCat
$Edge_1$, $Edge_2$ $\in$ {Right, Left}

Here Cat_1 is a subset of Cat_2. Cat_1= prosodic category {PrWd, Foot, Syllable, Mora, etc.}, while Cat_2 = grammatical category {Word, Stem, Root, Affix, etc.} (Kager 1999:118-19). Thus this constraint format requires that edges of grammatical and/or prosodic categories coincide, regardless of whether these are left or right edges.

Note that OT constraints are output constraints; that is, they evaluate output candidates rather than input forms. Faithfulness constraints do refer to the input. They, however, do that not for the sake of the input itself but to find out the loyalty of output forms to their underlying forms.

2.2.3 *Input and output in OT*

We have said that rule-based theories of phonology apply certain procedures to the input to derive an output. By contrast, OT is comparative rather than derivational; that is, the real output form is chosen from a number of candidate output forms (McCarthy

2002: 3). In order to choose the optimal candidate, a hierarchy of 'violable' constraints is used.

Constraint violability is a key notion in OT. In fact, OT constraints are frequently illustrated by analogy with the following Three Laws of Robotics (Asimov 1951, quoted in McCarthy 2008:13)

(24) Laws of robotics
1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given to it by human beings, except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

It is obvious that the first law is the most important of the three laws, with the second and third laws following it in descending order of importance. This means that a robot may disobey the second and third laws, as long as the first law is respected. Likewise, OT candidates should avoid violating high-ranking constraints, and may violate lower ranking constraints in order to do so.

It should be taken into account that constraint violability is not the same thing as parametrization. A parameter expresses a situation where a certain requirement can either be met or disregarded. That is, a parameter has binary choices (yes/no). Thus, depending on the language being dealt with, a parameter is either switched on or off. On the contrary, an OT constraint (irrespective of its position in the hierarchy) always confirms what it requires. For example, as a parameter NO-HIATUS is activated with languages that do not tolerate a sequence of two vowels, but deactivated with languages in which this sequence is permissible. As a constraint, on the other hand, NO-HIATUS assigns violation marks to forms that do not respect it (McCarthy 2002: 11-12; 2008: 26), even if those forms are the correct surfacing output.

In some theories of linguistics, differences between languages are frequently ascribed to parameters (McCarthy 2008: 26). OT theorists, by contrast, claim that systematic differences between languages can be attributed solely to constraint ranking. This means that different permutations of constraints give rise to a different grammar. Sometimes a languages seems to pay no attention to a certain constrain. This constraint, nevertheless, is believed to exist in the constrain hierarchy of that language. The inactivity of the constraint is because other constraints have outranked it and caused it to be invisible.

2.2.4 *Gen and Eval*

2.2.4.1 *Gen*

Before giving further explanation about the constraint hierarchy, let us first explore how output candidates are generated and evaluated. Out of a given input, the function Gen (short for Generator) produces an infinite number of potential output forms (known as candidates). Gen is universal, and for this reason it must at least produce "candidates varied enough to fit all of the ways in which languages can differ" (McCarthy 2002: 8). Gen's ability to posit an infinite number of candidates is referred to as the *freedom of analysis*.[8]

(25) **Freedom of analysis**: Any amount of structure may be posited (Kager 1999: 20).

Thus Gen can carry out a variety of operations on the input such as deletion of certain segments, epenthesis of some other segments, and altering the feature specifications of those segments (McCarthy 2008: 16). For instance, in many varieties of Libyan Arabic the voiceless prefix /t-/ undergoes voice assimilation to agree with the initial voiced

[8] An alternative term to *freedom of analysis* is *inclusivity* (McCarthy 2002: 8). The former term, however, is much more frequently used and recognised in the OT literature.

consonant of the verb stem to which it is attached.[9] The potential candidates for the input (say) /t- + zuur/ 'you/she visit(s)' will include forms with a voiced prefix [dzuur] (the actual output form), along with other candidates such as with a devoiced stem-initial sound [tsuur], with vowel epenthesis [tizuur], with deletion of the prefix or the stem-initial consonant [zuur, tuur], with no change at all (i.e. a totally faithful candidate) [tzuur], and so on. The optimal candidate is selected according to the way the hierarchically organised constraint component sorts out the candidate set (ibid: 16).

The previous paragraph shows that Gen is exceptionally productive in that there is no limit on the sort of operations it can carry out on a given input form. When epenthesis, for example, is involved, there is no specification as to what sort of segment to insert or where to insert that segment. There are, certainly, different bounds on what or where to epenthesize in the real output forms but "Gen isn't the place to impose these limits" (McCarthy 2008: 17). These limits are in fact necessitated by the phonotactics of the particular language/dialect.

Despite the freedom of analysis property which Gen enjoys, Gen is not completely unfettered but, rather, it is "input dependent" (McCarthy 2002: 9). This is to say that candidates that Gen produces should be related to an underlying form.[10] In fact, Gen's freedom is restricted only by "primitive structural principles essential in every language, perhaps restricting Gen to a specific alphabet of distinctive features" (ibid: 8). This is to say that candidates should be plausible linguistic structures. Commenting on this quotation, Uffmann (2007: 284) says:

[9] This assimilatory process does not occur across the board, but is blocked before certain sounds- as we will see in chapter (5) below.

[10] McCarthy (2002: 9) says that this input form can be "a phonological underlying representation, a syntactic D-structure, or a morphosyntactic feature specification". Of course, here we are mainly concerned with the phonological underlying representation.

> While [🐈] is not a potential output candidate for an input /kæt/, so probably are candidates which are specified with non-existing distinctive features (like [+meow]) or with conflicting feature values (say, a segment which is specified as [+voice] and [-voice] simultaneously).

So the freedom of Gen to cast candidates is in fact limited by the requirement that these candidates should be related to an input form.

Another way in which Gen's freedom is restricted can be seen by looking at Norwegian imperative construction (McCarthy 2008: 271). In this language the imperative is usually the same as the infinitive (as shown in (26)), the only difference being that the imperative does not have the suffix *-e* [-ə]. However, verb roots that end in a consonant cluster like [pn], [dl], or [kl] lack imperative forms (look at (27)). The final cluster in a bare root like *[åpn] renders it unpronounceable; most speakers do not resort to forms with epenthetic vowels like *[åpən]. Such speakers simply do not have an imperative form for the verb *open* and, accordingly, they make use of circumlocution- generally, a modal and an infinitive- when they want to express such a meaning (ibid).

(26) Norwegian imperatives

Infinitive	**Imperative**	
å spise	spis!	'eat'
å snakke	snakk!	'talk'
å løfte	løft!	'lift'

(27) Norwegian imperative gaps

Infinitive	**Imperative**	
å sykle	—	'bicycle'
å åpne	—	'open'
å paddle	—	'paddle'

McCarthy raises the question what candidate should be treated as optimal with an input like /sykl+Imperative/ and says "[P]resumably we do not want the phonological Gen to

be so rich that it offers the phrasal circumlocution as a competing candidate. The alternative is to regard the gap itself as a candidate." (2008: 272) This is a clear indication that Gen is in fact limited by some considerations.

2.2.4.1 *Eval*

The other main component of OT is the function known as Eval (for evaluator). Eval takes as its input the (large) candidate set produced by Gen and determines which candidate is the optimal one. The basic architecture of OT is diagrammed as follows:

(28) OT's basic architecture
/Input/ → Gen → {$cand_1$, $cand_2$, … $cand_n$} → Eval → [output]

Eval is composed of the universal constraint set (known as CON) organised in a language-specific hierarchy. The optimal candidate is the one that best satisfies the set of constraints; that is, the one which incurs the fewest violations. Constraint ranking plays a crucial role in the evaluation process, and this ranking is rigorously adhered to when candidates are compared. Because OT constraints are violable, it can be the case that the actual output (i.e. the optimal candidate) may fare worse than an ousted candidate on one or more constraints ranked beneath the determining constraint. For instance, if constrain C_1 outranks C_2 and C_3, then the optimal candidate may fare worse than its rival on C_2 and C_3, provided that it fares better on C_1. As Prince and Smolensky (1993) analogise, "azzzzz" alphabetically precedes "baaaaa", since when it comes to alphabetical order it is the leftmost letter that is decisive irrespective of the observation that the letters farther to the right may appear to strongly support an alternative order (see also McCarthy 2002: 4).

Note that the dominance relation between constraints is transitive. This means that if C_1 outranks C_2 and C_2 outranks C_3, then C_1 must outrank C_3. This can be written schematically as follows:

(29) Transitivity of constraint dominance: *If C_1» C_2 and C_2 » C_3 then C_1 » C_3*

Note also that in addition to being transitive, the dominance relation between constraints is strict. This is to say that it is not possible to make up for violation of higher-ranked constraints through respecting lower-ranked constraints. As Kager (1999) phrases it, "[O]ptimality does not involve any kind of compromise between constraints of different ranks" (p. 22). Tableau (30) gives a clearer picture of what we mean by strict dominance.

(30)

	C_1	C_2
a. ☞ candidate a		**
b. candidate b	*!	

Candidate (30a) incurs more violations of C_2, unlike (30b) which respects C_2 but at the costly expense of violating higher-ranked C_1. Any candidate that violates a high-ranked constraint that is respected by another candidate is ruled out outright, irrespective of its satisfying any lower-ranked constraints.

Strictness of dominance can also refer to the fact that "constraint violations are never added for different constraints" (Kager 1999: 23). Violating two (or more) lower-ranked constraints (C_2, C_3, etc.) cannot nullify a solitary violation of a higher-ranked constraint (C_1), as can be seen in tableau (31).

(31)

	C_1	C_2	C_3
a. ☞ candidate a		*	*
b. candidate b	*!		

This clearly shows that lower-ranked constraints can in no way band together against a constraint occupying a higher hierarchical position.

It can also be the case that several candidates incur an equal number of violations of C_1. In this case, all the offending candidates are handed on to be evaluated by a lower-ranked constraint, C_2. In such a situation there is said to be a "tie" between candidates; this tie is portrayed by tableau (32), and the tie on C1 is decided by the violation of C2.

(32)

	C_1	C_2
a. ☞ candidate a	*	
b. candidate b	*	*!

The amount of violation is also relevant to determining the actual output form; constraint violations should be kept to a minimum. In other words, a candidate that gets, say, one violation mark from C_1 is better than a candidate that gets two (or more) violation marks from this constraint. This points to an important property of OT, called 'Economy' by Prince and Smolensky (1993: 27).

(33) **Economy Property of Optimality Theory**
Banned options are available only to avoid violations of higher-ranked constraints and can only be used *minimally*.

Minimality of violation is illustrated by tableau (34).

(34)

	C_1	C_2
a. ☞ candidate a	*	*
b. candidate b	**!	

As well as applying to higher-ranked constraints, minimality of violation also applies to lower-ranked constraints. This means that higher-ranked constraints do not deactivate or switch off their lower-ranked counterparts, but less priority is given to violation of these latter constraints. Tableau (35) gives a picture of what we mean by minimal violation of lower-ranked constraints (Kager 1999: 24).

(35)

	C_1	C_2	C_3
a. ☞ candidate a		*	*
b. candidate b		**!	
c. candidate c	*!		

C_2 is lower than C_1, but it is still decisive as it is higher than C_3.

The evaluation process is illustrated by means of a grid known as a 'tableau'. The input is placed in the top row of the tableau, followed by the constrains– with the highest constrain(s) occupying the leftmost position; the importance of the constraint diminishes as the constraint moves down to the right-hand side. Constraints of different ranks are separated by solid lines, while dotted lines are used to separate equally-ranked constraints. The candidates are placed in the leftmost column, in cells just under the cell of the input: one of these candidates is selected as the actual output form, indicated by a pointing finger. An asterisk is conventionally used to indicate a violation of some constraint (the more the violations, the more the asterisks); fatal violation is indicated by means of an exclamation mark.

It should be taken into account that the optimal candidate is not necessarily flawless. It is simply selected as the most harmonic with respect to other competing candidates. The candidate chosen as the actual output form can in principle violate low-ranking constraints or even high-ranking ones as long as it fares better than its rivals. There is no way for a candidate to satisfy all constraints, as the different constraints make different requirements. This means that it is not possible to rule out all candidates in a given set.

PART II ASSIMILATORY PROCESSES

Chapter 3. Lateral Assimilation

The lateral sound /l/ is subject to a process of regressive assimilation whereby it assimilates totally to some segments. The most obvious and most commonly cited instance of lateral assimilation is that in which /l/ of the definite article assimilates totally to a following coronal. Before dealing with lateral assimilation in the present dialect, we will take a look at this process in some other languages and dialects, especially dialects of Arabic.

3.1 Lateral Assimilation in other Languages

Lateral assimilation is attested in some of the world's languages. In Spanish[1], for example, alveolar /l/ acquires the place of articulation of a following dental (/t, d/) or alveopalatal (/tʃ/) obstruent. Moreover, in one style of Spanish pronunciation (Allegretto), /l/ surfaces as palatal [ʎ] before /y/ across a word boundary, but as alveolar [l] inside the word, e.g. *al hielo* [aʎyelo] 'with ice', but *aliento* [alyento] 'breath' (Harris 1969: 19). Based on lateral and nasal assimilation, Harris makes the following linguistic generalisation: "noncontinuant sonorants become homorganic with a following obstruent, within the limits set by certain constraints (there are labial, labiodental, and velar nasals, but no labial, labiodental or velar *l*'s.)" (ibid). This is somewhat similar to what is found in the dialect investigated in this thesis. Nasals frequently adopt the place of articulation of a following obstruent. Lateral /l/, especially that of the definite article, assimilates to all coronal segments.

[1] The facts of lateral assimilation vary according to different styles of pronunciation in Spanish. For more details, see Harris (1969: 18-20). For a description of these styles, see Harris (1969: 7).

Unlike Spanish, however, the dialect under study does not assimilate to a following /y/, neither within a word nor across a word boundary. Thus /l/ in the following forms surfaces unchanged: *milyaan* 'full', *malyuuʕ* 'anguished', *ʃuɣul yoom* 'one day's work', *xaal yuunis* 'Younis's uncle'. (Neither does /l/ assimilate to /w/, the labiovelar counterpart of /y/, e.g *balwa* 'tribulation', *malwi* 'bent, curved').

It should be pointed out that Spanish has a definite article (*el*) that is similar to the Arabic definite article in that both articles end in an /l/ sound. Spanish /l/, however, assimilates partially (i.e. in place) to a following dental, alveolar, palatoalveolar, or palatal consonant. As noted by Cressey (1978: 61), these are the only points of articulation that a lateral can assume. The examples in (1) illustrate how /l/ shares the place with a following segment (Cressey 1978: 65)

(1)	el tio	[el tio] [2]	'the uncle'
	el nino	[e̪l̪ niño]	'the child'
	el chico	[elʲ ʧiko]	'the boy'
	el llavero	[eʎ ʎaβero]	'the keycase'

As these examples show, Spanish /l/ assimilates only partially to the aforementioned places of articulation; LA /l/, on the other hand, assimilates totally to a following coronal segment.

Basque also displays lateral assimilation both within the word and across a word boundary, as in *ata*[*l̪*] *denak* 'every section', *ata*[*ʎ*] *ttiki* 'small section' (Hualde 1991: 96). Laterals in Basque do not assimilate when the following consonant is bilabial, labiodental or velar, e.g. *ata*[*l*] *berri* 'new section', *ata*[*l*] *fresco*'cool section', *ata*[*l*] *gorri* 'red section' (ibid). Hualde believes that the blocking of lateral assimilation to such points of articulation seems to be due to "the universal impossibility or difficulty

[2] Cressey transcribes these examples in the following way: [el tio], [eĺ niño], [el̀ ĉiko], [el̃ l̃aʁero]. However, I am using the IPA symbols to transcribe Cressey's examples.

of producing a lateral articulation at certain places" (ibid: 98). Generally speaking, producing a lateral involves the use of the tongue tip or blade as active articulator. As we will see below, some dialects of Arabic, e.g. Moroccan (Heath 2002), Cairene (Watson 2002) may assimilate /l/ of the definite article to noncoronals, in which case assimilation would be total not just in place.

3.2 Lateral Assimilation in other Dialects of Arabic

We will begin this section by looking at the behaviour of lateral /l/ of the definite article. /l/ assimilation is attested in all varieties of Arabic, e.g. Standard Arabic (Kenstowicz 1994: 52), San'ani and Cairene Arabic (Watson 2002: 217), Palestinian Arabic (Abu-Salim 1980: 9; Hayes 1986: 470). In Standard and dialectal Arabic the definite article prefix /ʔil-/ 'the' is pronounced [ʔil][3] in isolation but when this article is added to another word, the /l/ can be realised differently according to the nature of the following sound. Thus /l/ may be retained or it may fully assimilate to the sound immediately following it. Kenstowicz (1994: 52) lists the following Standard Arabic examples:

(2)

ʔal-qamar	'the moon'	ʔaš-šams	'the sun'
ʔal-faras	'the mare'	ʔad-daar	'the house'
ʔal-kitaab	'the book'	ʔaz-zayt	'the oil'
ʔal-ḥarb	'the war'	ʔan-nahr	'the river'
ʔal-ʔab	'the father'	ʔaθ-θawb	'the garment'

Traditional Arab grammarians classify Arabic consonants into two main groups depending on whether they trigger total assimilation of lateral /l/ or not (Kenstowicz 1994: 52). Those that cause this liquid to assimilate to them are termed 'solar (or sun)

[3] In fact, pronunciation of the definite article may differ in different varieties of Arabic. For example, in Standard and other dialects this article is pronounced [ʔal] in isolation and before [-cor] segments. In other dialects, including the dialect under analysis, it is realised as [ʔil].

sounds', while those which do not trigger such assimilation are termed 'lunar (or moon) sounds'.

(3) Classification of sounds into solar and lunar

Solar Sounds	**Lunar Sounds**[4]
/t, d, ṭ, ḍ,θ, ð, s, z, ṣ, ð̣,ʃ, n, l, r/	/b, k, q, g, ʔ, f, ʒ, ɣ, x, ħ, ʕ, h, m, ʔ/

These sounds are so termed after the sounds /ʃ/ in *ʃams* 'sun', [ʔaʃ-ʃɑms] 'the sun' and /q/ in *qamar* 'moon', [ʔal-qɑmɑr] 'the moon'. These two groups of sounds pattern distinctly in that /l-/ assimilates to solar consonants but not to lunar ones. In this section, we will concentrate on the solar sounds.

Cowell (2005: 31) gives the following Syrian Arabic examples:

(4) z-zbuun 'the customer'
r-rṣaaṣa 'the bullet'
l-lḥāf 'the blanket'

Cowell also cites examples with a demonstrative pronoun or a preposition appended before the definite article, as in, for example, *ḥaž-žsūra* 'these bridges', *ləẓ-ẓġīr* 'for the little one', *ʕan-nsūra* 'about the vultures', *bəz-zmərrod* 'with emeralds', etc. As can be seen, these do not affect the assimilatory process in hand as they are attached before the prefix.

In addition to assimilating /l/ to coronal sounds, Cairene Arabic also optionally assimilates this /l/ to [-coronal] /k/ and /g/[5], e.g. *ʔil-kalb ~ ʔikkalb* 'the dog', *ʔil-gamuusa ~ ʔiggamuusa* 'the buffalo'. According to Watson (2002: 217), assimilation to a following velar stop "is more likely to occur in fast speech"; no assimilation takes

[4] The glides /w/ and /y/ are assimilation non-triggering sounds and are thus treated as lunar sounds.
[5] Some Cuban dialects of Spanish also assimilate /l/ (and /r/) to a following velar onset, e.g. [púgga] for both *pulga* 'flea' and *purge* 'purge' (Guitart 1997: 517).

place in careful speech. It should be pointed out that MLA assimilates /l/ to the voiceless velar stop in the word *kull*. Thus /ʔil + kull/ surfaces as [ʔukkull] 'all'. This can be treated as an exception, since it is probably the only case where /l/ assimilates to a following velar. Note also that the concatenation of the two morphemes causes the high front vowel /i/ of the prefix to surface as /u/, in harmony with the high back vowel of the stem.

Interestingly, in some varieties of Moroccan Arabic, *l-* may also acquire the place of articulation of both [+anterior] and [-anterior] noncoronal consonants. This can be seen in examples like: *b-bgər* 'the cows', *m-mṛa* 'the woman', *k-ktab-a* 'the writing', *g-gnaz-a* 'the corpse', and so on (Heath 2002: 169).

Moreover, dealing with the phonology of the Shahran tribe in South-western Saudi Arabia, Al-Shahrani (1988: 56) says that /l-/ does not assimilate to the alveolar affricates /ċ/ and /ź/, e.g. *ltʃalb* 'the dog' *lźirbah* 'the water skin'. In that dialect, /l-/ also fails to assimilate to the voiced alveolar /ʒ/, e.g. *lʒannah* 'Paradise', despite the fact that all these sounds are [+coronal] (ibid).

It seems that the definite article can sometimes be left out in certain combinations. For example, Ingham (1986: 276) cites the following sentence from the dialect of the Almurra of eastern and southern Arabia "alħaya da ʒa min ʃimaal" 'that rain came from the north', without prefixing the definite article to the noun *ʃimaal* 'north'. In that variety, the article is dropped before nouns denoting the cardinal directions:*ʃimaal* 'north', *ʒinuub* 'south', *ʃarg* 'east', *ɣarb* 'west'. In the dialect studied in this thesis, the article is also left out, especially when the preposition *min* 'from' is used before the cardinal direction, but an /-a/ is suffixed to the stem, viz. *min baħar**a*** 'from the north', *min gibl**a*** 'from the south', *min ʃarg**a*** 'from the east', *min*

*ɣarb**a*** ‘from the west’, ***min ʔilbaħar**a**,*** etc. Note that the article may be retained but the meaning will be slightly different; when the article is prefixed, the meaning will be “from the x part of Libya’, e.g. mi*ʃ ʃarig* ‘from the east (of Libya)’. Note also the use of the words *baħara*[6] ‘north’, and *gibla* ‘south’, which are termed *ʃimaal* and *ʒanuub*, respectively in Standard and many other dialects of Arabic.

In San’ani, geminate plosives and affricates surface deprived of voice (Jastrow 1984, cited in Watson 2002: 248-9). For example /gg/ becomes [kk]; /bb/ surfaces as [pp]; /dd/ is realised as [tt], and so on. Here are two examples (Watson 2002: 248):

(5)	/ħagg/	[ħakk]	‘right, belonging to’
	/haddād/	[ħattād]	‘blacksmith, iron-worker’

The *l* of the definite article undergoes total assimilation to a following coronal stop or fricative (as we have seen in other Arabic dialects). When the stem to which the article is prefixed begins with a voiced coronal stop, total assimilation occurs. This total assimilation, of course, results in voiced geminate plosives. This voiced geminate becomes the target of geminate devoicing, as can be seen in the following examples (ibid: 249)

(6)	/al-daayir/ > ad-daayir	a[t-t]aayir	‘the key’
	/al-dawm/ > ad-dawm	a[t-t]awm	‘the doum fruit’

Maltese Arabic also assimilates the /l/ in its definite article to a following coronal segment: /t, d, s, z, n, r/. Thus underlying /l/ surfaces totally assimilated in the following forms /it-tiin/ ‘the figs’, /iʃ-ʃemʃ/ ‘the sun’ /ir-raas/ ‘the head’, /in-naar/ ‘the fire’ (Borg 1997: 255). As is the case in some Arabic dialects, Maltese /l/ does not assimilate to a following alveopalatal affricate /dʒ/, e.g. /il-dʒisem/ ‘the body’; Maltese,

[6] The vowels flanking guttural /ħ/ are lowered. According to Watson (2002: 37), Arabic, Maltese, and Ethiopian guttural consonants cause contiguous vowels to lower. In Maltese, for instance, the imperfect prefix vowel surfaces as [ɑ] when it precedes a stem-initial guttural, but as [i] elsewhere (Brame 1972, cited in Watson (2002: 37)). Compare the following forms *ni+kteb* ‘I write’ and *ni+nzel* ‘I descend’ as opposed to *na+ʔbez* ‘I jump’ and *na+ʔleb* ‘I overturn’ (Watson 2002: 37)

however, does assimilate /l/ to /tʃ/, the voiceless counterpart of /dʒ/, e.g. /itʃ-tʃarruuta/ ‘the rag’ (ibid: 257).

Note, in this connection, that assimilation of the definite article to /dʒ/ is optional in some Eastern Arabic dialects. In rural Palestinian Arabic, for example, [ildʒaar] alternates with [idʒdʒaar] ‘the neighbour’. This, according to Borg (1997), implies that the voiced alveopalatal affricate is “ambiguously categorized in the consonant systems of these vernaculars” (p. 256).

This process takes place in all varieties of Libyan Arabic. Owens (1984: 47) provides us with examples of this process as occurring in Eastern Libyan Arabic in forms like *ilsu:g* → *issu:g* ‘the market’, *il-ṭuri:g* ‘the street’ , *il-jisim* → *ijjisim* ‘the body’, *il-θo:r* → *iθ-θo:r* ‘the bull’. Owens says that *l* assimilates to “the features of dental, alveolar, and alveopalatal consonants’ (ibid), all of which are [+cor] of course. Abumdas (1985) deals with it as attested in the dialect spoken in Zletin, e.g. *al-tamar* → *attamar* ‘the dates’, *al-ṣeef* → *aṣṣeef* ‘the summer’ (p. 120). Harrama gives examples from the Libyan Arabic variety spoken in al-Jabal al-Garbi (the Western Mountain). Three of Harrama’s examples are:

(7)

Definite	indefinite	
/θuuma/	/θ-θuuma/	‘the garlic’
/ðiib/	/ð-ðiib/	‘the wolf’
/ḏill/	/ḏ-ḏill/	‘the shade’

Harrama presents fourteen examples, one example for each of the sounds to which /l/ assimilates. We have cited just three of Harrama’s examples, i.e assimilation to the sounds that do not occur in the dialect under investigation.

Because this process is witnessed in all varieties of Arabic without any noticeable differences (except for the differences mentioned above), there will be no need to mention more instances of this process in other Arabic dialects.

However, one final observation in this regard is that Standard Arabic *jiim* is a palatal affricate[7] "with the phonetic value /dʒ/ which makes it [+coronal]." (Al-Nassir 1993: 69). It is consequently expected to belong to the assimilation-triggering solar segments and behave the same way they do. This, however, is not the case as definite /l/ fails to assimilate to it[8]. Watson (2002: 218) says that no assimilation takes place when *l* of the definite article precedes a palatoaveolar affricate /dʒ/[9] in Standard, San'ani, as well as in some Peninsula dialects including Hadrami (See also Al-Saqqaf 1999: 162-3). Heath (2002: 169) says that this is also the case in Jebli dialects of Moroccan Arabic, as in, for example, *l-ʤbəl* 'the Jebli region', with a stem-initial affricate. Moreover, dʒ-initial nouns and adjectives borrowed from the literary language generally retain the *l-*, as they use the Moroccan Arabic reflex of Classical Arabic /dʒ/, e.g. *l-ʒumhur* 'the crowd', even though loans from, for example, French usally assimilate, as in *ʒ-ʒurnal* 'the newspaper' (ibid).

The non-assimilation of *l*, according to Watson, can probably be attributed to historical rather than phonological reasons, since contemporary /dʒ/ can be traced back to a Proto-Semitic and pre-Classical Arabic voiced velar plosive **g*. The segment -*l*, of course, did not assimilate to velar **g* and absence of assimilation survived even after the diachronic fronting of **g* to a palatoalveolar affricate (Watson 2002: 218). Woidich and Zack (2009: 44) also believe that the fact that /l/ of the article does not assimilate to

[7] Woidich and Zack (2009: 44) classify it as a dental affricate.

[8] Al-Nassir (1993) says that "[i]ndeed it does function as a Shamsi [solar] consonant in modern Arabic both Fuṣḥa and colloquial. Unless the speaker is trained to produce it as Qamari [lunar], like Qur'anic reciters and radio announcers, who in fact intentionally do so in the formal pronunciation of Arabic, but do not on informal occasions." (pp. 69-70) Al-Nassir's statement is largely true. For example, when playing roles in TV series in which Classical (or Standard) Arabic should be used, many actors do assimilate /l/ to a following /dʒ/. This is most likely due to dialectal influence; some varieties of Arabic (e.g. the present variety) have in their sound inventory fricative /ʒ/, which is assimilation-triggering, rather than affricate /dʒ/.

[9] Note that Heath and Watson use the symbole /j/ to represent the palatoalveolar affricate.

[dʒ] indicates that the affrication of /g/ must have occurred after the assimilation rules for the article had taken place. Consequently, it is likely that the affrication of /g/ did not affect some varieties of Arabic, "but whose speakers nevertheless were amongst the tribes who immigrated into Egypt in the 7th century" (ibid).

Let us now shed some light on this process in the present dialect and see the constraints that govern it.

3.3 Lateral Assimilation in MLA

As has been mentioned above, the dialect under analysis does not differ significantly from other Arabic dialects with respect to this assimilatory process. Thus speakers of Misrata Dialect do not say, for example, *[ʔilḍluuʕ] 'the ribs' but [ʔiḍḍluuʕ] where the [ḍ] is pronounced as a geminate consonant. For more examples, consider the forms in (8) below. Prefixation of /ʔil-/ to the forms in (8a) gives rise to assimilation, while no assimilation takes place when this /ʔil-/ is added to the forms in (8b).

(8) a. Prefixation of /ʔil-/ to 'solar' sounds

ʔil + tamir → ʔittamir	'the dates'
ʔil + dub → ʔiddub	'the bear'
ʔil + ṭibiib → ʔiṭṭibiib	'the physician'
ʔil + ḍabaʕ → ʔiḍḍabaʕ	'the hyena'
ʔil + zeet → ʔizzeet	'the oil'
ʔil + samin → ʔissamin	'the ghee butter'
ʔil + naaga→ ʔinnaaga	'the she-camel'
ʔil + risaala→ ʔirrisaala	'the letter'
ʔil + ṣabuun→ ʔiṣṣabuun	'the soap'
ʔil + laamba → ʔillaamba	'the pulb'
ʔil + ʒaamiʕ → ʔiʒʒaamiʕ	'the mosque'
ʔil + ʃamis → ʔiʃʃamis	'the sun'

But

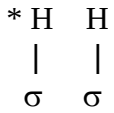
b. Prefixation of /ʔil-/ to 'lunar' sounds

ʔil + baab →	ʔilbaab	*ʔibbaab	'the door'
ʔil + kalib →	ʔilkalb	*ʔikkalib	'the dog'
ʔil + qanuun →	ʔilqanuun	*ʔiqanuun	'the law'
ʔil + gailb →	ʔilgalib	*ʔiggalib	'the heart'
ʔil + faar →	ʔilfaar	*ʔiffaar	'the mouse'
ʔil + miftaaħ →	ʔilmiftaaħ	*ʔimmiftaaħ	'the key'
ʔil + xaʃim →	ʔilxaʃim	*ʔixxaʃim	'the nose'

A glance at these examples shows that the initial sounds of the forms in (8a) have the feature [+coronal] while the correspondent sounds of the forms in (8b) are characterised by the feature [-coronal]. Watson (2002) believes that assimilation of /l/ to the coronal it precedes results from "an OCP violation on the coronal tier" (p. 220). The OCP (short for Obligatory Contour Principle) is a filter that can mark a certain form as ungrammatical and thus demand that it should be repaired (Yip 1988: 65).

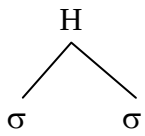
The OCP was first introduced by Leben (1973) to deal with tones; it prevents identical tones from being adjacent. For example, the OCP disallows representations such as the one in (9).

(9)



The structure in (20) is ill-formed because of the existence of two adjacent high tones, as opposed to what the OCP requires (Myers 1994: 1). The OCP will force these two adjacent high tones to be represented as in (10) where one high tone is associated with two syllables.

(10)

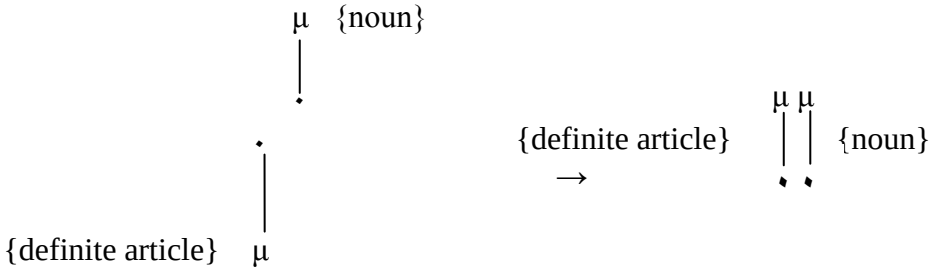


The OCP proved to be of use as well in other areas of phonology. McCarthy (1986) was the first to provide evidence for the OCP as a constraint "on the organization of nonprosodic or segmental phonology" (p. 208).

(11) Obligatory Contour Principle (OCP) (McCarthy 1986: 208)
At the melodic level, adjacent identical elements are prohibited.

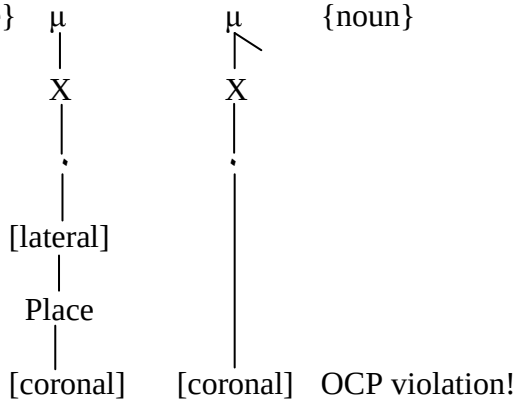
The total assimilatory process we are dealing with, Watson argues, takes place in two stages. At the first stage, multilinear morphemes are linearized by Tier Conflation (TC). This stage is schematized in (12) (2002: 220).

(12) Tier Conflation



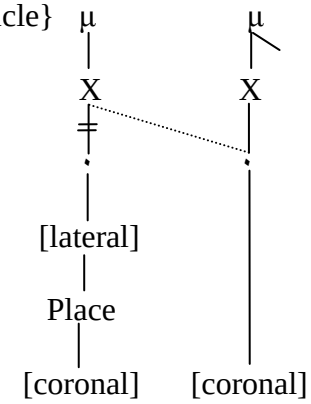
The linearization of the morphological tiers through TC gives rise to an obvious OCP violation in a particular morphological domain. In order to avoid this OCP violation, it is necessary to delete the root node of the leftmost matrix (i.e. the matrix to which /l/ is linked). Deleting the leftmost node results in vacuum; the root node of the contiguous coronal spreads from right to left, filling up this vacuum. The representations in (13) depict the assimilation of *l*- to the coronal obstruent it precedes (Watson 2002: 220).

(13) a. {definite article} μ μ {noun}



(13b) shows how the leftmost root node is deleted and how the rightmost node spreads from right to left (ibid).

b. {definite article} μ μ {noun}



Thus we end up with a geminate sequence.

Saying that the process in hand takes place at two stages might imply that this is a derivational process. This could be challenged by saying that there is no place for derivation in OT, as this theory is parallel rather than derivational. However, it should be pointed out that TC is a morphological (rather than phonological) process. That is, Tier Conflation and assimilation are two distinct process taking place at two separate components of the grammar (i.e. morphology and phonology, respectively). It can thus be argued that assimilation takes place only after TC has occurred.

As the schematic representation in (13a) shows, TC results in two adjacent unidentical segments with the feature specification [+cor], in violation of the OCP. To

translate this situation into a constraint-based analysis, we see that the following constraints are involved:

(14) a. OCP [cor]
Adjacent [+cor] consonants are prohibited, unless they are identical

b. IDENT-IO
Correspondent segments of input and output should be identical.

The first is a markedness constraint militating against a sequence of [l-] followed by a distinct coronal, whereas the second is a faithfulness constraint requiring that the input and output be exactly the same.

The observation that underlying forms like /ʔil + naas/, /ʔil+ tiffaaħ/, /ʔil + daar/ surface as [ʔinnaas] 'the people', [ʔittiffaaħ] 'the apples', [ʔiddaar] 'the room', respectively, points to the fact that the markedness constraint is ranked higher than its faithfulness competitor, thus:

(15) OCP » IDENT-IO
ʔinnaas › ʔilnaas

This ranking can be illustrated using the following tableau.

(16)

Input: /ʔil-naas/	OCP	IDENT-IO
a. ☞ ʔinnaas		*
b. ʔilnaas	*!	

The two candidates under consideration incur the same number of violations. But candidate (16b) is ruled out due to violating the high-ranked constraint OCP, which is not violated by candidate (16a).

It should be noted that this kind of assimilation takes place only across a morpheme boundary but never inside the root. For example, compare the following

forms: /ʔil + tariix/→ [ʔi**tt**ariix] ‘the history’ and /ʔil + ʒaar/→ [ʔi**ʒʒ**aar] ‘the neighbour’ with [ba**ls**im] ‘balsam’ and [ma**lʒ**a] ‘resort (n).’ Assimilation takes place in the first two pairs of forms because two morphemes are involved, while no assimilation occurs in the last two forms (i.e. *balsim* and *malʒa*) as the *l* is part and parcel of the words in question (see Abumdas 1985: 120). The fact that /l/ assimilates across a morpheme boundary but fails to assimilate within the same root (as noted by Pater 1999 when discussing the inapplicability of root-internal nasal substitution) is a cross-linguistic tendency; many processes take place when a morpheme boundary is involved but prove to be inapplicable morpheme-internally. This is a typical example of so-called the *derived environment* effect (cf. Mascaro 1976; Kiparsky 1982, 1993; Kager 1999).

To deal with this cross-linguistic inclination in OT, researchers have suggested that faithfulness constraints are implemented more stringently inside the root than across a morpheme boundary, such as an affix. Thus root-specific instantiations of faithfulness constraints are introduced and are placed in a higher position than their general faithfulness counterparts (Kager 1999: 75). Tableau (17) depicts how /l/ fails to assimilate to the tautomorphemic [+cor] consonant it precedes.

(17)

Input: /malʒa/	ROOT-IDENT	OCP	**IDENT**-IO
a. ☞ malʒa		*	*
b. maʒʒa	*!		*

Candidate (17a) incurs a violation of OCP, which would immediately exclude a candidate that fails to respect it across a morpheme boundary. Nevertheless, (17a) is

optimised as it avoids violating high-ranked ROOT-IDENT. Candidate (17b) is rendered ill-formed on a fatal violation of the top constraint.

3.3.1 *Alternative strategies*

3.3.1.1 *Vowel epenthesis*

There are, of course, other repair strategies that the dialect could have used to avoid this prohibited sequence of l+ [cor]. The first is epenthesis, whereby a vowel is inserted between /l-/ and the following coronal. Epenthesis is frequently resorted to by speakers of the dialect in avoidance of coda consonant clusters with rising sonority, as in the forms *qism→ qisim* 'deparment', *ṭifl→ ṭifil* 'child', *faʒr→ faʒir* 'dawn', and so forth.

Inserting the vowel [i], for example, we end up having the ill-formed output *[ʔilinaas], violating an important constraint: D**EP**-IO. This faithfulness constraint disprefers output segments that do not have input correspondents (Kager 1999: 68).

(18) DEP-IO
Output segments must have input correspondents.
('No epenthesis')

This constraint helps rule out ill-formed forms like *[ʔilinaas]. There are, nevertheless, cases in which a vowel is inserted, giving rise to a violation of D**EP**-IO but the resulting forms are not considered to be ungrammatical. This can be seen in forms like *qisim* 'department', *ṭifil* 'child', *faʒir* 'dawn', listed above. But these forms violate D**EP**-IO in order to avoid violating sonority sequencing variation.

Let us consider the following diagram to see the mismatch between input and output forms Diagrams (19) and (21) are based on Kager (1999):

(19) Correspondence diagram for vowel epenthesis

Input: ʔ i l n a a s
| | | | | | |
Output: ʔ i l i n a a s

This diagram shows a violation of DEP-IO in that the inserted vowel [i] does not have a correspondent in the input (ibid). But what is the relative ranking of this constraint with respect to the other two constraints? Both forms *[ʔilnaas], with a sequence of [l] followed by a coronal, and *[ʔilinaas], with an epenthetic [i], are avoided in favour of the form [ʔinnaas], in which the /l/ is replaced by an [n]. This means that DEP-IO is equally important as OCP.

Tableau (20) demonstrates the interaction of OCP, DEP and IDENT-IO.

(20)

Input: /ʔil-naas/	OCP	DEP-IO	IDENT -IO
a. ☞ ʔinnaas			*
b. ʔilnaas	*!		
c. ʔilinaas		*!	*

3.3.1.2 */l/ deletion*

The second strategy that might have been resorted to in order to avoid the adjacency of the /l-/ and the following coronal is the deletion of /l/. It might be argued that the coronal, rather than the /l/ could be deleted. This is a logical argument, but only /l/ deletion is in concordance with McCarthy and Prince's (1995) observation that root faithfulness outranks affix faithfulness (cf. section 3.3 above).

Again, /l/ deletion will result in the incorrect form *[ʔinaas], contradicting the faithfulness constraint MAX-IO. This constraint penalizes output forms that lack any of the input segments. Diagram (21) represents how input /l-/ is missing from the output.

(21) Correspondence diagram for /l-/ deletion

Input:	ʔ	i	l	n	a	a	s
	|	|	|	|	|	|	|	
Output:	ʔ	i		n	a	a	s

The nonexistence of this form shows that MAX-IO is an active constraint. Tableau (22) illustrates the ranking of the constraints under discussion.

(22)

Input: /ʔil-naas/	OCP	MAX-IO	DEP -IO	IDENT -IO
a. ☞ ʔinnaas				*
b. ʔilnaas	*!			
c. ʔilinaas			*!	*
d. ʔinaas		*!		*

Again, the optimal candidate (22a) satisfies the high-ranked constraint OCP. Likewise, candidates (22c) and (22d) satisfy this constraint. Now consider their evaluation by the next two constraints. Both candidates are excluded as they violate these constraints (candidate (22c) violates DEP–IO, while (22d) does not respect MAX-IO), which are satisfied by candidate (22b). But this last candidate is rendered ill-formed as it does not satisfy OCP. This means that OCP, MAX-IO and DEP-IO should all be placed higher than IDENT-IO.

A piece of evidence in support of placing IDENT-IO at the bottom of the hierarchy is that our optimal candidate [ʔinnaas] incurs a violation of this constraint.

Had we placed this constraint in a higher position, it would have excluded the winning candidate, which is not identical to the input form.

3.4. Homophonous /ʔil-/ and Dative Enclitic /l/

In section (3.3) we said that /l/ assimilation takes place only across a morpheme boundary. However, further investigation reveals that this is not always the case. Sometimes we have a morpheme boundary separating the /l/ and the following coronal but no assimilation takes place. Consider, for example, the non-assimilated /l/ of the homophonous morpheme /ʔil-/ meaning 'for, to', as in the following sentence:

(23) ʔi**lt**aratori miʃ i**ls**iyaara
for tractor not for car
'for a tractor not for a car.'

It has been claimed (e.g. Owens 1984: 47[10]; Abumdas 1985: 120; Harrama: 1993: 37) that /l/ assimilation is restricted to the definite article only. However, the example in (23) and the ones in (24a) and (24b), where the homophonous morpheme /ʔil-/ is prefixed to a word beginning with a [+ cor] segment, reveal that this claim is only partly correct.

(24) a.	ʔil + saalim → ʔilsaalim	'for Salim'	*ʔissalim
	ʔil + ʃukri → ʔilʃukri	'for Shukri'	*ʔiʃʃukri
	ʔil + daara → ʔildaara	'for his room'	*ʔiddaara
	ʔil + treebya →ʔiltreebya	'for a harverster'	*ʔittreebya
	ʔil + ṭaalib → ʔilṭaalib	'for a student'	*ʔiṭṭaalib
	ʔil + ṣabri → ʔilṣabri	'for Ṣabri'	*ʔiṣṣabri
	ʔil + ḍaabiṭ → ʔil + ḍaabiṭ	'for an officer'	*ʔiḍaabiṭ

[10] To prove that /l/ assimilates only when it is part of the definite article, Owens gives the following example:
"shariti il-sayya:ra il-ṣa:hbi"
buying my for car for my friend
'my buying a car for my friend'

b.	ʔil + nabiil → ʔinnabiil	'for Nabiil'
	ʔil + naaṣir → ʔinnaaṣir	'for Naaṣir'
	ʔil + luṭfi → ʔilluṭfi	'for Luṭfi'
	ʔil + laaxir → ʔillaaxir	'for the other one (m.)'
	ʔil + raaʒil→ ʔirraaʒil	'for a man'
	ʔil + rassaam→ ʔirrassam	'for a painter'

Despite the fact that all the stem-initial consonants in (24) are coronal, the /l-/ remains unchanged before the consonants in (24a), but undergoes assimilation when preceding the segments in (24b).

It is obvious that the initial segments of the forms in (24a) are [-son], whereas those in (24b) are [+son]. This leads us to conclude that the lateral sound in the preposition /ʔil-/ assimilates totally to coronal sonorants, but fails to assimilate to coronal obstruents. This is how this /l/ differs from that of the definite article, which assimilates the features of a following coronal segment irrespective of sonority.

Another assimilatory process similar to the one we have just dealt with is the assimilation of Dative enclitic *l* which assimilates totally to the 1st Pl suffix *-na*, as can be seen in /lga-ha-l-na/ → [lga-hi-n-na] 'he found it for us', /kitab-ha-l-na/ → [kitab-hi-n-na] 'he wrote it to/ for us' (Heath 2002: 171). [11] This process is attested in many dialects of Arabic. Borg (1997: 256) reports examples of this process as taking place in Maltese Arabic and says that it occurs exclusively at the morpheme boundary. Since this process is optional in Maltese[12], forms with assimilated /l/ alternate with forms where /l/ is unaffected by a following /n/: /kilna ~ kinna/ 'we ate' /hadilna ~ hadinna/ 'he took from us', and so on. Bakalla (1973: 514-15) provides us with examples from Meccan Arabic,

[11] Heath adds that "[T]he assimilated pronunciation is very common (though not universal), to the point where incipient morphologization can be suspected, and spot-checking did not suggest any clear dialectal divides." (p. 171) Heath also says that no assimilation is attested in dialects with Dative *-li-* (e.g. ʕṭa-ha-li-na 'he gave it to us'), where the high front vowel separates the two coronal consonants.

[12] Unlike what happens in Maltese, this process is obligatory in the dialect under study, unless in careful speech of course.

in forms such as /gulna/ → [gunna] ‘we said’, /saʔalni/ → [saʔanni] ‘he asked me’, /ʒaamalna/ → [ʒaamanna] ‘he did us a favour/ we did a favour’.

Likewise, a word-final /l/ optionally assimilates to a following /n/. The following examples represent this process.

(25)

gabil naʕiima → gabin naʕiima		‘before Naʕiima’
ʒimal naaʒi → ʒiman naaʒi		‘Naaʒi’s camel’
ʕasal naħli → ʕasan naħli		‘bee honey’

Since /l/ assimilates to a following /n/, and since both these sounds are [+coronal], we can use the same constraints we have used to account for the assimilation of /l/ of the definite article to a following coronal consonant.

(26)

Input/lga-ha-l-na/	OCP	MAX-IO	DEP -IO	IDENT -IO
a. ☞ lgahinna				*
b. lgahilna	*!			
c. lgahilina			*!	*
d. lgaahna		*!		*

As was the case with tableau (22) above, candidates (26a, b, and c) are discarded due to violating the three highly ranked constraints. Candidate (26a), by contrast, respects these three constraints and is thus chosen as the optimal candidate. It should be stressed here that a morpheme boundary falls between /l/ and the alveolar nasal to which it assimilates. So, this is not an exception to the preservation of a word-internal l-[coronal] sequence, as illustrated in (17).

Finally note that lateral assimilation may also take place across a word boundary when /l/ is word-final and the following word begins with an /r/. The examples in (24) demonstrate this process.

(27) gaal reetha → gaar reetha ‘he said he saw her’
waṣṣil rabiiʕ → waṣṣir rabiiʕ ‘he gave Rabiiʕ a lift’
kimal rudda → kimar rudda ‘it’s finished so return it’

Assimilation of /l/ across a word boundary is widely attested across Arabic varieties. Heselwood *et al* (2011) deal with this process as heard in Syrian Arabic. The electropalatographic and acoustic study conducted by Heselwood *et al* reveals that assimilation is “optional at slow, normal and fast speech rates and most common at the fast rate” (p. 63).

Sheikh (2001: 50) cites a similar example from the Qur’an, i.e. /qul/ + /rabbi/ → [qurrabi] ‘say oh my Lord’. Qur’anic phoneticians call this sort of assimilation *Idghaam Al-Mutaqaaribain* ‘assimilation of the related (sounds)’. Sheikh, however, cites the assimilatory process just referred to and says “[i]n this type, two **completely different** [emphasis mine] speech sounds are involved in the process of assimilation” (ibid). This is probably because of his erroneous translation of the Arabic term used by Qura’nic phoneticians (i.e. *Idghaam Al-Mutaqaaribain*) as “assimilation involving *dissimilar* speech sounds” rather than “assimilation involving *similar*/*closely-related* sounds.”

However, when the order of /l/ and /r/ is reversed, i.e. when /r/ precedes /l/ assimilation is not attested. Sibawayh (1982: 448) says that /r/ does not assimilate to /l/ because it is *mukarrarah* “repetitive”: it involves successive taps by the tongue tip on the alveolar ridge (when it is a trill of course)[13]. Sibawayh further says that because /r/ is expansive, speakers of Arabic did not like to do it “injustice” and assimilate it to sounds that do not have this quality (ibid; see also Al-Nassir 1993: 63).

Sibawayh set up a strength hierarchy within coronal sonorants; the sounds that do not assimilate easily are classified as ‘strong’. /r/, Sibawayh believes, is the strongest

[13] According to Heselwood *et al* (2011) “The canonical allophone of /r/ in Arabic is a trill although it often weakens to a tap or even an approximant and often becomes devoiced” (p. 65).

in this group since it is never influenced by a following /n, l, j/; /n/, by contrast, is the weakest as it assimilates to any of the other sonorants but cannot cause any of them to assimilate it (Heselwood *et al* 2011: 64).

Heselwood *et al* (2011: 65) state that applying the notion of sonority hierarchy (Goldsmith 1990: 110) shows that there appears to be a constraint opposing the assimilation of sounds of higher sonority value to lower sonority sounds. Heselwood *et al* give the pertinent part of the hierarchy as in (28)[14]

(28) n l r j

increasing sonority

To support this viewpoint, Hesewood *et al* cite Garbell's (1958: 326) example where indicative /b-/ prefix assimilates to a following nasal, e.g. /bnaakul/ surfacing as [mnaakul] 'we eat'. Furthermore, they cite another example used by Garbell (ibid): The /l/ in /ʕaam l awwal/ 'last year' undergoes progressive assimilation in manner to preceding nasal /m/. This assimilation of /l/ to /m/, Heselwood *et al* believe, violates the sonority hierarchy. However, this assimilatory process is unlikely. An alternative explanation is that no assimilation whatsoever takes place in this phrase (apart from nasalisation of the vowel preceding the bilabial nasal). That is, what Garbell, and consequently Heselwood *et al*, thought to be an /l/ was actually an /n/. In Standard and some other varieties of Arabic, an /n/ is added to the end of a noun or adjective to show that it is indefinite, a process known as *tanwiin* 'nunation' (Biadsy *et al* 2009: 398). Thus, this phrase is actually /ʕaam n awwal/[15] rather than /ʕaam l awwal/.

[14] As can be seen, this part of the hierarchy contains only sonorant segments. The first of the examples cited by Heselwood *et al*, however, involves an obstruent assimilating to a nasal, namely /b/ becoming [m] under the influence of a following /n/.

[15] In some varieties of LA, this is pronounced as [ʕaamin awwil] (i.e. a previous year). Note that in isolation, the second word in this phrase is pronounced as [ʔawwil], with the glottal stop /ʔ/ occupying the initial position of the word. This glottal stop is dropped in connected speech to be replaced by *n*, which resyllabifies as onset.

Were this segment /l/ rather than /n/, the definite article /ʔil-/ would be prefixed before the noun *ʕaam* to yield *ʔilʕaam lawwil* 'the first/previous year, i.e. last year'. Assimilating /l/ to preceding /m/ contradicts the sonority hierarchy (as proposed by Heselwood *et al* 2011) since /l/ is more sonorous than /m/. In addition, it is well-known that regressive assimilation is much more frequent than progressive assimilation. /l/ does not assimilate to /m/ regressively, let alone progressively. The following examples show lack of assimilation between lateral /l/ and nasal /m/.

(29)	a.	ʕilmi 'scientific/ my knowledge'	*ʕimmi/ ʕinmi
		saalma 'proper name'	*saamma/ saanma
	b.	gaabil mija 'he met one hundred'	*gaabim mija/ gaabin mija
		xeel miliiħa 'good horses'	*xeem miliiħa/ xeen miliiħa
(30)	a.	ʕumla 'currency'	* ʕumma/ ʕumna
		gamla 'louse'	*gamma/ gamna
	b.	laam luleed 'he blamed the child'	*laam muleed/ laam nuleed
		kilaam liibi 'Libyan talk'	*kilaam miibi/ kilaam niibi

The examples in (29a-b) show that /l/ does not assimilate to /m/ regressively word-internally or across a word boundary. Likewise, the forms in (30a-b) illustrate lack of lateral assimilation to /m/ progressively.

In spite of the argument above that /r/ does not assimilate to /l/, Ghalib (1984: 36) cites the Qur'anic form *yaɣfil lakum* for *yaɣfir lakum* 'He will forgive you (your sins)', with /r/ surfacing as /l/. It should, however, be stressed that this is the only example I could find of /r/ assimilating to /l/. Even Ghalib, who cites this example, gives it together with other examples of some sound assimilating to some other sound, e.g /n/ → [l], /ɣ/ →[x], etc. In spite of the uniqueness of this example, Ghalib cites it without any further information. That is, he does not refer to any source where this can be found, nor does he try to justify the occurrence of such a process.

Chapter 4. Assimilation of Nasal /n/

Another frequently occurring kind of assimilation is that of nasal /n/. This sound assimilates either partially or totally to some of the segments it immediately precedes. The current chapter focuses on assimilation of this nasal sound.

4.1 Nasal Assimilation as a Cross-linguistic Phenomenon

Nasal assimilation is one of the most frequently occurring kinds of assimilation in the world's languages. It takes place in a big number of languages including English (Halle & Mohanan 1985; Kang 1996), Austronesian languages (Pater 2001), the Niger-Congo language of Yoruba (Pulleyblank 1997), and many others.

For example, as we saw in section (2.1.1.6), English /n/ may share some or all features with a following consonant, as when it becomes [m] under the influence of a following bilabial nasal or stop in phrases such as *ten more* ~ *te*[m] *more*, *in Paris* ~ *i*[m] *Paris*. Similarly, the change from alveolar /n/ into velar /ŋ/ in the phrase *in California* is another example of nasal assimilation. The examples just cited are instances of nasal assimilation across a word boundary. This process is also operative within the same word as in /ink/ ~ [iŋk], /long/ ~ [loŋ], /emphasis/ [eɱfəsɪs]. In all these examples, /n/ adjusts to the place of articulation of the following consonant.

Wa Mberia (2002: 158) cites examples of nasal assimilation as attested in Kitharaka (a Bantu language spoken in Kenya). In this language nasal /n/ has four realisations (namely alveolar [n], bilabial [m], palatal [ɲ], and velar [ŋ]), resulting from place assimilation to a following obstruent. This is shown by the following examples[16].

[16] Note also that the examples in (1) illustrate the process of continuant hardening by means of progressive assimilation to the nasal stop, which changes fricatives into stops. Analysing such a process is not germane to our discussion.

(1) /n + pandi/ → [mpandi] grasshopper/grasshoppers
/n + βaka/ → [mbaka] cat/cats
/n+ riɣi / → [ndiɣi] threads/strings

This assimilatory process is caused by early modification of the articulators, due to the influence of the following obstruent (ibid: 158).

Padgett (1994: 491) presents examples of nasal assimilation as taking place in Kpelle (a Mande language of West Africa).

(2) /N + polu/ [mbolu] 'my back'
/N + tia/ [ndia] 'my taboo'
/N + kɔɔ/ [ŋgɔɔ] 'my foot'
/N + fela/ [ɱvela] 'my wages'

Here, as well, a nasal shares the place of articulation with a following obstruent but, unlike what we saw in (1), without continuant hardening.

Diola Fogny is another language where nasal assimilation is witnessed. Nasals in this West African language acquire the point of articulation of the obstruent or nasal they precede, as shown in (3a) and (3b) respectively (Sapir 1965: 16, cited in Ito 1986: 56).

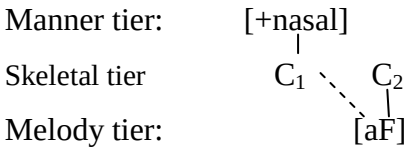
(3) a. /ni-gam-gam/ → nigaŋgam 'I judge'
/ku-bon-bon/ → kubombon 'they sent'
/na-tiiŋ-tiiŋ/ → natiintiiŋ 'he cut through'

b. /ni-maŋ-maŋ/ → nimammaŋ 'I want'
/ni-ŋan-ŋan/ → niŋaŋŋan 'I cried'

In Diola Fogny, however, sonority plays an important role when it comes to assimilation in that "a segment only assimilates to another segment with less or equal sonority" (Ito 1986: 66). This is not exactly the case in MLA, where nasal /n/ assimilates to segments of higher or lower sonority (but see chapter (5) where sonority is proved to block assimilation of the prefix /t-/.)

Ito formulates Diola nasal assimilation autosegmentally as melody spread in (4).

(4) **Melody Spread (ibid)**



Sonority of $C_1 \geq$ sonority of C_2

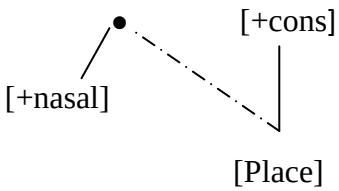
When the immediately following segment is more sonorous than the nasal, deletion, rather than assimilation, is the choice. The data set in (5) illustrates this (ibid: 55).

(5) /na-lan-lan/ → nalalan 'he returned'
/na-yoken-yoken/ → nayokeyoken 'he tries'
/na-wan-aam-wan/→ nawanaawan 'he cultivated for me'

In the first example of (5) the segment following the nasal is a liquid, while in the second and third examples of (5) a glide follows the nasal sound. Thus the nasal is elided, as it can assimilate to neither of these segments.

Dutch, as well, displays both assimilation and deletion of the coronal nasal. Thus a nasal and an obstruent in a tautosyllablic cluster always share the same place of articulation, as in, for example, *ramp* 'disaster', *tand* 'tooth', *daŋk* 'thank', etc. (Booij 1995: 64). In morphologically complex words the appendix consonants, with a nasal preceding a coronal consonant, are the only systematic exception. Therefore, we do not need to specify nasals for Place as they will receive Place features from the following consonant through feature spread (ibid).

(6) Nasal Assimilation



Morpheme-internally, nasal-obstruent clusters usually also share the same place of articulation, as in *kamfer* [kaɱfer] 'camphor', oranje [orañje] 'orange' Spanje [spañje] 'Spain', etc. Booij, however, says that a few exceptions do exist such as the word *imker* 'beekeeper'. Consequently, the nasal sound in this word should be specified as Labial underlyingly (ibid).

Booij also contends that in compounds and phrases only the coronal nasal /n/ undergoes place assimilation to the consonant it precedes, as in, for instance, *in Parijs* 'in Paris' which surfaces as [ɪmparɛis], where [+coronal] /n/ becomes [-coronal] under the influence of the following bilabial stop. [-coronal] nasals, according to Booij, do not undergo assimilation, as shown by the compound *damkampioen* 'draughts champion' *[dɑŋkɑmpijun]. What has been said about this form could have perhaps been said about the form *imker* 'beekeeper' cited in the previous paragraph. Thus we could probably say that the /m/ in *imker* does not assimilate the place of /k/ as it is a non-coronal nasal, rather than a coronal one.

Booij suggests that the restriction of assimilation to /n/ can be accounted for by assuming that the morpheme-final coronal nasal is unspecified for Place. Consequently, it will get its place specification through Nasal Assimilation in case it precedes a consonant-initial word in the domain where Nasal Assimilation takes place. If the word that /n/ precedes does not begin with a consonant, then the Place specification [coronal] will be provided by default at the end of the phonological derivation. This means that [coronal] is the unmarked[17] Place value for nasal (ibid: 65).

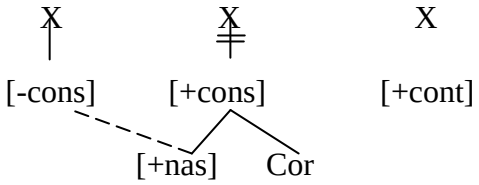
[17] The idea that [coronal] is an unmarked Place value can be linked to the observation that coronals have the most frequency of occurrence in the world's languages. According to Maddieson (1987: 31), all languages (apart from Hawaiian) have a minimum of one coronal stop. The coronal dental or alveolar /n/ occurs in 316 out of 317 languages (ibid: 60). Maddieson also observes that if only one fricative exists in a given language, it will be the coronal fricative /s/; besides, liquids are [+coronal] in the vast majority of the languages. Stole-Gammon (1985: 509) and Vihman et al (1986: 26) report that coronals and labials

It is worth noting that in a sequence of a nasal followed by a fricative, deletion, rather than assimilation, may take place, particularly in fast speech. Again, this process affects only the alveolar nasal (Trommelen 1984: 265; Booij 1995: 148). As noted by Gussenhoven and Broeders (1976) nasal deletion is more frequently occurring, taking place before non-plosives. The following set of data illustrates this phenomenon (Booij 1995: 148).

(7)	on-fatsoenlijk 'indecent' /ɔn-fɑtsunlək/	[ɔ̃fɑtsunlək]
	on-zeker 'uncertain' /ɔn-zekər/	[ɔ̃zekər]
	on-gewoon 'abnormal' /ɔn-ɣəʋon/	[ɔ̃ɣəʋon]
	on-weer 'thunderstorm' /ɔnʋer/	[ɔ̃ʋeːr]
	on-rustig 'unquiet' /ɔnrʏstəɣ/	[ɔ̃rʏstəx]

Note that the vowel preceding the deleted nasal is nasalised and slightly lengthened. The rule in (8) illustrates this sort of nasal deletion and compensatory lengthening.

(8)



This is an instance of delinking-cum-spreading whereby the features of the nasal consonant are disassociated from the X-slot, and the feature [+nasal] is re-associated with the preceding vowel (ibid: 149) As we will see below, this is somewhat similar to the process known as *ikhfaa* by the scholars of *tajwiid* 'Qur'an recitation'.

We have just seen that Dutch /n/ deletion occurs before non-plosives. Thus /n/ is also elided when followed by a nasal. This is evident from forms like *onmogelijk* 'impossible' [ɔmoɣələk] and *in Madrid* 'id.' [ɪmadrɪt]. In these two examples, the first member of the sequence of nasals does not show up in the output form (ibid: 64). What

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are the first consonants which children acquire. Building on high frequency of occurrence and acquisition facts, Kean (1980:) concludes that coronals are the most neutral (i.e. unmarked) consonants.

is interesting about these two examples is that (unlike the examples in (7) above) the vowel preceding the elided /n/ does not nasalise, in spite of the fact that it is followed by a nasal.

The deletion of the coronal nasal before non-plosives can be phonetically accounted for in that a nasal-continuant sequence needs two separate gestures with regard to "the degree of stricture of the vocal tract: first a stop and then a continuant" (Booij 1995: 149). In a nasal + plosive obstruent sequence, by contrast, the two segments can be produced using the same gesture. This may also account for the observation that in coda positions nasals cannot be followed by fricatives in Dutch, and for the observation that such a sequence (compared to a nasal-plosive sequence) seldom occurs within morphemes even when the two members of the sequence are heterosyllabic (ibid).

The deletion-cum-spread that is operative in Dutch can also be heard in English. The phrase *Grand prix*, for example, is pronounced as [grɑ̃ː priː], with the alveolar nasal dropped and the preceding vowel lengthened and nasalised (compare this to the pronunciation of the adjective *grand* [grænd] in which the /n/ is retained and the preceding vowel is nasalised but not lengthened.) Moreover, when the sequence vowel + nasal consonant occurs before a voiceless stop, the nasal may be left out and the vowel nasalised, e.g. *can't* [kæ̃t], *bent* [bɛ̃t], *think* [θɪ̃k]. This results in a phonetic contrast of the type [Ṽ]–[V], such as that found in pairs like *cat* [kæt] – *can't* [kæ̃t], *bet* [bɛt] – *bent* [bɛ̃t], *thick* [θɪk] – *think* [θɪ̃k] (Tranel 1987: 73-4).

French as well deletes nasals and nasalises the vowels that precede them. This can be observed in forms like *bon* 'good' and *bonte* 'goodness', pronounced as [bɔ̃] and [bɔ̃te], respectively. Although the nasal does not show up in the surface forms,

nasalisation can be heard clearly in the preceding vowel[18]. In rule-based phonology, Nasal Deletion is said to counterbleed Vowel Nasalisation (Bye 2011: 149).

An interesting phenomenon can be found in Indonesian. In this language, a nasal that is unspecified for place assimilates the place of a following voiced obstruent. This process mainly affects the nasal of the prefix /məN-/ (Pater 1999: 310; Kager 1999: 59). Thus forms like /məN-bəlih/ 'to buy', /məN-dapat/ 'to get, to receive' and /məN-ganti/ 'to change' surface as [məmbəlih], [məndapat] and [məŋganti], respectively.

However, if the verb to which /məN-/ is prefixed begins with a voiceless obstruent, coalescence (segment fusion), rather than place assimilation, takes place. The process is treated as an instance of coalescence because the resulting segment has features of both input segments: it gets nasality from the lefthand nasal and place of articulation from the righthand obstruent (Kager 1999: 59). The examples in (9) parallel the three examples mentioned in the preceding paragraph.

(9)	i. /məN-pilih/	məmilih	'to choose, to vote'
	ii. /məN-tulis/	mənulis	'to write'
	iii. /məN-kasih/	məŋasih	'to give'

The inapplicability of place assimilation before voiceless obstruents reflects avoidance in Austronesian languages of a nasal immediately followed by a voiceless consonant (For an articulatory analysis of why a nasal+voiceless-consonant sequence is avoided, see Huffman 1993; Hayes and Stivers 1995.) As we will see below, nasals in MLA may assimilate the place of a following consonant whether the consonant is voiced or voiceless.

[18] Note that a vowel occurring before a nasal sound need not necessarily be nasalised. For example, the prenasal vowel in the following words is oral rather than nasal: *couenne* [kwan]] 'rind', *évidemment* [evidamɑ̃] 'obviously', *femme* [fam] 'woman', etc (Tranel 1987: 74-5).

Sometimes /n/ assimilates within a word but not when a word boundary separates word-final /n/ from the first consonant of the following word. For example, in Largo (a Spanish speech style), word-final /n/ in the words below surfaces unaffected by the obstruent in the following word (Harris 1969: 8).

(10) un beso [unbeso] 'a kiss',
un cacto [unkakto] 'a cactus'

Within the same word, by contrast, /n/ shares the point of articulation with a following obstruent but not a nasal, liquid or glide. The forms in (11a) are examples of regressive place assimilation before an obstruent[19]; those in (11b) represent lack of assimilation when /n/ precedes a sonorant.

(11) a. campo 'field, camp,
triuɱfo 'triumph'
cuan̪to 'as'
canso 'tired'
raɲcho 'ranch'
gaŋga 'bargain'

b. inmenso 'immense'
honra 'honor'
enlace 'link, liaison'
nuevo 'new'

In (11a.) /n/ surfaces as bilabial, labiodental, dental, alveolar, palatal, and velar, respectively. In (11b.), underlying /n/ is realised as it is. Harris observes that except for the cluster *nch*, only homorganic clusters of nasal plus obstruent are attested (ibid: 9).

As will be noted below, MLA also blocks nasal assimilation before glides (both within the word and across a word boundary) but assimilates /n/ to obstruents, nasals and liquids.

[19] Harris notes that despite the fact that palatal /ɲ/ does exist in the phonetic inventory of Largo, /n/ before palatal /c/ does not palatalise to [ɲ]. The nasal preceding the palatal obstruent (which Harris transcribes as noncommittal [n̠]) is "auditorily indistinguishable from alveolar [n] but quite different from palatal [ɲ]". (1969: 9).

The examples we have seen so far have all been instances of 'regressive' place assimilation, whereby /n/ assimilates to the immediately following segment. German /n/, however, may take on the place of articulation of an adjacent segment both progressively and regressively. This can be seen in the following examples, from Wiese (1996:166).

(12) a. Progressive assimilation of place

/vaːgn/ → [vaːgŋ]	'car'
/gəhɔlfn/ → [gəhɔlfm̩]	'helped'
/gəgeːbn/ → [gəgeːbm]	'gave'

b. Regressive assimilation of place

/bin mit/ → [bimmit]	'am with'
/tseːn maɐk/ → [tseːm maɐk]	'ten marks'

Based on such data, Wiese, following Yu (1992), argues that coronal sounds "lack a Place specification" (ibid: 167).

4.2 Nasal Assimilation in Arabic Varieties

Examples of nasal assimilation are very easy to find in dialects of Arabic. Baothman and Ingleby (2006: 97) cite the following Standard Arabic examples.

(13)

ʃanq → ʃaŋq[20]	'hanging'
qanṣ → qaɲṣ	'hunting/sniping'
janfuθha → jamfuθha	'inject/spray'

These are examples of velarisation, palatalisation, and labialisation, respectively. Baothman and Ingleby believe that nasal assimilation in Arabic is unidirectional and follows the same regressive pattern in English.

[20] Note that Baothman and Ingleby present this form as *ʃaŋiq*, the with vowel [i] inserted between [n] and [q]. However, the presence of this vowel is expected to prevent assimilation. Note also that the assimilated nasal is presented as velar [ŋ], rather than uvular [N].

Classical Arabic, especially where recitation of the Qur'an is involved, displays many examples of nasal assimilation. Here as well, the alveolar nasal assimilates to different sounds.

Qur'anic /n/ has four different rules. The first of these is *idghaam* 'assimilation'. Qur'anic phoneticians classify assimilation of /n/ into two types: *idghaam bi-ghunnah* (assimilation with nasality) and *idghaam biduun ghunnah* (assimilation without nasality). The former type takes place when /n/ falls immediately before one of the glides /w/ or /y/, as in / … min + walii …/ → [miw walii] 'no patron', /man + yuʔmin/ → [may yuʔmin] 'he who believes'. Note also that assimilation here takes place only across a word boundary; no assimilation occurs word-internally. This non-assimilation of /n/, where the alveolar nasal occurs immediately before the glides /w/ or /y/, can be found in only four words in the Qur'an: *dunya* 'world', *binyaan* 'building', *ṣinwaan* 'single roots', *qinwaan* 'clusters of dates'(Ma'bad 1980: 18). In all four words /n/ is retained as it is. This, according to Al-Marghini (1995: 89), is because assimilation in this case may result in the assimilated forms being confused with forms which have underlying geminates. However, because no such words as **duyya*, **biyyaan*, etc. exist, this word-internal blocking of assimilation could possibly be attributed to the observation that a word boundary is needed for assimilation to occur.

In addition to assimilating to the two glides, /n/ undergoes this type of assimilation when it is followed by the nasals /n/ or /m/, e.g. /… min + niʕmah/ → [min niʕmah] 'no favour', /luʔluʔan manθuura/ → [luʔluʔam manθuura] 'scattered pearls'.

Assimilation of nasal /n/ across a word boundary is contrary to Mohanan's (1993: 87) argument that "[T]he force of attraction is stronger in a smaller domain than

in a larger domain"[21] (see also Al-Nassir 1993: 67; Heselwood *et al* 2011: 64). This process, however, agrees with so-called 'the derived environment effect' (Mascaro 1976; Kiparsky 1982, 1993; Kager 1999. See section (3.3) above); it is also in harmony with Cho's (2001) observation that assimilation in Korean is more frequently attested across a morpheme boundary than within a morpheme.

It is relevant to add that the dialect under analysis, by contrast, does not behave in a similar way when followed by any of these glides whether a word boundary is involved or not: /n/ is retained and does not change to /w/ or /y/. For example, the /n/ survives in forms like /min + yibbi/ → [min yibbi] 'who wants?', /min + widdaan/ → [min widdaan] 'from Widdaan', where a word boundary falls between the alveolar nasal and the following glide. /n/ also remains intact word-internally in forms such [manwir] 'inner courtyard', [munya] 'proper name', [minyaaka] 'sodium bicarbonate'.

The other type of /n/ assimilation, so-called *idghaam biduun ghunnah* 'assimilation without nasality', occurs when /n/ is word-final and the following word begins with either of the liquids /r/ or /l/. Two examples are /min + rabbihim/ → [mir rabbihim] 'from their Lord', /raħmatan[22] + lilʕaalamiin/ → [raħmatal lilʕaalamiin] 'mercy for all creatures'. Unlike the former type of assimilation, which is believed to be total, tajwiid scholars believe that this type is partial although it results in a sequence of [ll] or [rr]. This is because assimilating /n/ to the glides and nasals leaves the nasality

[21] Mohanan Further argues that "[A] sequence that undergoes place assimilation in a larger domain will also undergo place assimilation in a smaller domain" (1993: 96). Watson (2002: 215) agrees with Mohanan's argument. She gives a nasal assimilation example: within the phonological word, the alveolar nasal /n/ always acquires the place of articulation of a following consonant in San'ani; however, in careful speech assimilation may fail to occur across a word boundary, e.g. *minayn bašīr* 'from where is Bashir?' or *minaym bašīr*, *gadin misāfirāt* 'they f. are travelling' or *gadim misāfirāt*.

[22] Note that this /n/ is not radical but results from nunation (called 'tanwiin' in Arabic terminology). Nunation refers to the endings /-un/, /-an/ and /-in/ that are attached to nouns and adjectives to indicate that these nouns and adjectives are indefinite (Brustad 2000: 27). Because an /n/ resulting from nunation is not radical, it does not appear in the orthography; it is simply indicated by diacritics written above or below the word-final letter. *–in* nunation can still be heard (in a non-final position) in some contemporary dialects of Arabic, such as Eastern Libyan Arabic and Gulf Arabic.

intact. Assimilating /n/ to the liquids, on the other hand, causes the nasality to disappear, resulting in a sequence of identical [rr] or [ll] (Al-Hosary 1996:176-77). Contrary to the argument that there is no nasality when /n/ assimilates to /l/ or /r/, Sibawayh states that "if /n/ assimilates to /r, l, y, w/, then it is not a nasal sound but an oral sound which has acquired nasality" [my translation] (1982: 454). Al-Nassir (1993) comments on this, saying that Sibawayh differentiates between a sound that is originally nasal and a sound that is nasalised.

It should be pointed out that in spite of the observation that assimilation in the Qur'anic examples listed in the preceding paragraph results in a sequence of geminate segments (which is a characteristic of total assimilation), tajwiid (recitation) scholars believe that these geminates are not exactly the same. Thus, they argue, assimilation here is partial, rather than total. This is because the feature of nasality remains intact on the first half of the geminate (Al-Hosary 1996:174-75; Sheikh 2001: 51).

To differentiate between these two types of assimilation (i.e. assimilation with nasality and assimilation without nasality), we may place a tilde over the first member of the sequence of glides (and nasals) but leave the sequence of liquids as it is: [w̃w] and [ỹy], but [ll] and [rr].

Note, however, that some researchers believe that nasality may also remain when /n/ assimilates regressively to other sonorants not just /w/ and /j/. For example, studying modern Arabic and using spectrography and aerometry, Bakalla (1983) dealt with this process in the phrase /man lak/ 'who is for you' (i.e. who supports you?). Bakalla's results illustrate that this process may yield both a partial and a complete assimilation. When the assimilation is complete, nasal airflow is very little. When the assimilation is partial, by contrast, nasal airflow is "longest and most persistent"

(Heselwood *et al* 2011: 65), which means that "the lateral lingual articulation is accompanied by an open velopharyngeal port resulting in a nasalised [l̃]." (ibid)

Secondly, when Qur'anic /n/ is followed by /b/, the former is changed into [m], a process known as *iqlaab* 'changing or altering'. This takes place both within the same word and across word boundaries (Sheikh 2001: 56-57), e.g. /ʔanbiʔhum/ → [ʔambiʔhum] 'tell them', /min + baʕd/ → [mim baʕd] 'after that'. As these examples show, this type of assimilation is the one known as regressive, partial (place) assimilation in contemporary linguistics. These examples also show that tajwiid scholars use the term *idghaam* 'assimilation' only to describe processes that result in a sequence of geminate segments, whether these geminates are identical (as in [ll] and [rr]) or not identical (as in [w̃w] and [ỹy]). If, on the other hand, the process gives rise to a sequence of segments that share only the place feature, the term used is *iqlaab* 'changing/ altering'.

Thirdly, no assimilation takes place when /n/ occurs before so-called *ħalqi* (related to the throat) sounds[23]. These sounds constitute what is known in modern linguistic terminology as the class of gutturals. They are six sounds and they include /ʔ/, h/, /ʕ/, /ħ/ /ɣ/ and /x/ (Ma'bad 1980: 15; Sibawayh 1982: 454; Al-Hosary 1996:168-171; Sheikh 2001: 53). McCarthy (1994: 192) also classifies gutturals as a class in terms of their place of articulation. He adds that "[u]ltimately, the thesis I develop is not unlike the earliest classification of these sounds by the Arab grammarian Sibawayh." The examples in (14) illustrate how /n/ is unaffected by occurring before these sounds.

[23] Tajwiid scholars divide the area of speech into five main *makhaarij* 'outlets' (sing. *makhraj*) which are further subdivided into seventeen subsections. The *ħalq* (throat), where these six sounds are produced, is one outlet. It is further divided into three subsections: *aqsa lħalq* 'the deepest part of the throat' is the outlet for the glottal stop /ʔ/; /h/ is also articulated at this outlet, though a bit higher than /ʔ/. The second subsection of the throat is *wasat alħalq* 'the mid-throat', which is where /ħ/ and /ʕ/ are produced. Finally, *adna lħaq* 'the nearest part of the throat' is responsible for producing /x/ and its voiced counterpart /ɣ/ (Umm Muhammad 1997: 5-6; see also Kenstowicz 1994: 32-3).

(14)	yanʔawn	‘they keep away’
	minhum	‘among them’
	man ʕamila	‘whoever does’
	faman ħaaʒʒaka	‘whoever disputes with you’
	ʕafuuwan ɣafuura	‘Ever Oft-Pardoning, Oft-Forgiving’
	faʔin xiftum	‘if you fear’

The established term used to refer to such blocking of nasal assimilation is *iẓhaar* ‘demonstration, showing’. Lack of nasal assimilation to these sounds, both Sibawayh (1982: 454) and Al-Hosary (1996: 70) maintain, is because of lack of similarity between /n/ and these sounds, since /n/ is articulated at the alveolar ridge whereas these non-triggering sounds are produced at the far end of the vocal cavity. As we will see in the Sudanese data below, this blocking of assimilation before such consonants leads Kenstowicz (1994) to take it as phonological evidence in support of dividing the vocal tract into two cavities.

It is relevant to add that Nelson (2001: 18) refers to this process as dissimilation. However, this is not the right term to use; dissimilation is “the reverse of assimilation” (Bhat 2001: 80). In the process of dissimilation, two similar or identical sounds become less so. In *iẓhaar*, by contrast, the speech sound is articulated as it is, i.e. without any adjustment in its place or manner of articulation (Sheikh 2001: 53).

One might ask “since no nasal assimilation takes place before these segments, why bother to tell us their story in the first place?” The reason behind mentioning this[24] is that blocking of assimilation here shows that guttural sounds function in a similar way. McCarthy (1991: 7) illustrates that in a good number of languages, especially Semitic, the guttural sounds behave as a class in many phonological processes (See also McCarthy 1994: 192; Halle 1995: 17; Zawaydeh 1999: 23)[25]. Moreover, the behaviour

[24] Qur’anic phoneticians illustrate what happens to /n/ before this class of sounds (as well as before other classes) so that learners master the art of tajwiid.

[25] Zawaydeh classifies the emphatic sounds and the uvular stop /q/ under the class of gutturals. She defines this as “a group of sounds that have a constriction in the back part of the vocal tract” (1999: 23).

of this class presented in this section can be linked to chapter (5) of this work, where the two [+voice] members of this class (/ʕ/ and /ɣ/) are shown to block voicing assimilation of the imperfective prefix /t-/.

Despite the insistence of Qur'anic scholars that no assimilation takes place when /n/ precedes so-called 'ħalqi sounds', Al-Nassir (1993: 66-67) says that in a sequence of /n/ followed by one of the uvular sounds /x/ and /ɣ/, "the outcome alternates between *Idghaam* and non-*Idghaam*", that is, between assimilation and non-assimilation. Sibawayh believes that the place of articulation of these two sounds is the upper pharynx area and says that lack of assimilation can be attributed to this factor (ibid: 66). However, some CA speakers treat these sounds the way they treat the uvular plosive /q/, and consequently assimilate the alveolar nasal to it. (See also Watson (2002: 13) who classifies eighth-century Classical Arabic /q/ as having a uvular place of articulation.) Thus when assimilation takes place, /n/ takes on the place of articulation of following /x/ and /ɣ/, surfacing as [N]. This can be seen in forms like /man ɣalabaka/ → [maN ɣalabaka] 'who had beaten you', and /munxul/→ [muNxul] 'sieve' (Sibawayh 1982: 454; Al-Nassir 1993: 66-67).

Finally, it is worthwhile to say that the blocking of assimilation before gutturals is in accordance with Watson's (2002: 235) observation that nasal assimilation universally fails to take place to sounds that lack an oral place of articulation (i.e. the primary gutturals /ʔ, h, ʕ, ħ/). Note here that /x/ and /ɣ/ are not included in the assimilation-blocking segments. This may account for the fact that these sounds do trigger assimilation when they are immediately preceded by /n/, as we have just seen in the previous paragraph. Note also that Booij (1995: 65) lists these two segments among

As will be shown below, however, when it comes to Qur'an recitation /q/ and the emphatics pattern together with the other obstruents that trigger the process of *ikhfaa* 'concealment' of nasal /n/ (see also Al-Hashmi 2004: 38-39). Bin-Muqbil (2006: 76) also treats gutturals and emphatics as two distinct classes.

the segments to which /n/ assimilates, in prepositional phrases and compounds like *in chaos* [ɪŋxaɔs] 'in chaos', and *ongewoon* [ɔŋɣəʋon] 'uncommon'.

The fourth rule of the alveolar nasal is the one dubbed *ikhfaa* by tajwiid scholars. Literally, the term *ikhfaa* means hiding or concealment. *Ikhfaa* is characterised somewhere between *idghaam* and *iẓhaar*. We have seen that each of the three processes mentioned thus far (i.e. *idghaam*, *iqlaab*, and *iẓhaar*) takes place when /n/ is followed by certain sounds: the first process occurs when /n/ precedes /w, y, l, r, m, n/; the second takes place when /n/ is followed by the bilabial plosive /b/, while the third process crops up when one of the six *ħalqi* sounds is placed after the alveolar nasal.

This means that the process of *ikhfaa* takes place when /n/ occurs to the left of any of the remaining fifteen sounds: /t, θ, ʒ, d, ð, z, s, ʃ, ṣ, ḍ, ṭ, ẓ, f, q, k/ (In fact, *ikhfaa* is further divided into three subtypes, depending on the segment that follows the nasal sound. For more details on this topic, see Al-Hosary 1996:188-189.) Here /n/ is not pronounced clearly but is said to be "hidden in the nose"[26]. What happens during this process is that the tongue gets close to, but does not make any real contact with, the alveolar ridge, a step that is necessary for the articulation of /n/.[27] Thus the air can pass both through the mouth and the nose, resulting in "an oro-nasal sound" (Abdul-Fattah *et al* 1989: 162). This oro-nasal sound is prolonged in duration (for about 2-3 seconds) and is accompanied by some nasalisation, "which gives the hearer an implicit feeling of the /n/ sound" (Matar 2005: 11). The sound that is prolonged and accompanied by nasalisation is in fact the short vowel preceding the vowel-less /n/.[28] To take an example, let us consider the word *junfax* 'is blown'. As can be seen, the short vowel /u/

[26] http://heesbees.wordpress.com/tag/noon-saakinah/
[27] The mouth is to be shaped in a manner such that it is prepared for the next sound. Real contact between the active and passive articulators is made only when the sound that follows hidden /n/ is produced.
[28] Determining the exact nature of the vowel that is prolonged and nasalised requires a separate study.

falls before the alveolar nasal. This vowel is lengthened and nasalised so that we end up having a long nasalised vowel [ũ:] (Abdul-Fattah *et al* 1989: 162). This is the trace that remains from concealing the alveolar nasal. Only after the prolonged vowel has been produced, do the lower lip and the upper teeth come into contact, producing the labiodental fricative /f/.

The process of *ikhfaa* takes place both within the word and across a word boundary. This is shown by the examples in (15a) and (15b)

(15) a. andaadan ‘rivals’
janṭiquun ‘(if they can) speak’
minkum ‘amongst you’
b. liman ʃaaʔ ‘who chooses’
min sulaalatin ‘out of an extract’
waʔin qiila ‘if it was said’

Unlike what we have just seen, the dialect analysed in this dissertation treats /n/ differently in such contexts, that is, no concealment of /n/ takes place. Thus, as we will see below, /n/ frequently undergoes place assimilation to agree with the articulation point of the following obstruent.

Finally, it should be noted that the process of *ikhfaa* is somewhat similar to /n/ deletion in the Dutch examples above. The difference between the two processes is that Dutch nasal deletion takes place before non-plosives, whereas *ikhfaa* occurs when /n/ precedes obstruents, excepting the bilabial plosive /b/. In addition, the terms used to label these processes are not the same; the Dutch process is termed *deletion*, while tajwiid scholars prefer to use the term *ikhfaa* to designate the ‘concealment’ of /n/ before the fifteen obstruents mentioned above.

Similarly, Reichmuth (1983: 34, cited in Dickins 2007: 87) says that in Šukriyya dialect (spoken in the Sudan) /n/ is realised as a nasalised vowel before a voiceless fricative, apart from /f/, e.g. /maa binxaaf/ → [maa bi~ xaaf] (ibid).

From the Qur'anic examples introduced so far, we can conclude that *idghaam* 'assimilation' takes place when /n/ precedes sonorants. Furthermore, among the class of sonorants, assimilation is believed to be total before liquids, but partial before nasals and glides. In addition to this process, there is the process of *iqlaab*, which takes place only when /n/ is followed by /b/. Moreover, no assimilation occurs when the alveolar nasal immediately precedes so-called 'ħalqi sounds' (i.e. gutturals), a process known as *iẓhaar*. Finally, when /n/ occurs to the left of an obstruent, excluding the bilabial stop and the guttural sounds, the /n/ itself is said to be concealed, leaving nasality as a trace (Some copies of the Qur'an use colour coding to indicate different processes so that the reciter knows exactly how to pronounce each sound.)

Dialectal Arabic is also full of instances of nasal assimilation. In Syrian Arabic, for example, /n/ optionally assimilates to immediately following labials. Consider the following examples from Cowell (2005: 27) *məmmuut* (or *mənmuut*) 'we die', *ʔəmf* (or *ʔənf*) 'nose' *məm beeruut* (or *mən beeruut*) 'from Beirut' and *ʕəmbar*[29] 'storehouse'. Cowell adds that when /n/ does not undergo assimilation, a helping vowel can be used to break up the unhomorganic cluster, e.g. *ʔəmf* or *ʔənəf* (p. 33).

Likewise, when Syrian Arabic /n/ is immediately followed by a velar sound, this /n/ is articulated at the velar area, yielding a sequence of *nk* or *ng*. However, unlike the nasal-labial sequence, which as we have just seen, can be broken up by epenthetic [*ə*], a nasal-velar sequence is usually unsplitable: *baŋk* 'bank' (not **baŋək*), *ʔəngliizi* 'English' (not **ʔənəgliizi*) (ibid).

[29] As can be seen, only in the case of the word *ʕəmbar* does Cowell give only one form (i.e. with /n/ surfacing as [m]). In all the other examples, Cowell gives forms with assimilated and unassimilated [n].

Syrian Arabic /n/ also undergoes optional assimilation to the other sonorant consonants (i.e. *l* and *r*), as can be seen in forms like *ʔaħsal-lak* (or *ʔaħsan-lak*) 'better for you', *r-raaħ* (or *n-raaħ*) 'if he goes' (ibid: 27).

An interesting process can be seen in Moroccan Arabic. In loan words, some possible occurrences of /mb/ are prevented by replacing the bilabial nasal with the crosslinguistically unmarked alveolar nasal /n/, as in /tnbər/ 'postage stamp' (cf. French *timbre*), pluralised as /tnabr/. In very rare cases, however, the sequence /mb/ is retained, e.g. /kambu/ 'country hick, bumpkin' (cf. Spanish campo 'field') (Heath (1987: 31).

Unexpectedly, when the bilabial nasal and stop are separated by a vowel (a process that results from ablaut mappings) the /m/ is changed into /n/. Examples of this include: /kwanəb/ (plural of *kambu*), /t-kunəb/ 'act like a hick' (ibid). To account for this, Heath postulates two possibilities. The first is to set up /kanbu/ as an underlying form and treat the change from the alveolar to the bilabial nasal to be resulting from an irregular rule of place assimilation (Contrast this with /ta-n-bat/ 'I spend the night' and /tnbər/ 'postage stamp', in which the sequence /nb/ remains stable. The second possibility, Heath argues, is to take /kambu/ as the stem but to stipulate that the /m/ must change into /n/ when a vowel detaches it from /b/.

Across a morpheme boundary /n/ does not undergo assimilation to agree with the following [α place] obstruent. Examples are: /ta-n-bus/ 'I kiss', /ta-n-dir/ 'I do' and /ta-n-gul/ 'I say' (Heath 1987: 210). Heath adds that /m/ as well remains unchanged before an obstruent, e.g. /m-bruk/ 'blessed, /m-dgdəg/ 'beaten up', /ṣm-ti/ 'you (s) fasted' (ibid).

One last observation about the Fes/Meknes variety of Moroccan Arabic is that in native stems a nasal occurring immediately before /k, g, q/ is usually articulated as unassimilated /n/: exceptions include words like /ʕngr-a/, which has the alternative

pronunciation /ʕŋgr-a/ (ibid: 211). Greenberg (1950) attributes this (for Classical Arabic) to a general constraint prohibiting clusters of nonidentical consonants from the set /k, q, x, ɣ/. Heath believes that this constraint applies also to the Fes/ Meknes variety of Moroccan Arabic.

Nasal assimilation is also operative in Sudanese Arabic, as the following examples show (Kenstowicz 1994: 158).

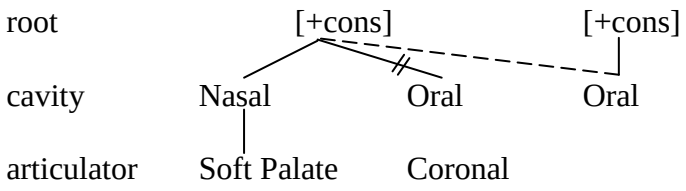
(16)	Perfect	Imperfect	Gloss
	[nabaħ]	[ya-mbaħ]	'bark'
	[na***f***ad]	[ya- ŋ***f***id]	'save'
	[nazal]	[ya-nzil]	'descend'
	[naʃar]	[ya-nʃur]	'spread'
	[nagal]	[ya-ŋgul]	'transfer'

The examples in (16) show that nasal /n/ acquires the place of articulation of a following labial, labiodental, alveolar, postalveolar, or velar consonant. Assimilation is blocked when the sound following the nasal is pharyngeal or glottal (see the Qur'anic examples in (14) above), as shown by the data set in (17).

(17)	Perfect	Imperfect	Gloss
	[na-ħar]	[ya-nħar]	'slaughter'
	[niʕis]	[ya-nʕas]	'fall asleep'
	[nahab]	[ya-nhab]	'rob'

This is also the case in the dialect under investigation. Kenstowicz takes the lack of nasal assimilation to theses sounds as phonological evidence for dividing the vocal tract into an oral cavity and a pharyngeal cavity. Kenstowicz argues that this assimilation can be represented as "spreading of the Oral cavity node of the following consonant leftward to a preceding coronal nasal, delinking the original Oral cavity node" (ibid), as shown in (18).

(18)



Watson (2002: 235) deals with nasal assimilation as attested in Cairene and San'ani. In both dialects, underlying coronal nasals undergo place assimilation to agree with the consonant they immediately precede. Within the phonological word, according to Watson, nasal place assimilation is obligatory. However, this type of assimilation is optional within the phonological phrase. Nasals seldom assimilate to the glides /w, y/, and, as we saw above, never assimilate to gutturals. When the nasal occurs before a labial or a dorsal consonant, the unmarked nasal is considered to be weak because of three main factors: its position (leftmost, and thus more likely to be an undergoer rather than a trigger), its nasality, and its place [coronal] (ibid). Scheer (2004: 708) comments on the fact that nasals are weaker than obstruents saying that "the roles played by the nasal and the obstruent appear to be universal: the latter is the master, the former is the servant. Cases where an obstruent would assimilate to a nasal are not on record."

Thus the place feature of the stronger rightmost segment spreads leftward, superseding the weaker [coronal] feature, which is disassociated. For example, in San'ani and Cairene clitic-final /n/ becomes homorganic with an immediately following consonant, as can be seen in the following San'ani examples (Watson 2002: 236):

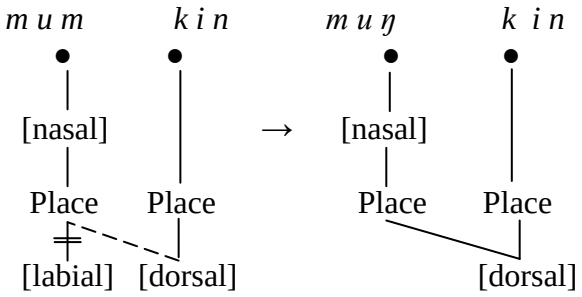
(19)

/min kam/	*mi*[*ŋ*] *kam*	'from how many, much'
/min fayn/	*mi*[*ŋ*] *fayn*	'from where'
/min matā	*mi*[*m*] m*atā*	'from when'

In a similar vein, the San'ani labial nasal /m/ may become homorganic with the velar stop following it, as in for example *mumkin* [muŋkin]. In this example, the stronger [dorsal] feature of the velar stop supersedes the labiality of the nasal. Again, the place

feature of the nasal is delinked due to leftward spread of the dorsal feature. This spread is represented in the following diagram (ibid: 237).

(20)



This process, which takes place only within the phonological word, is attested in San'ani but not in Cairene; nor is it attested in MLA.

The opposite situation (a situation where a certain process takes place in Cairene but not in San'ani or in the dialect under analysis) is also possible. An example is the assimilation of the coronal nasal to the voiceless coronal stop. In Cairene, /n/ optionally assimilates to /t/ in two isolated forms: /bint/ (= [bint] ~ [bitt]) 'girl' and /kunt/ (= [kunt] ~ [kutt]) 'I was/you m.s. were'. Feghali (2004: 71) says that total assimilation of /n/ to a following /t/ is commonly heard in Eastern Saudi Arabian dialects and some dialects of Bahrain, e.g. /bintak/ → [bittak]. In these dialects, assimilation of /n/ to a following /t/ occurs mainly before the "pronominal suffix" (Feghali 2004: 303). As Watson (2002: 238) argues, however, coronal sonorants assimilate to contiguous obstruents lexically but not postlexically.

Gulf Arabic /n/, as well, is frequently homorganic with an immediately following obstruent. For example, it is realised as a velar [ŋ] before a velar plosive. Thus /banka/ surfaces as [baŋka] 'fan' with the dorsal feature spreading from /k/ to /n/. In casual speech before the bilabial plosive, /n/ often has a bilabial articulation: /nibiiʕ/

→ [mbiiʕ] ‘we sell’. Likewise, it is a labiodental [ɱ] when immediately preceding /f/, e.g. /anfaar/ → [aɱfaar] ‘persons’ (Holes 1990: 263).

Similar processes are also attested in the speech of the Shahran tribe in South-western Saudi Arabia. Partial assimilation of /n/ occurs when it precedes /b, m, k/. This happens both within the phonological word and across a word boundary, e.g. *jambiyyah* ‘dagger’, *bim maʃhuur* ‘son of Mashhuur’, *miŋk* ‘from you’, *miŋgaaʃ* [30]‘chisel’ (Al-Shahrani 1988: 58-9). Total assimilation takes place when the coronal nasal is followed by either of the liquids //r/ or /l/, as in *mil ħʒaaz* (min l-ħʒaaz) ‘from Hejaz’, *mir raasi* (min raasi) ‘from my head’ (ibid: 58).

Having looked at nasal assimilation in different languages and dialects, let us focus on this phenomenon as it operates in the variety under scrutiny.

4.3 Nasal Assimilation in MLA

4.3.1 *Partial assimilation*

Partial assimilation takes place when /n/ is immediately followed by any of the obstruents /b/, /k/, /g/ or /f/. Here /n/ shares the same place of articulation with the following sound. Thus it is realised either as bilabial [m], velar [ŋ] or labiodental [ɱ]; that is, it retains its nasality but acquires a new point of articulation.

It should be borne in mind that unlike assimilation of definite article /ʔil-/, which takes place only across a morpheme boundary, /n/ assimilates to the sound it precedes whether that sound belongs to the same or a different morpheme. (We will see below that this applies only to partial assimilation.) Consider the following examples:

(21) Partial assimilation of /n/ to the following obstruent

[30] The last two examples are the only examples given by Al-Shahrani (1988) of underlying /n/ surfacing as [ŋ]. In both examples the alternation occurs inside the word. However, I think the Shahraan dialect would not be different from other Arabic dialects in changing /n/ into [ŋ] both within the word and across a word boundary.

a.i	ʒanbi → ʒamb	‘my side’
a.ii	danba → damb	‘his sin’
a.iii	ʕanbar → ʕambar	‘ward’
a.iv	ʕankabuut → ʕaŋkabuut	‘spider’
a.v	ʕanguud → ʕaŋguud	‘bunch (of grapes)’
a.vi	xanfuusa → xaɱfuusa	‘beetle’
b.i	min+ Fransa → miɱfransa	‘from France’
b.ii	kan+ barra → kambarra	‘he was outside’
b.iii	min+ gaalha → miŋgaalha	‘who said that?’
b.iv	min+ kallmik → miŋkallmik	‘who spoke to you?’

As these examples demonstrate, /n/ assimilates to a following stop (15a.i-v & 15b.ii-iv) or fricative (15a.vi & 15b.i). It should, however, be noted that /n/ assimilation to a following /f/, as shown in this example and the next, is a counterexample to the universal tendency to avoid assimilating a nasal to a following fricative. Padgett (1994: 469-70) observes that a nasal frequently becomes homorganic to a stop. But when the nasals precedes a fricative, the expected situation is i) assimilation either fails to occur and the nasal receives a default place, ii) the nasal gets deleted, or iii) nasal assimilation does take place but is accompanied by hardening of the fricative to a stop or an affricate. Padgett concludes that if nasals in a certain language assimilate in place to fricatives, they assimilate to stops as well. The reverse situation is not true (ibid: 467).

Pieces of evidence in support of the claim that /n/ is underlying in the examples in (21) are not hard to find. Some of these forms may also be pronounced with an epenthetic [i] separating the [n] from adjacent [b] as in the first two examples in (21a); in this case an [n] rather than [m] will show up in the surface form: [ʒanib] and [danib], respectively. Moreover, the plural forms of these words are [ʒnaab] and [dnuub], respectively. As for the third example in (21a), in the singular this word is always pronounced with a sequence of a nasal and an obstruent, that is, with no epenthesis. The

plural of this form, however, is *ʕanaabir,* with [aa] inserted between [n] and [b], again in which case [n] is articulated. The same is true of the remaining three examples, which are pluralised as *ʕanaakib, ʕanagiid* and *xanaafis*, respectively. In addition to this, all these forms are spelt with *n* in the orthography. Thus we can safely say that we have /n/ rather than any other sound at the underlying structure.

The examples in (21) show that /n/ must share place of articulation with the following obstruent. Two constraints seem to be in conflict here, as we have seen with /l-/ assimilation in the preceding chapter. On the one hand, output [n] has to be faithful to its input correspondent. On the other hand, this nasal has to be homorganic to the following obstruent. The faithfulness constraint I**DENT**-IO is repeated in (22)

(22) I**DENT**-IO. (repeated from the previous chapter)
Correspondent segments of input and output should be identical.

The markedness constraint is introduced in (23) (McCarthy 2011: 6).

(23) SHARE(F)
Assign one violation mark for every pair of adjacent elements
that are not linked to the same token of [F].

We will take the left-hand element in McCarthy's constraint to be the alveolar nasal /n/. We will also take the right-hand element in this constraint to be the obstruent with which the nasal has to be homorganic. In the process in hand, the token of [F] is the [Place] which /n/ and the obstruent following it share.

The examples in (21) above, however, show that being homorganic to the following consonant is preferred to being faithful to the input. Therefore, our two constraints can be placed as in the following tableau.

(24)

Input: /ʒanbi/	SHARE(F)	IDENT-IO
a. ☞ ʒambi		*
b. ʒanbi	*!	

The optimal candidate (24a) survives as it respects the highest-ranked constraint. Its competitor is loyal to the input form, but this loyalty comes at a costly expense resulting in a fatal violation of the topmost constraint.

Before moving to the next section we should note that a sequence of a nasal followed by a voiceless obstruent is completely permissible in MLA, as can be seen by looking at examples (21 a.iv, vi, b.i, iv) above. This runs counter to the markedness constraint *NÇ that is respected in many languages. (Huffman 1993; Ohala and Ohala 1993; Hayes and Stives 1995; Kager 1999; Pater, 1999; 2001) Taking into account the claim that the OT constraints are universal (Prince and Smolensky, 1993/2004), it seems that this constraint is ranked too low to be effective in this dialect.

4.3.2 *Total assimilation*

All the forms listed in the preceding section have been examples of partial assimilation. However, /n/ undergoes total assimilation as well. This happens when /n/ immediately precedes /l/, /r/ or /m/, as can be seen in the following forms:

(25) Total assimilation of /n/ to the following sonorant consonant

/miʃin looṭa/ → [miʃillooṭa]	‘they f. went downstairs’
/wen lawwel/ → [wellawwel]	‘where is the first?’
/min raak/ → [mirraak]	‘who saw you?’
/kaan raaʒil/ → [kaarraaʒil]	‘he was a man’
/min moħsin/ → [wemmoħsin]	‘from Moħsin?’
/kan maaʃi/ → [kammaaʃi]	‘he was going’

It is clear from these examples that speakers of Misrata Dialect avoid a sequence of /n/ immediately followed by any of the sonorants /l/, /r/ or /m/ and that they, consequently, resort to assimilating /n/ fully to the following sonorant. As was the case in assimilation of /l/, /n/ assimilation results in a geminate structure.

Aurayieth (1982) says that "sonorant sounds do not usually cluster in spoken Libyan Arabic." (p. 60) That is, when two sonorants occur contiguous to one another, the first undergoes total assimilation to the second. To prove this point, Aurayieth gives the following examples:

(26)	ʔinlu:m→ ʔillu:m	'I blame'
	ʔitlu:m↛ *ʔillu:m	'you blame'
	ʔinrawwiħ→ ʔirrawwiħ	'I go home'
	min man→mimman	'from who?'
	bi lraaħa → birraaħa	'with ease'
	min ʔilli→milli	'who is the one?'

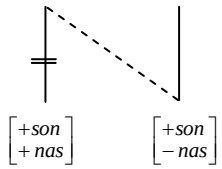
The examples listed by Aurayieth clarify the point that sonorants do not cluster. However, Aurayieth's statement is too general. The restriction on the clustering of sonorants seems to be confined to a sequence of the alveolar nasal /n/ and a following sonorant, apart from the glides /y/ and /w/. A sonorant consonant can safely cluster with a following glide as in *marwi* 'irrigated', *baryuush* 'croissant', *malwi* 'bent', *xaalya* 'empty s. f.', *gamla* 'louse', *risamna* 'we drew', *faanya* 'transient s. f.', *ʕinwaan* 'address', *ʕilmi* 'scientific'.

It should also be pointed out that the last example in Aurayieth's data contains a sequence of /n/ followed by /ʔ/. That is a sonorant and a glottal stop, rather than a sonorant and another sonorant. In many dialects of Arabic, including Libyan Arabic, the glottal stop is usually dropped utterance-internally and finally, but retained utterance-initially. This is exactly the case with the last example in (26), where the glottal stop is

elided in an utterance-internal position. The deletion of the glottal stop and the vowel following it results in a sequence of /n/ and two *ll*'s. This sequence becomes the target of haplology and total assimilation. According to Abumdas (1985: 120), in Libyan Arabic haplology takes place when three identical or similar (i.e. the similarity which gives rise to total assimilation) consonants are adjacent and the second of which is the definite article. In such a case one of the three consonants is deleted. Haplology may sometimes results in ambiguity. For instance, the prepositional phrase *mir raff* can mean 'from the shelf' or 'from a shelf' (ibid).

Let us now return to /n/ assimilation to sonorant consonants. Looking at the phonological features of the consonants involved in this assimilatory process, we find that /n/ has the specifications $\begin{bmatrix}+\text{son}\\+\text{nas}\end{bmatrix}$; /m/ also has the specifications $\begin{bmatrix}+\text{son}\\+\text{nas}\end{bmatrix}$, whereas the following liquids (i.e. /l/ and /r/) are specified as $\begin{bmatrix}+\text{son}\\-\text{nas}\end{bmatrix}$. However, the specification of /n/ for nasality is delinked as a result of assimilation. This can be depicted as in (27) below.

(27) n + r e.g. /min raak/ → [mirraak] 'who saw you?'



Again, this means that a faithfulness constraint and a markedness constraint are opposing one another. The faithfulness constraint stipulates that output forms should be identical to input forms. The markedness constraint, on the other hand, militates against a sequence of /n/ followed by a sonorant consonant. The faithfulness constraint I**DENT**-IO has been cited twice so far (see (14b) in the previous chapter and (22) in this this chapter), so it will not be repeated here. Our markedness constraint, on the other hand, can be stated as in (28).

(28) *nS (where S= nonidentical sonorant)
n must not be followed by any sonorant consonant other than *n*

The examples in (25) above indicate that the markedness constraint outranks its faithfulness counterpart. Tableau (29) illustrates the interaction between the relevant constraints.

(29)

Input min raak	*nS	IDENT-IO
a. ☞ mirraak		*
b. minraak	*!	

Candidate (29b) is excluded from the competition because it incurs a fatal violation of the topmost constraint. On the other hand, candidate (29a) avoids a similar fate by respecting the highest constraint and changing underlying /n/ into a [r]; consequently, it is chosen as the optimal candidate.

In section (4.2.1) above it was said that /n/ assimilation takes place both within the same word and across a word boundary. It is worthwhile to say that this applies only to partial assimilation; total assimilation of /n/ takes place only when two morphemes are involved. It is also worthwhile to say that this kind of assimilation occurs only when /n/ precedes sonorant consonants, as shown by the examples in (25) above. This is because /n/ cannot precede sonorant consonants within one morpheme. Sibawayh (1982: 456) states that /n/ in Arabic cannot be immediately followed by /l/ or /r/ within a word, and thus the clusters */-nl-/ or */-nr-/ are unattested (cf. the examples in (26) and the sentences immediately below them).

4.3.3 Alternative strategies

We saw in the last chapter that there are other ways the dialect could have used in order to avoid certain configurations. Let us now see whether it is possible for the dialect to resort to avoidance strategies with regard to total assimilation.

4.3.3.1 *Epenthesis*

The first strategy is to insert a vowel between the alveolar nasal and the sonorant consonant following it. If we insert a vowel between the two members of the impermissible sequence in the phrase *miʃin looṭa*, we get the ill-formed structure **miʃini looṭa*, indicating that DEP enjoys a high rank. This is confirmed by tableau (30).

(30)

Input: miʃin looṭa	DEP	IDENT-IO
a. ☞ miʃil looṭa		*
b. miʃini looṭa	*!	

Candidate (30a.) is optimised because it respects DEP, unlike its competitor (30b.) which is excluded for incurring a fatal violation of this constraint.

4.3.3.2 *Metathesis*

Metathesis is sometimes resorted to in the dialect under consideration. This happens when appending a vowel-initial suffix results in a weak syllable; that is, an unstressed, open syllable with a short, high vowel (McCarthy 2007: 168). Consider, for example, a verb stem like *jurgud*. This, as can be seen, consists of two closed syllables with stress falling on the initial (i.e. penultimate) syllable, thus *JUR.gud*. Appending the vowel-initial suffix does not affect stress location. It, nevertheless, causes the coda of the final syllable to resyllabify as an onset to the newly added vowel *JUR.gu.du*. This renders the now-penultimate syllable ‘weak’. To get rid of this weak syllable, the onset of the penultimate syllable and the vowel following it swap places to yield *JU.rug.du*.

Forms that undergo metathesis lead to a violation of LINEARITY (Kager, 1999; McCarthy, 2000; McCarthy & Prince, 1999). This constraint is defined in (31) (Kager, 1999: 63).

(31) LINEARITY ('No metathesis')
The output reflects the precedence structure of the input, and vice versa.

It might be argued that since the dialect avoids having a weak syllable by resorting to metathesis, the two sonorants involved in the current assimilatory process could similarly swap places and thus the offending sequence could be eliminated.

Let us try this option and see the result. Take, for example, the sentence *kaan raaʒil*. If /n/ and /r/ exchange places, we end up with **kaar naaʒil*. The ill-formedness of this form illustrates that LINEARITY is a respected constraint in the process in hand. That LINEARITY also outranks I**DENT**-IO is shown by a look at tableau (32).

(32)

Input: kaan raaʒil	LINEARITY	I**DENT**-IO
a. ☞ kaar raaʒil		*
b. kaar naaʒil	*!	

Violating LINEARITY causes the bottom candidate to be excluded from the competition, leaving place to candidate (32a), the actual output form.

The next step is to place the competing constraints in one tableau and see how they interact. This is illustrated by tableau (33).

(33)

Input: kaan raaʒil	*nS	LINEARITY	DEP	IDENT
a. ☞ kaar raaʒil				*
b. kaar naaʒil		*!		*
c. kaani raaʒil			*!	*
d. kaan raaʒil	*!			

Only (33a.) survives as it respects the three top-ranked constraints. Each of the other three candidates violates a high-ranking constraint and is consequently excluded.

Chapter 5. Assimilation of the Prefix /t-/

5.1 Assimilation of Imperfective /t-/

This chapter deals with the behaviour of the prefix /t-/. The prefix, which represents the second person (singular or plural) or the third person feminine (singular or plural[1]) in the imperfective tense, acquires its voicing from an initial voiced consonant of the verb stem to which it is prefixed (Elgadi 1986: 50; Harrama 1993: 34; Abdunnabi 2000: 43).

Before dealing with this process in MLA, we will consider the behaviour of the same process in other varieties of Arabic.

5.1.1 *Assimilation of /t/ in other Arabic dialects*

This prefix takes various forms in different Arabic varieties. In Standard Arabic, for example, it appears as /ta-/ or /tu-/ with a vowel intervening between *t* and the following consonant, and thus preventing assimilation (The use of /a/ or /u/ depends on the type of the verb to which the prefix is attached: quadrilateral verbs take /u/; /a/ is used elsewhere.) This can be seen in the following forms:

(1)	tazʔar	'it f. roars'
	tuʒahhiz	'you /she prepare(s)'
	tudammir	'you/she destroy(s)'
	taḍbuṭ	'you/she adjust(s)

Tripolitanian Arabic, like MLA, displays such an assimilatory process. Elgadi (1986: 50) presents the following examples, observing that voicing assimilation is a cross-linguistic phenomenon that frequently takes place.

[1] Note that to form the plural, a suffix must be added to the imperfective verb. /-u/ is suffixed to yield the second person masculine plural (e.g. t-zuuru); suffixing /-i/ yields the second person feminine singular (t-zuuri). Finally, appending the suffix /-in/ gives the second person feminine (t-zuurin) (see the first example in (1)).

(2) /t + guul/ → [dguul] ‘you say’
/t + ziid/ → [dziid] ‘you add
/t + diir/ → [ddiir] ‘you do’
/t + ʒawwiz/ → [dʒawwiz] ‘you marry’
/t + zayyin/ → [dzayyin] ‘you decorate’

Elgadi adds that when this prefix is attached to the stem of the verb, a vowel is epenthesised.

(3) /t + ktab/ → /tiktib/ ‘you write’
/t + xdam/ → /tixdim/ ‘you work’
/t + ħsab/ → /tiħsib/ ‘you calculate’
/t + mʃe/ → /timʃi/ ‘you go’

As the examples in (3) show, Elgadi’s statement that a vowel is inserted when the prefix is attached to the stem of a verb should be rephrased as ‘when this prefix is attached to a stem that begins with a consonant cluster’.

Harrama (1993: 34) deals with this process as used in the dialect spoken in al-Jabal al-Garbi (the Western Mountain, located about one hundred kilometres southwest of Tripoli (ibid: 13)). Harrama believes that the prefix is an underlying /ti-/ and that voicing assimilation to the first segment of the verb takes place after the vowel /i/ has been syncopated. The following are some of the examples given in Harrama (1993).

(4) td → dd /ti + diff/ → /tdiff/ → /ddiff/ ‘you (m.s.) push’
tz → dz /ti + ziid/ → /tziid/ → /dziid/ ‘she adds’
tʒ → dʒ /ti + ʒurr/ → /tʒurr/ → /dʒurr/ ‘you (m.s.) pull’
tð → dð /ti +ðannib/ → /tðannib/→ /dðannib/ ‘you m.s. punish’
tṭ→ ṭṭ /ti + ṭiir/→ /tṭiir/ → /ṭṭiir/ ‘it flies’

The last example is an instance of emphatic assimilation whereby the /t/ surfaces as /ṭ/ under the influence of an immediately following /ṭ/. In this study, however, we will be concerned only with voicing assimilation.

As seen in (4), Harrama treats the imperfective prefix as /ti-/, with assimilation occurring after vowel deletion. In fact, this is not entirely accurate. This is true of Standard Arabic, but not of the variety Harrama deals with; in Standard Arabic the vowel in the imperfect prefix is phonemic and it cannot be deleted as that variety of Arabic does not tolerate consonant clusters in onset position. The problem with Harrama's analysis is that he seems to be taking Standard Arabic forms as underlying forms. This, however, cannot be the case; Standard Arabic (or Classical Arabic) forms cannot be treated as input, since Standard Arabic is not the variety that Libyan (or any other Arabic-speaking) children are exposed to and acquire as their mother tongue. Only in rare cases do children acquire Standard Arabic during the language acquisition period. This is the case with, for example, Arab children living in a non-Arabic speaking country and exposed to Standard Arabic TV programmes[2]. Moreover, Standard Arabic tends to disappear gradually from the speech of those children, with colloquial Arabic taking over.

Furthermore, Harrama says that when the high front vowel of the prefix /ti-/ is not deleted, assimilation will not take place, as in the following examples.

(5) /ti + dris/ → /tidris/ 'you (m.s) study'
/ti + gdir/ → /tigdir/ 'you (m.s.) are capable of'
/ti + zraʕ/ → /tizraʕ/ 'you (m.s.) sow'

Here a more likely analysis is that the vowel is not retained but inserted. As can be seen, attaching the (vowel-less) prefix would result in a cluster of three consonants. A vowel is epenthesised in such cases because the maximum number of consonants in the onset position is two. In his dissertation, Harrama presents ten syllable types in the dialect he

[2] Some people believe that children do not learn language from television. However; as clearly indicated in this paragraph, in some exceptional cases children may acquire a certain variety from TV. This is exactly the case with my own children.

deals with, none of which contains a CCC cluster, neither in the onset nor in the coda position.

It should also be pointed out that this analysis is difficult to pursue in OT. A two-stage process– deleting the underlying vowel, and then having voicing assimilation– means that the voicing assimilation is opaque in OT. On the other hand, by assuming that the vowel is not an underlying part of the prefix (as assumed in this thesis), the data are more compatible with an OT analysis, since i) the vowel is inserted when necessary for markedness reasons, and ii) voicing assimilation is not opaque; it is surface true.

In Moroccan Arabic, the prefix takes the form /t-/, but this *t* is usually preceded by the durative prefix /ka-/. Heath (1987: 223) gives the following alternations:

(6)

Rule	Example	
td → dd	/ka-d-dir/	'she does'
tḍ → ḍḍ	/ka-ḍ-ḍarb-u/	'they hit each other'
tṭ → ṭṭ	/ka-ṭ-ṭiħ/	'she falls'
tz → dz	/ka-d-zid/	'she adds more'
tz → dz	/ka-d-zawwər/	'she counterfeits'
tʒ → dʒ	/ka-d-ʒawəb/	'she answers'
tṣ → ṭṣ	/ka-ṭ-ṣum/	'she fasts'

These examples show that *t* acquires both voicing and emphasis from the stem-initial segment. In Saharan Moroccan dialects that retain interdental fricatives, further assimilation takes place where an underlying sequence of /tθ/ surfaces as [θθ]; a sequence of /tð/ surfaces as [ðð] (Heath 2002: 167).

Heath notes that in a number of northern Jebli Moroccan dialects the imperfective prefix is *d-* rather than *t-*, e.g. *d-akul* 'you eat' or 'she eats'. In these varieties, prefixing *d-* to a voiceless obstruent-initial stem also gives rise to regressive assimilation, in which /d/ devoices to [t]. The outcome of this process is, of course, different from that of the process whereby /t-/ is prefixed. In the former process [d] is

produced; in the latter process the resultant allophone is [t]. What is relevant, however, is that the prefix loses its voicing value to get the voicing value of the following segment (ibid).

Interestingly, Teifour (1997: 41) says that (Aleppo) Syrian Arabic *t-* assimilates also to a stem-initial /k/, yielding forms like /tkatteb/ → [kkatteb] 'you make … write'

Sefrou Moroccan Arabic also exhibits assimilation of the imperfective prefix /t-/. Again, this /t-/ is preceded by the durative prefix /ka-/. This can be illustrated through the following examples (Amakhmakh 1997: 41):

(7)	Base	Gloss	Imperfective	Durative
	/dar/	do	[d-diir]	[ka-d-diir]
	/ḍrəb/	hit	[ḍ-ḍrəb]	[ka-ḍ-ḍrəb
	/zad/	add	[d-ziid]	[ka-d-ziid]
	/ẓar/	visit	[ḍ-ẓuur]	[ka-ḍ-ẓuur]
	/ʒawəb/	reply	[d-ʒawəb]	[ka-d-ʒawəb]

Amakhmakh says that /t-/ acquires voicing when it occurs to the left of a voiced coronal. The dialect under investigation, by contrast, assimilates in voicing both to [+cor] and [-cor] non-sonorant consonants.

Nour (2003: 46) very briefly deals with this process in Tetouani Moroccan Arabic. Nour gives only four examples; voice assimilation takes place in two examples but not in the other two. The relevant examples are listed in (8).

(8)	/ka+t+smaʕ/	[katəsmaʕ]	'you hear'
	/ka+t+fham/	[katəfham]	'you undersatand'
	/ka+t+lʕab/	[kadəlʕab]	'you play'
	/ka+t+nzal/	[kadənzal]	'you climb down'

As can be clearly seen, the stem-initial consonant in the first two examples is [-voice] whereas the stems in the third and fourth examples begin with [+voice] consonants.

What is interesting about these examples is that a schwa is inserted between the prefix and the first consonant in the stem. In spite of the fact that a vowel separates the prefix from the stem in all four examples, the prefix undergoes assimilation only in the last two examples, i.e. the ones whose stems begin with a voiced sound. As we will see below, vowels do not trigger voice assimilation of /t/. This seems to imply that /t/ here undergoes distant assimilation[3], i.e. assimilation through the vowel to acquire voicing from the [+voice] segments to the right of the vowel: /l/ and /n/. It is obvious that /l/ and /n/ are sonorant segments. The observation that /t/ assimilates to these two segments is not in harmony with the claim made in section (5.1.2) below that sonorants block assimilation of this voiceless coronal stop.

In Syrian Arabic, the prefix takes the form *t-*, but this *t-* is preceded by durative *bə-*. Here as well /t/ becomes [d] when prefixed to stems beginning with a single obstruent *d, z* or *ʒ*; it is realised as [ḍ] before the emphatic sound *ḍ*. Cowell (2005: 179) gives the following examples:

(9)	*bə-d-ziid*	'it (f.) increases'
	bə-d-ʒiib	'you bring'
	bə-d-dəll	'it (f.) indicates'
	bə-ḍ- ḍall	'it (f.) remains'

The same prefix may sometimes assimilate totally to a following sibilant (z, ẓ, ʒ, s, ṣ, ʃ). The examples in (10) show this process:

(10)	*bə-z-ziid*	'it (f.) increases'	(=*bə-d-ziid*)
	bə-ʒ-ʒiib	'you bring'	(=*bə-d-ʒiib*)
	bə-ʃ-ʃuuf	'you see'	(=*bə-t-ʃuuf*)

[3] Moroccan Arabic seems to be famous for such processes. For example, this variety of Arabic displays optional long distance regressive assimilation whereby coronal sibilants of a stem harmonise. This can be seen in alternating forms like [zuʒ] ~ [ʒuʒ] 'two', [sfənʒ] ~ [ʃfənʒ] 'doughnut' (Zellou 2010: 3). As can be seen, only the place of articulation changes; the feature [voice] remains unaffected. Thus voiceless [s] alternates with voiceless [ʃ], while voiced [z] alternates with voiced [ʒ]. For more examples, references and discussion, see Zellou (2010).

bə-ṣ-ṣəb ‘you pour’ (=*bə-ṭ-ṣəbb*)

The examples in (9) and (10) demonstrate that this assimilatory process is not exactly the same in Syrian Arabic and in the dialect under analysis. Syrian Arabic *t*- assimilates partially before a following voiced obstruent, and totally (i.e. spirantizes) before a following sibilant. In the present dialect, on the other hand, imperfective *t*- only acquires voicing from a following [+voice] obstruent and does not undergo spirantization.

5.1.2 *Assimilation of /t-/ in MLA*

Having looked at instances of prefix /t-/ assimilation in a number of Arabic dialects, let us see how this process works in the dialect under scrutiny. The following examples illustrate this voicing assimilation:

(11) t-+ zuur → dzuur ‘you/she visit(s)’
t-+ zakki → dzakki ‘you/she give(s) zakat’
t-+ ʒahhiz → dʒahhiz ‘you/she prepare(s)’
t-+ ʒuud → dʒuud ‘you/she become(s) generous’
t-+ gaabil → dgaabil‘you/she meet(s)’
t-+ gallib → dgallib ‘you/she turn(s) sth.’
t-+ daxxin → ddaxxin ‘you/she smoke(s)’
t-+ daafiʕ → ddaafiʕ‘you/she defend(s)’

Elgadi (1986: 51) argues that /t/ assimilation is blocked when the stem begins with a nasal sound. To account for this process, Elgadi first gives the rule in (12).

(12) $t \longrightarrow d / \#$ _____+ C^1
[+voice]

Later on, he revises it and gives the rule in (13) to exclude non-assimilation of this prefix before nasals.

(13) Revised Voicing Assimilation Rule
$t \longrightarrow d / \#$ _____+ C
$\begin{bmatrix} -son \\ -nasal \\ +voice \end{bmatrix}$

Abdunnabi (2000: 42-43) also says that this prefix assimilates the voicing of the first consonant of the verb stem in the dialect known as "Eastern Jabal 'Mountain' Libyan Arabic (EJLA)" and used by the inhabitants of the Green Mountain Territory (located about 1000 km east of Misrata). He presents examples like /t + guul/ → [dguul] 'you say', /t + diir/ → [ddiir] 'you do', /t + ʒawwiz/ → [dʒawwiz] 'you marry', /t + ziid/ → [dziid] 'you add'.

Abdunnabi agrees with Elgadi that nasality in the LA dialect he deals with blocks assimilation of the imperfective prefix. To support the claim that nasality blocks assimilation in the dialect he deals with, Abdunnabi gives the following examples:

(14) /t + muut/ → [tmuut] 'you die'
/t + fizz/ → [tfizz] 'you get up'
/t + zigg/ → [tzigg] 'you push'
/t + naam/ → [tnaam] 'you sleep

It is obvious that only the first and last of these examples begin with nasal sounds; it is not clear, however, why Abdunnabi is using the second and third examples, since the stem-initial segments in these forms (/f/ and /z/) are clearly obstruents and have nothing to do with nasality. In fact, /f/ is not only [-nas] but also [-voice] and should have been excluded from the examples altogether. In addition, on the very same page (p. 43) Abdunnabi lists /z/ among the voiced segments that trigger assimilation of /t/ (cf. the last example ([dziid]) in the previous paragraph.)

We have seen that both Elgadi (1986) and Abdunnabi (2000) claim that the imperfective prefix /t/ does not assimilate to nasals. However, /t/ assimilation is also blocked when the initial segment of the stem is /l/, /r/, /w/ or /j/, as can be illustrated by the following examples.

(15) t-+ nugg → [tnugg] 'you/she nag(s)' *dnug
t-+ naffaʕ → [tnaffaʕ] 'you/she benefit(s) sb.' *dnaffaʕ
t-+ tmill → [tmill] 'you/she get(s) fed up' *dmil

t-+ maari → [tmaari]	‘you/she imitate(s)’ *dmaari
t-+ laagi → [tlaagi]	‘you/she meet(s)’ *dlaagi
t-+ lizz → [tlizz]	‘you/she dismiss(es)’ *dliz
t-+ raaʒi → [traaʒi]	‘you/she wait(s)’ *draaʒi
t-+ raṭṭib → [traṭṭib]	‘you/she moisturise(s)’ *draṭṭib
t-+ wazzaʕ → [twazzaʕ]	‘you/she distribute(s)’ *dwazzaʕ
t-+ jassir → [tjassir]	‘you/she make(s) sth easy’ * djassir

All the initial segments in the examples in (15) are sonorants. Thus it seems that it is sonority, rather than nasality that blocks /t/ assimilation.

The examples in (15) show that sonority blocks /t/ assimilation; consulting more examples lends further support to this claim. For example, /t/ assimilation is also blocked before the voiced gutturals /ʕ/ and /ɣ/; as the set of data in (16) shows, no voicing assimilation takes place in the following forms.

(16) t-+ ʕuum → [tʕuum] ‘you/she swim(s)’ *dʕuum
t-+ ʕaani → [tʕaani] ‘you/she suffer(s)’ *dʕaani

t-+ ɣaamir → [tɣaamir] ‘you/she venture(s) *dɣaamir
t-+ ɣallif → [tɣallif] ‘you/she wrap(s) sth. *dɣallif

Gutturals are sometimes classified as sonorant sounds “on the basis of phonetic and phonological similarities to the sonorants” (Abu-Mansour 1996: 230). We will deal with each of these two sounds in turn, beginning with /ʕ/.

The pharyngeal sound /ʕ/ is also classified as a ‘resonant’ sound (Khalil and Qasim 1996; Zawaydeh 1999).[4] Khalil and Qasim (1996) present the phenomenon of ‘al-ʔistinṭaaʔ’, a nasalization process whereby a [ʕ] immediately preceding a [ṭ] is changed to an [n] by some speakers of Karaki Jordanian Arabic– a dialect spoken in the Jordanian city of Karak– which is located to the south of the capital, Amman. This phenomenon can also be witnessed in the speech of some other Jordanians, Syrians, and

[4] Halle (1995) also classifies guttural as [+sonorant]. Abu-Mansour (1996: 202) suggests that gutturals be classified as sonorants in terms of voice specification.

Iraqis. Thus a word like [ʔaʕṭaah] can be pronounced as [ʔanṭaah] 'he gave him sth.' (Zawaydeh 1999: 42).

Khalil and Qasim (1996) suggest that this replacement of [ʕ] by an [n] might be attributed to the observation that both are resonant sounds. In addition, some Arabic speakers from the Gulf region "pronounce the [ʕ] with some sort of nasality" (Zawaydeh 1999: 42). Zawaydeh (1999) hypothesizes that this substitution of [ʕ] by an [n] before a [ṭ] could result from the "acoustic effect of lowering the F2 by the emphatic." (p. 42). Furthermore, Zawaydeh goes on to say that she feels that there could be "some nasal murmur" as she pronounces the [ʕ]. Therefore, [ʕ] might have some acoustic similarity to [n]; but, as Zawaydeh admits, this needs to be proved by experimentation. Nonetheless, the behaviour of *t-* supports this position.

The voiced guttural /ɣ/ also behaves like a sonorant with respect to voice assimilation in the dialect under consideration. We saw in (16) that /t/ remains voiceless when it occurs to the left of /ɣ/. This voiced uvular sound can be linked to the voiced pharyngeal /ʕ/; they have some basic features in common, as can be seen in (17).

(17)

[ɣ]	[ʕ]
$\begin{bmatrix} +voice \\ +uvular \\ +cont \end{bmatrix}$	$\begin{bmatrix} +voice \\ +pharyngeal \\ +cont \end{bmatrix}$

A quick look at (17) shows that [ɣ] and [ʕ] share the phonation type [+voice] and manner of articulation [+cont].

It should also be pointed out that these sounds behave similarly even when they are adjacent to other affixes. Thus they devoice when they are followed by the laryngeal sound [h] and cause this [h] to assimilate totally to them, e.g. /simaʕ+ -ha/ → [simaħħa]

'he heard her/it', /balliɣ+ -ha/ → [ballixxa] 'he informed her' (as we will see in the next chapter).

Moreover, we can refer to language acquisition to seek evidence supporting the strong relationship between these sounds. Some children acquiring Arabic as their native language face difficulty pronouncing /ɣ/.[5] Consequently, they frequently substitute /ʕ/ instead of it. For example, a child is most likely to pronounce a word like [ɣudwa] 'tomorrow' as [ʕudwa], or [muɣṭa] 'lid' as [muʕṭa] (Likewise, from my own observation, children also replace the uvular sound [x] with the pharyngeal sound [ħ].)

Another piece of evidence in support of the observation that /ɣ/ does belong to the resonant class of sounds is that people with a certain kind of speech impediment (rhotacism**)** often produce this sound instead of /r/[6], which is undoubtedly resonant. For someone with such kind of impediment, a word like [reeta] 'I saw him' is most likely to surface as [ɣeeta]; a word like [tiriis] 'men' is expected to surface as [tiɣiis].

We have presented evidence in support of the claim that /ʕ/ and /ɣ/ can be classified as sonorant segments with respect to voice assimilation. In some dialects, however, these sounds pattern with obstruents as they spread voice to preceding obstruents. For example, in Sudanese Arabic voiceless obstruents acquire voice from an immediately following /ʕ/ or /ɣ/, as can be seen in the following forms: (Mustapha 1982: 228, cited in Dickins 2007: 84-85).

(18) [tizʕa] (for /tisʕa/ 'nine')
[maʒɣuul] (for /maʃɣuul/ 'busy')

[5] Bear in mind that this difficulty is restricted to a certain age (probably when they are between two to five or six years). Normal older children are ok with this sound, and infants are also capable of pronouncing the [ɣ] at the babbling stage.
[6] Thanks to S.J. Hannahs for drawing my attention to this piece of evidence.

Abu-Mansour (1996: 225) also cites the Sudanese Arabic form [ʔaʒɣaal] from underlying /ʔaʃɣaal/ 'works'. She further cites the example /ʃeex#ʕali/ [ʃeeɣʕaal] 'Sheikh Ali', with /x/ surfacing as /ɣ/ under the influence of a following /ʕ/ across a word boundary.

In Cairene Arabic, /ʕ/ behaves the same way it behaves in MLA, e.g. [mitʕallim] 'educated' (Kabrah, 2011: 31). /ɣ/, by contrast, behaves like Sudanese /ɣ/ in that it causes a preceding voiceless segment to become voiced. This is evident from forms like /ʔaṣɣar/ → [ʔaẓɣar] 'younger', /jitɣarrab/ → [jidɣarrab] 'to be in a foreign country' (ibid).

One voiced sound that blocks voicing assimilation of /t/, though it does not have much in common with the (resonant) sounds blocking this assimilation is the bilabial plosive /b/. The following examples illustrate how /t-/ assimilation is blocked before /b/:[7]

(19) t-+ biiʕ→ [tbiiʕ] 'you/she sell(s) *dbiiʕ
t-+ baddil→ [tbaddil] 'you/she change(s) *dbaddil

5.1.2.1 *The relevant constraints*

We have seen that [-voice] /t-/ becomes [+voice] when prefixed to a verb beginning with the voiced obstruents /z/, /d/, /ʒ/ or /g/. We now need to find the constraints that tackle such a process

In the previous chapter we introduced McCarthy's constraint *SHARE(F)* to account for the observation that /n/ takes on the place of articulation of an immediately following obstruent. Here as well we will use this constraint to account for the voicing

[7] This is treated as an exception (Elgadi 1986: 52). However, this blocking could probably be linked to the absence of a voiceless counterpart [p]. All the voiced obstruents to which *t* assimilates have voiceless counterparts. Thus we have contrasts between z~s, ʒ~ʃ, g~k, d~t. On the contrary, no such contrast exists between voiced [b] and voiceless [p] in MLA.

assimilatory process under consideration. This constraint is repeated in (20), for ease of reference.

(20) SHARE(F)
Assign one violation mark for every pair of adjacent elements that are not linked to the same token of [F].

McCarthy's constraint requires that adjacent elements be linked to the same token of [F]. As we will see below, however, sharing the same feature ([+voice] in this case) is restricted to adjacent obstruents. In the previous chapter the feature shared was Place; here we take the word *elements* to refer to *obstruents*. We will also take the first member of the adjacent obstruents to be the imperfective prefix /t-/, since other obstruents with different voicing specifications may be contiguous.

The examples in (11) above indicate that SHARE(F) has priority over IDENT. Thus we have the ranking argument in (21).

(21) SHARE(F) » IDENT-IO
dzuur > tzuur

This priority is confirmed by tableau (22).

(22)

Input: /t- zuur/	SHARE(F)	IDENT-IO
a. ☞ dzuur		*
b. tzuur	*!	

Candidate (22a) wins because it is favoured by the high-ranking SHARE(F), as opposed to candidate (22b) whose faithfulness to the voice feature of its input causes it to be excluded from the competition.

5.1.3 *Alternative strategies*

5.1.3.1 *Vowel insertion*

As we have previously seen, there are other repair strategies that the dialect could have used to avoid the clash in the feature [voice] between the prefix and the first segment of the stem. The first is epenthesis, whereby a vowel is inserted between /t-/ and the following obstruent. Inserting the vowel [i], for example, we end up having the ill-formed output *[tizuur]. The examples in (23), modified from those in (11), show that vowel insertion here would lead to ungrammatical forms.

(23) t-+ zuur → *[tizuur] 'you/she visit(s)'
t-+ ʒahhiz → *[tiʒahhiz] 'you/she prepare(s)'
t-+ gaabil → *[tigaabil] 'you/she meet(s)'
t-+ daxxin → *[tidaxxin] 'you/she smoke(s)'

Insertion of this vowel is an instance of DEP violation. The asterisks before the examples in (23) indicate that DEP is an active constraint in the dialect. This means that DEP as well ranks above IDENT-IO. Tableau (24) illustrates the interaction between these constraints.

(24)

Input: /t- zuur/	DEP	IDENT-IO
a. ☞ dzuur		*
b. tizuur	*!	

Here again violating the higher ranking constraint results in candidate (24b) being ruled out of the competition. Incurring a violation of **IDENT**-IO, however, does not affect the status of candidate (24a) as the optimal candidate.

5.1.3.2 *Consonant deletion*

It might be argued that the dialect could have resorted to deletion to avoid having the impermissible sequence. However, an Arabic verbal root is composed of a number of consonants which carry the basic meaning of the verb (Bauer 2003: 216). Thus deleting

the first segment in the stem would, consequently, result in a change of the intended meaning or in a nonsense word, e.g. *[tuur]. Likewise, the prefix cannot be left out as the meaning would be affected. In OT terms, this shows that MAX also plays an important role in the process in hand. Tableau (25) illustrates that deletion is not possible.

(25)

Input: /t- zuur/	MAX	IDENT-IO
a. ☞ dzuur		*
b. zuur	*!	
Input: /t- zuur/		
a. ☞ dzuur		*
b. tuur	*!	

The lower part of the tableau is a mirror image of the upper part. In the upper part, the prefix is missing, while the stem-initial segment /z/ is left out in the lower part.

5.1.3.3 *Stem-initial devoicing*

We have seen that the dialect voices prefixal /t-/ in the environment of a following voiced obstruent. The dialect could, alternatively, have devoiced the initial segment of the stem. Adopting this strategy, we could have witnessed forms like, e.g. *tsuur. This form clearly involves a violation of IDENT-IO. However, we have established that IDENT-IO occupies a hierarchical position that is so low that it can be ignored (see tableaux 22, 24 above), at least as far as prefixal voicing is concerned.

This means that we should have a special version of IDENT-IO so that we can include cases where the prefix undergoes voicing assimilation but, at the same time, exclude cases where the stem-initial segment is devoiced. This stem-specific version of the faithfulness constraint is introduced in (26).

(26) IDENT-IO(stem-initial)
Input voicing values of stem-initial segments should be preserved in the output.

This constraint ensures that the initial sound of the stem (e.g. z of *dzuur*) remains intact. The non-alternation of this initial segment points to the fact that this is a high-ranking constraint.

Paradoxically, this constraint interacts with the other faithfulness constraint: I**DENT**-IO. This latter constraint is a general one that can include all segments of both input and output. We, consequently, need to constrain it so as to restrict its application to the prefix only.

(27) IDENT-IO(prefix)
Input voicing values of the prefix should be preserved in the output.

The constraints in (26) and (27) are the same, except that the former is stem-specific whereas the latter is prefix-specific. The change in the voicing feature of the prefix means that the prefix-related constraint is outranked by that governing the stem-initial segment. This is shown by tableau (28).

(28)

Input: /t-zuur/	IDENT-IO(stem-initial)	IDENT-IO(prefix)
a. ☞ dzuur		*
b. tsuur	*!	

Respecting top-ranking IDENT-IO(stem-initial) entitles (28a) to being chosen as the optimal candidate, at the expense of (28b) which is excluded from the competition for incurring a violation of this constraint.

Having established the constraints involved in this process, we need to see all of them placed in a tableau. Tableau (29) shows this ranking.

(29)

Input: /t-zuur/	SHARE(F)	DEP-IO	MAX	IDENT-(S-I)	IDENT(prefix)
a. ☞dzuur					*
b. tzuur	*!				
c. tizuur		*!			
d. zuur			*!		
e. tsuur				*!	

As we saw in tableaux (22), (24) and (25) concerning the ranking of **IDENT**-IO, **IDENT**(prefix) is placed at the bottom because placing it in a higher rank will result in the exclusion of candidate (29a), the actual output.

5.1.4 *More on assimilation and sonority*

We have established that sonorant segments do not trigger voice assimilation of the prefix /t-/. Before bringing this part of the chapter to an end, there is more to be said about the fact that assimilation of the prefix /t-/ is blocked before sonorant segments, as illustrated by the data sets in (15) and (16) above, repeated as (30) and (31) for convenience.

(30)	/t-+ nug/ → [tnug]	'you/she nag(s)'	*dnug
	/t-+ naffaʕ/ → [tnaffaʕ]	'you/she benefit(s) sb.'	*dnaffaʕ
	/t-+ tmil/ → [tmil]	'you/she get(s) fed up'	*dmil
	/t-+ maari/ → [tmaari]	'you/she imitate(s)'	*dmaari
	/t-+ laagi/ → [tlaagi]	'you/she meet(s)'	*dlaagi
	/t-+ liz/ → [tliz]	'you/she dismiss(es)'	*dliz
	/t-+ raaʒi/ → [traaʒi]	'you/she wait(s)'	*draaʒi
	/t-+ raṭṭib/ → [traṭṭib]	'you/she moisturise(s)'	*draṭṭib
	/t-+ wazzaʕ/ → [twazzaʕ]	'you/she distribute(s)'	*dwazzaʕ
	/t-+ jassir/ → [tjassir]	'you/she make(s) sth easy'	* djassir
(31)	/t-+ ʕuum/ → [tʕuum]	'you/she swim(s)'	*dʕuum
	/t-+ ʕaani/ → [tʕaani]	'you/she suffer(s)'	*dʕaani
	/t-+ ɣaamir/ → [tɣaamir]	'you/she venture(s)	*dɣaamir

/t-+ ɣallif/ → [tɣallif] ‘you/she wrap(s) sth. *dɣallif

It should be pointed out that MLA sonorants are not alone in their inability to trigger voice assimilation. This is also the case in other varieties of Arabic. Consider, for examples, the data sets in (32) and (33)[8], which are examples of regressive voicing assimilation in Egyptian Arabic. Here voiceless obstruents become voiced when they immediately precede a voiced obstruent.

(32) a. ʔasaabiiʕ ‘weeks’
ʔuz̲buuʕ ‘week’ (root = s-b-ʕ)

b. ṣabar ‘he was patient’
buz̲bur ‘he is patient’ (root = ṣ-b-r)

c. kibiir ‘big, great’
ʔg̲bar ‘bigger, greater’ (root= k-b-r)

The same process is attested across a word boundary.

(33) a. ʔibnak ga →
ʔibnag̲ ga ‘your son came’
b. fisiix ɣaali →
fisiiɣ̲ ɣaali ‘expensive salted fish’

However, no assimilation is witnessed when the obstruent is followed by a sonorant, as can be seen in the following examples, which parallel the examples given in (32) and (33).

(34) masluuʔ ‘boiled’ *mazluuʔ
maṣraf ‘bank’ *maẓraf
yaklu ‘they eat’ *yaglu

(35) ʔibnak lissa ma gaaʃ ‘your son hasn’t come yet’ *ʔibnag lissa …
tariix nefertiiti ‘Nefertiti’s history’ *tariiɣ nefertiiti

[8] The examples in (32) and (33) are from Abu-Salim (1988: 51) and Gary and Gamal Eldin (1982: 127) respectively. Those in (34) and (35) are my examples, about which I consulted a native speaker of Egyptian Arabic.

Unlike the obstruents in (32) and (33), which agree with the following obstruent in the feature [+voice], the obstruents in (34) and (35) do not undergo such a process when they are followed by a sonorant, as evidenced by the starred forms. Thus, here again we see voicing assimilation being blocked by sonorants.

Watson (2002: 214) relates assimilation to the notion of dominance. Some phonological features are more dominant than others. The weaker the feature, the more likely it is to be affected by assimilation, and vice versa. For example, [sonorant] is a weak feature, and assimilation tends to target consonants with high sonority. On the other hand, the trigger (i.e. the sound that causes another sound to undergo assimilation) is "the less sonorant consonant, and sonorants rarely trigger assimilation" (ibid). In San'ani and Cairene Arabic, for example, nasal /n/ acquires the place features of the obstruent it precedes within the phonological word, as when San'ani *yinba*^{c} surfaces as *yi*[*m*]*ba*^{c} 'he jumps'. The /n/, however, seldom acquires the place features of a following palatal or labiovelar glide. Thus *yinwi* mostly surfaces as *yi[n]wi* 'he intends', with the nasal's place feature remaining intact (ibid).

A somewhat similar phenomenon (sonorant transparency) can also be found in Russian (Jakobson 1978). In this language as well, obstruents retain their voicing specification before a sonorant (Trubetzkoy 1969). According to Hayes (1984), voicing in Russian spreads through a sonorant at a proclitic boundary in rapid speech. Thus an obstruent acquires the voice value of a following obstruent even when a sonorant falls between the two obstruents involved, as in /izmtsenska/ → [ismtsenska] 'from Mcensk', /otmgl̥i/ → [odmgl̥i] 'from haze' (Kulikov 2010)[9].

[9] Kulikov says that sonorant transparency in Russian is controversial, with some linguists viewing it as a gradient phenomenon (Cho 1990, Shapiro 1993), only attested before a devoiced sonorant (Ševoroškin

Likewise, a Polish obstruent assimilates the voice specification of the obstruent it immediately precedes. This assimilation is still attested when a sonorant intervenes. Gussmann (1992: 32) presents the following two examples, where the first obstruent of the noun *me*[trk]*a* (gen. sg. of me[drek] 'wiseacre') and in the verb[10] *me*[trk]*owac* 'wisecrack' undergoes devoicing through the sonorant /r/.

The inapplicability of voice assimilation triggered by sonorants means that we need to have a constraint that optimises a candidate which does not share the feature [+voice] with a following sonorant and, in conjunction with some of the constraints it outranks, rules out any candidate that assimilates the prefix or otherwise prevents it from being contiguous to the following sonorant. Kulikov (2010) presents the following constraint, which can do the job specified in the preceding paragraph nicely.

(36) ID PRESONORANT VOICE (IDPRESON VOI)
An obstruent in presonorant position must be faithful to the input specification of voice.

Tableau (37) gives a clear picture of the interaction between the different constraints.

(37)

Input: /t-laagi/	IDPRESON VOI	SHARE(F)	MAX-IO	DEP-IO	IDENT-(S-I)	IDENT(prefix)
a. ☞ tlaagi						
b. dlaagi	*!					*
c. tilaagi				*!		
d. laagi			*!			
e. tl̥aagi					*!	

1971), or even unattested in Standard Russian (Es'kova 1971, Kavitskaja 1999). Kulikov adds that "[I]n spite of these doubts, claims about voice assimilation through a sonorant are usually included in phonological analyses of Russian (e.g. Petrova 2003, Rubach 2008), and sonorant transparency has been used to support important theoretical claims (Kiparsky 1985, Steriade 1999)."

[10] Note that both the noun and the verb at hand are based on the adjective ma[dr]y 'wise' (Gussmann: 1992: 32). Note also that the /r/ itself surfaces 'devoiced phonetically' (ibid).

Recall that SHARE(F) refers to the prefix /t-/ and the obstruent it precedes. Thus [tl] in candidate (37a) does not count as a violation of this constraint since this cluster comprises prefixal /t/ and a sonorant rather than an obstruent. Candidate (37b), which would have been chosen as the actual output if /t/ and an obstruent had been involved, is excluded on a violation of the newly introduced constraint. By contrast, candidate (37a), which would have been excluded in a cluster of two obstruents, is optimised as it respects this new constraint. The remaining three candidates (37c, d, e) are ruled out for the same reasoning provided for (29c, d, e) respectively.

5.2 Assimilation of Detransitivizing /t-/

We have seen that the imperfective prefix /t-/ undergoes partial (voicing) assimilation when appended before a voiced non-sonorant obstruent. A similar prefix (detransitivizing /t-/) undergoes total assimilation before a coronal obstruent. This prefix is used to derive form V verbs (i.e. tifaʕʕil) from form II verbs (i.e. faʕʕil). It is also appended before form III verbs (i.e. faaʕil) to produce form VI verbs (i.e. tifaaʕil) (Watson 2002: 134; Wright 2007: 29; see section 1.8 above).

When dealing with (partial) assimilation of the imperfective prefix in the previous section, we saw that MLA is not the only Arabic dialect where such a process is witnessed. Likewise, MLA is far from being alone when total assimilation of the detransitivizing prefix is concerned. Let us first have a look at this process in some varieties of Arabic before dealing with it in the variety under investigation.

5.2.1 */t-/ assimilation in other Arabic dialects*

In the previous section, regarding partial assimilation of imperfective /t-/, we saw that in MSA a vowel intervenes between the voiceless alveolar plosive and the following obstruent and, consequently, assimilation is blocked. Similarly, with the detransitivizing prefix a vowel intervening between the prefix and the obstruent it precedes prevents assimilation. Some examples are presented in (1).

(1)

taṣannat	‘to eavesdrop’
taʒahhaz	‘to get ready’
taʃaaʔam	‘to be pessimistic’
tazaaħam	‘to crowd’
tadaafaʕ	‘to stampede’

Unlike speakers of MSA, speakers of Cairene Arabic do not insert a vowel between the prefix and the first segment of the stem. Thus in that dialect as well /t-/ undergoes total assimilation to the following coronal or velar stop (note that

assimilation to velar stops is optional (as we saw in chapter (3) concerning assimilation of /l/ of the definite article), and optional assimilation to a following coronal sibilant. Consider the following examples from Watson (2002: 222).

(2)	a. /t + daaxil/	iddaaxil	'to interefer'
	/t + ṭarrab	iṭṭarrab	'to be covered'
	b. /t + saabiʔ	issaabiʔ ~itssabiʔ	'to contend with'
	/t + ʃaṭaf/	iʃʃaṭaf ~ itʃaṭaf	'to be chipped'
	/t + ṣabban/	iṣṣabban	'to be soaped'
	/t +kabb/	ikkab ~ itkabb	'to be poured'
	/t + gawwiz/	iggawiz ~ itgawwiz	'to get married'

No assimilation is attested, however, when *t-* occurs immediately before a coronal sonorant or labial or guttural consonant, regardless of the speed of pronunciation (ibid).

Abumdas (1985: 121, 125) briefly deals with this assimilatory process in the Libyan Arabic dialect spoken in the city of Zliten (about fifty kilometres west of Misrata). He also says that *t* undergoes total assimilation. However, since Abumdas's study is not devoted solely to assimilation, he only gives examples where /t-/ is followed by the coronal obstruents /z, t, ʒ/. Three of Abumdas's examples are *tzarraʕ* → *zzarraʕ* 'it scattered', *ttaawab* → *ttaawab* 'he yawned', *tʒalla* → *ʒʒalla* 'it became clear'. Abumdas gives the rule in (3) to account for this process.

(3) t → C_1 /# ___ + C_1 where C_1 = [+cor, -nas, -liquid]

The features [-nas, -liquid] in this rule should, however, be changed to [-son], since both nasals and liquids are sonorant segments.

Harrama (1993: 35) deals in passing with this process in the Libyan Arabic variety used in the West Mountain Area. Harrama cites examples of this prefix attached to stems beginning with the segments /z, ʃ, s, ṣ, ð̣, ṭ, d, ʒ, g/, e.g. /tð̣aarabu/ → [ð̣ð̣aarabu] 'they fought one another' /tʒammad/ → [ʒʒammad] 'it became frozen'. As

we will see below, the dialect under analysis also assimilates its detransitivizing prefix to all these coronal obstruents (except for the emphatic interdental fricative /ð̣/, which is not part of the sound system of MLA). What is interesting in this list of sounds is the last one, i.e. the voiced velar stop /g/. Harrama says that /t-/ of the detransitivizing prefix[1] assimilates in voice to this sound and gives the following alternation: /tgaddam/ → [dgaddam] 'he advanced'. However, this assimilatory process seems to be unlikely, as will be explained in the next two paragraphs.

We have seen in (2) above that detransitivizing /t-/ optionally assimilates to stem-initial /k/ and /g/ in Cairene Arabic. Those examples also show that Cairene /t-/ assimilation is total, as is the case in the other varieties referred to in this study, of course when it comes to assimilation to segments other than /k/ and /g/ to which no assimilation is attested in these varieties. Likewise, /t-/ in Harrama's examples undergoes total assimilation to the segments it precedes in all the examples he lists, apart from the last example of course. We have also seen in section (3.2) above that Cairene /l/ of the definite article may undergo total assimilation to a following /k/ or /g/. On the other hand, /l/ in the dialect described by Harrama assimilates only to [+cor] segments but fails to assimilate to segments that lack this feature (Harrama gives the form /l-galb/ in whcih /l/ fails to assimilate (p. 37)). So since /l/, as dealt with by Harrama (1993), behaves like the /l/'s in the majority of Arabic dialects, excluding Cairene, the expectation is that /t/ would also behave the way it does in these dialects, Cairene excluded. Even if we assume that the /t/ in Harrama's examples patterns with Cairene /t/, it should undergo total rather than partial assimilation.

[1] The term "*t*- of the detransitivizing prefix" is due to McCarthy and Prince (1990: 39); see also Watson (2002: 141-42). Harrama refers to this *t*- as "the prefix /t-/ of Form V and Form VI of the perfect verb" (p.35). We have already said that this /t-/ is used to produce form V and form VI verbs (see section (1.8.5.2)).

We have also seen in the previous section that imperfective /t/ assimilates in voice to a following voiced obstruent. This leads us to conclude that Harrama seems to be confusing detransivitising /t/ (which assimilates totally) with imperfective /t/ (which assimilates only partially).

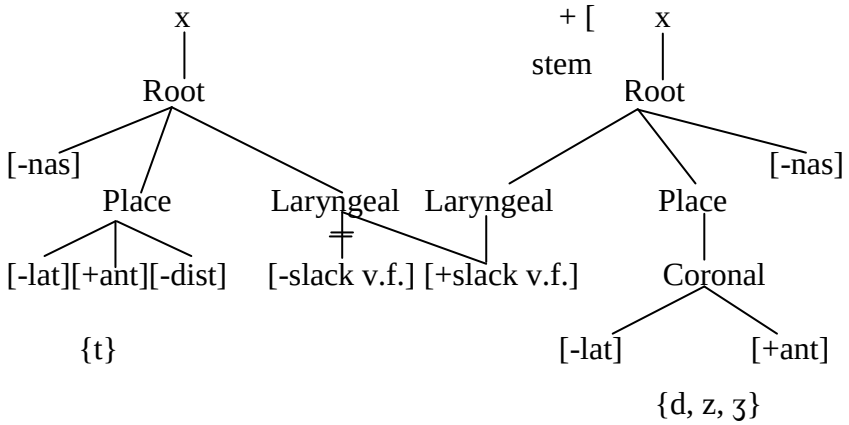
Amakhmakh (1997: 36-37) presents examples of this process in Sefrou Moroccan Arabic. He says that prefixal /t/ undergoes only voicing assimilation before the [+voice] coronal obstruents /d, ḍ, z, ẓ, ʒ/. That is, it undergoes only partial, rather than total assimilation, unlike the dialect under investigation. The data set in (4) illustrates this process (Amakhmakh 1997: 36-37).

(4)

Base	Gloss	Intransitive
/zayəd/	adding	[d-zayəd]
/ʒawəb/	answer	[d-ʒawəb]
/ḍarəb/	hitting	[ḍ-ḍarəb]
/daħəs/	cramp	[d-daħəs]
/ẓəyyər/	tighten	[ḍ-ẓəyyər]

Here *t-* becomes [+voice] when occurring immediately before a voiced obstruent (also [+emphatic] when the following obstruent is an emphatic). Amakhmakh uses a non-linear approach to deal with this process and gives the following rule to account for it.

(5) /t/ voicing assimilation



This rule clearly shows that assimilation is treated as spreading of the laryngeal node. However, the reason why assimilation takes place is not mentioned. It should be pointed out that in the Moroccan Arabic variety Amakhmakh deals with, this rule is suitable for describing both assimilation of imperfective /t-/ and that of detransitivizing /t-/ since both processes involve voicing assimilation of /t/ to the following coronal obstruent (ibid).

Likewise, Cowell (2005: 86) says that Syrian Arabic *t-* generally becomes voiced when followed by voiced dental and palatal obstruents (d, z, ʒ, ḍ, ẓ), as in *dʒawwaz* 'to be married', *dzakkar* 'to remember', *ddoozan* 'to be in tune'. Cowell further says that "the tendency to assimilate to a voiced radical is not equally strong in all words" (ibid). For example, some speakers usually voice the prefix in *dʒawwaz* 'to be married'; the same speakers, however, do not assimilate it in *tʒaawaz* 'to exceed'. Interestingly, for the very same speakers this latter form (without voicing assimilation) alternates with *tfaawaz* (with the first consonant in the stem devoiced rather than with the *t* voiced, i.e progressive instead of regressive assimilation).

Cowell further says that the prefix *t-* may undergo optional assimilation to a following coronal sibilant (s, ṣ, ʃ, z, ẓ, ʒ), e.g. *bəzzakkar* 'I remember' (for *bədzakkar*), *məṣṣaṭṭeħ* 'lying down' (for *məṭṣaṭṭeħ*), *ẓẓannar* 'he girded himself' (for *ḍẓannar*) (ibid).

Cowell's examples indicate that Syrian Arabic /t-/ differs from that of MLA in that the former may undergo total or partial assimilation to a following coronal or palatal obstruent and (optional) total assimilation to a following coronal sibilant. The latter, on the other hand, undergoes total assimilation to all the coronal obstruents it precedes (see the examples in (7) below).

Feghali (2004: 70) says that /t/[2] in the dialects of Riyadh and Eastern Saudi Arabian usually assimilates totally to the first radical of verbs that begin with one of the following consonants: /θ, j, d, ð, z, s, ḍ, ṭ, ẓ/, e.g. /tdayyan/ → [ddayyan] 'he borrowed money', /tθamman/→ [θθamman] 'it was evaluated', /tðammar/ → [ððammar] 'he complained'.

Holes (1990: 278) gives examples of this process as heard in subvarieties of Eastern Gulf Arabic (EGA). According to Holes, /t/ assimilates to the any of the following root-initial consonants: /t, d, θ, ð, ṭ, ḍ, ḏ, s, z, ṣ, ʃ/, e.g. /tsallif/→ [ssallif] 'to borrow', /tdallaʕ/ → [ddallaʕ] 'to spoil (child)', /tṣaadam/ → [ṣṣaadam] 'to collide'.

Finally, Sakarna (1999: 79) presents this process as attested in the ʕabadi dialect (a Bedouin dialect of Jordanian Arabic). Like the case in Saharan Moroccan dialects, mentioned above, the dialect analysed by Sakarna also displays total assimilation of /t-/ to a following dental fricative, /θ, ð/. Sakarna presents the following examples:

(6)	/t-taffal/	[ttaffal]	'spit'
	/t-dabbar/	[ddabbar]	'arrange'
	/t-θabbat/	[θθabbat]	'settle'
	/t- ðakkar/	[ððakkar]	'remember'

These are examples of form V verbs. Sakarna presents many more examples of form V and form VI verbs both in the perfective (a total of forty-four examples). Here only four examples are given, including two in which /t/ assimilates to the interdental fricatives which do not occur in MLA.

[2] Feghali refers to the verbs to which this /t/ is prefixed as "imperfect verb forms". However, the examples show that the /t/ in this case is attached to perfective verbs. That is, here as well form V verbs are derived from form II verbs through prefixation of /t-/.

5.2.2 */t/ assimilation in MLA*

We have seen in the previous section that the detransitivizing prefix /t-/ behaves somewhat differently in various dialects. The current section sheds light on the behaviour of this prefix in MLA. The examples in (7) illustrate this process.

(7)

t- + sallif → ssallif	'to borrow'
t- + ṣaariʕ → ṣṣaariʕ	'to wrestle'
t- + zaaħim → zzaaħim	'to crowd'
t- + ʃammis → ʃʃammis	'to bask'
t- + ʒassis → ʒʒassis	'to spy'
t- + daxxil → ddaxxil	'to interfere'
t- + ḍallim → ḍḍallim	'to complain'
t- + ṭawwir → ṭṭawwir	'to develop'
t- + tabbit → ttabbit	'to confirm'

With the following forms, however, no assimilation occurs as a vowel is inserted between the prefix and the first segment in the stem.

(8)

t- + ʕallim → təʕallim	'to learn'
t- + ħaʃʃim → təħaʃʃim	'to feel shy'
t- + ʔaxxir →təʔaxxir	'to be late'
t- + ɣayyir → təɣayyir	'to change'
t- + xayyil → təxayyil	'to imagine'
t- + bassim →təbassim	'to smile'
t- + gassim → təgassim	'to be divided'
t- + kallim→ təkallim	'to speak'
t- + naffil →tənaffil	'to perform voluntary prayer'
t- + manna→ təmanna	'to whish'
t- +rayyiħ → tərayyiħ	'to rest'
t- + laffit → təlaffit	'to turn around'
t- + wassaʕ→ təwassaʕ	'to dilate/expand'
t- + yabbis → təyabbis	'to stiffen'

The examples in (7) and (8) indicate that the detransitivizing prefix takes the form *t-* before coronal obstruents and the form *tə-* before sonorants and [-coronal] obstruents. That is, a vowel is inserted between the prefix and the stem when the stem begins with a sonorant or a [-cor] obstruent.

To be more precise, we should point out that the examples in (8) do not show whether the blocking of assimilation is caused by the existence of a vowel between the voiceless alveolar stop and the stem-initial segment or this blocking is because /t/ does not assimilate to these segments in the first place. However, consulting examples from other Arabic dialects, e.g Tripoli Libyan Arabic, proves that assimilation does not take place even when no vowel intervenes. For example, /t- + ʕallim/ → [tʕallim], /t- + ħaʃʃim/ → [tħaʃʃim], etc. Cairene Arabic /t/ also fails to undergo assimilation to such segments. Consider, for example, the non-assimilation of /t/ in the following forms: *itnaakish* 'to tease one another', *itħammil* 'to bear', *itfakkar* 'to be reminded', *itʕawwaʔ* 'to be made late' (Watson 2002: 222). But note that Cairene optionally assimilates *t-* to velar /k/ and /g/, as in the last two examples in (2b.) above.

The same is true of Syrian Arabic /t/. Although Cowell does not state it explicitly, his examples indicate that (similar to the case of Tripolitanian and Cairene Arabic) /t/ in the Syrian Arabic dialect he is dealing with does not undergo total assimilation to sonorants or [-cor] obstruents (Cowell 2005: 86). Non-assinilation of Syrian Arabic /t/ to such segments can be seen in the following examples:

(9) tʕallam 'to learn'
tɣayyar 'to change, be changed'
tʔaxxar 'to be late'
tmanna 'to wish'

Going back to the data set in (8), the question arises as to why a vowel is inserted when the stem begins with a sonorant or a non-coronal obstruent. This could probably be a way of avoiding ambiguity between imperfective /t-/ (cf. the previous section) and detransitivizing /t-/ (as manifested in this section). We saw in the previous section that the imperfective prefix assimilates partially to voiced obstruents and fails to undergo assimilation to sonorants. Likewise, the detransitivizing prefix assimilates

totally to coronal obstruents and does not assimilate when the stem-initial segment is a sonorant. Non-assimilation of both imperfective /t-/ and detransitivizing /t-/ before such sounds means that the attachment of either prefix will result in identical forms. We have said that form II verbs take the detransitivizing prefix to produce form V verbs, and that from III verbs take the same prefix to yield from VI verbs. These forms (i.e. form II and form III), however, can also take the imperfective prefix to indicate the second person singular or the third person feminine singular. For example, *tʕallim* could mean either 'he learned' or 'you teach'. Likewise, *tɣajjir* could be understood either as 'you change' or 'he changed'. Thus it seems that speakers of the dialect insert a vowel so that distinction between imperfective *t-* and detransitivizing *t-* is maintained. In other words, a vowel is inserted after detransitivizing /t-/ but not after imperfective /t-/. This gives us *təʕallim* and *tʕallim* respectively; consequently, ambiguity is avoided.

The fact that imperfective /t-/ can be attached to verb forms II and III without triggering vowel epenthesis (and without assimilation, of course) means that the trigger of epenthesis is semantic rather than phonetic.

It should be pointed out that this total assimilatory process is restricted only to detransitivizing /t-/. As we have seen in the previous section, imperfective *t-* undergoes partial (rather than total) assimilation to [+voice] obstruents. Moreover, no assimilation takes place when /t/ is a morpheme-internal segment, e.g. *hatʃa* 'gap-toothed f.s.', *natʃa* 'bite n.' *matʒir*[3] 'shop'. Likewise, infix /-t-/ does not undergo assimilation to the obstruent sounds preceding it, e.g. /s-t-alam/ → [stilam] 'to receive', /ʒ-t-amaʕ/ → [ʒtimaʕ] 'to meet, /ʃ-t-aɣal/ → [ʃtaɣal] 'to work' (Sakarna 1999: 79). Lack of

[3] Abumdas (1985: 223) says that the phoneme /t/ in the word *matʒar* 'shop' (note that the final vowel in this word is [a] in the dialect described by Abumdas (Zliten dialect) but [i] in the present dialect) surfaces as [d] due to regressive voicing assimilation. Abumdas adds that this is the only instance where the phoneme /t/ undergoes assimilation inside the word. According to Abumdas, [tʒr] is the only root where /t/ occurs as first radical and /ʒ/ as second (ibid).

assimilation in the case of the infix -t-, indicates that the process under analysis is restricted both morphologically (by affecting only detransitivizing /t-/) and phonologically (by applying only regressively) (ibid). According to Watson (2002: 223), assimilation of the detransitivizing prefix to a following coronal obstruent is a lexical process.

The argument so far has shown that /t/ assimilates to the following coronal obstruent. It could, conversely, be argued that assimilation could have taken a different directionality, where the obstruent assimilates to the prefix rather than the other way around. However, assimilation of /t/ rather than assimilation of the obstruent is in harmony with the crosslinguistic tendency that regressive assimilation is more frequently attested than its progressive counterpart (See also the following chapter concerning the devoicing of the continuants /ʕ/ and /ɣ/.) In addition, an Arabic verbal root is composed of a number of consonants[4] which carry the basic meaning of the verb (Bauer 2003: 216). Assimilating the first segment in the stem instead of the prefix would, consequently, result in a change of the intended meaning or in a nonsense word. For example, let us attach the prefix to some of the forms in (7) above and see how the output of progressive assimilation would look like.

(10) t- + sallif → ttallif
t- + zaaħim → *ttaaħim
t- + ʃammis → *ttammis

Only the first of these three forms is well-formed semantically and phonetically. The other two, on the other hand, are phonetically accepted but they are ill-formed when meaning is taken into consideration. Thus it is clear that semantic recoverability plays an important role in this process.

[4] Of course, these consonants have vowels placed between them, for derivational and inflectional purposes. The basic meaning, however, is provided by the consonants rather than the vowels.

5.2.3 *The relevant constraints*

We saw in Chapter 3 above that assimilation of lateral /l/ of the definite article results from avoidance of an OCP violation. The same is true of the total assimilation of detransitivising /t/. McCarthy (1986: 208) defines the OCP as follows.

(11) Obligatory Contour Principle (OCP)
At the melodic level, adjacent identical elements are prohibited.

McCarthy argues, for example, that in Afar, a Lowland East Cushitic language, a vowel may be deleted in some environments (12a) but retained if the consonants surrounding it are identical (12b) (ibd: 220-21; see also Paradis and Prunet 1990: 456-57).

(12) a.	xamila	xaml-i	'swampgrass' (acc./nom.-gen.)
	ʕagara	ʕagr-i	'scabies'
	daragu	darg-i	'watered milk'
b.	midadi	*middi	'fruit'
	sababa	*sabba	'reason'
	xarar-e	*xarre	'he burned'

The starred forms in (12b) show that identical segments are not permissible by the OCP in Afar. The MLA examples we saw in (7) illustrate that /t/ assimilation results in identical adjacent consonants. On the face of it, this seems to contradict the requirement that identical adjacent segments should be avoided. However, as was mentioned in section (3.3) above, /t/ assimilation is the result of "an OCP violation on the coronal tier". This means that in the dialect under investigation geminate consonants are not banned altogether but the ban is restricted only to adjacent consonants that share the feature [+cor].[5]

[5] Recall from section (5.2.2) that this total assimilatory process is restricted to detransitivising /t-/. Imperfective /t-/ and infix /-t-/ do not undergo such a process. Likewise, assimilation of /t/ does not take place when this coronal voiceless stop is a morpheme-internal segment (see also assimilation of definite article /l-/ in chapter (3) above).

It is relevant here to add that the OCP does not function solely as a blocker of phonological processes, but it may also be a trigger of some other phonological processes (Yip 1988: 65). Yip says that different types of repair strategies can be used to resolve an OCP violation. These include degemination, dissimilation, assimilation, epenthesis, and metathesis (ibid: 73-74). Fukazawa (1999) reviews Yip's analysis and states that languages can be classified into four kinds concerning OCP on features, as follows (p. 27; see also Fukazawa and Kitahara 2001: 100):

(13) Typology of the OCP effects on features

Type 1 language:	OCP violation is observed.
Type 2 language:	OCP violation is not allowed, and featural fusion takes Place. (Dissimilation & Assimilation)
Type 3 language:	OCP violation is not allowed, and feature deletion and feature insertion both occur. (Dissimilation)
Type 4 language:	OCP violation is not allowed, and feature deletion leads to segmental deletion. (Deletion)

The Afar examples in (12) represent an instance of OCP blocking effects. The process under analysis, by contrast, is an example of the triggering effect of the OCP. The ban on adjacent coronal consonants could be stated in OT terms as in (14).

(14) OCP [cor]
Adjacent [+cor] consonants are prohibited, unless they are identical.

This constraint excludes consonants that have the feature [+cor] in common but are otherwise different. Again, this conflicts with IDENT-IO, militating against differences between input and output forms.

(15)

Input: t- sallif	OCP[cor]	IDENT-IO
a. ☞ ssallif		*
b. tsallif	*!	

Candidate (15a) is optimised as it is in conformity with the top ranked constraint. Its rival (15b), on the other hand, is rendered ungrammatical as it begins with two adjacent non-identical [+cor] segments.

5.2.4 *Alternative strategies*

It is now time to have a look at the potential ways the dialect could have used to prevent an OCP violation resulting from adjacency between detransitivizing /t-/ and a following coronal obstruent.

5.2.4.1 *Vowel insertion*

The first strategy the dialect could have resorted to is inserting a vowel between the two adjacent members of the disallowed sequence. As we saw previously, the high front vowel is usually epenthesised to avoid coda consonant clusters that violate the Sonority Principle. Inserting this vowel separates the prefix from the next coronal obstruent, and thus OCP violation is avoided. This, however, would yield unattested forms like *[tisallif]. The ungrammaticality of this form results from a violation of the anti-epenthesis constraint DEP. The fact that the dialect prefers assimilation to epenthesis means that the dialect ranks DEP higher than I**DENT**-IO.

(16)

Input: t- sallif	DEP	I**DENT**-IO
a. ☞ ssallif		*
b. tisallif	*!	

Candidate (16b) is ruled out because of incurring a fatal violation to DEP. (16a) is chosen as the actual output as it respects the top-ranking constraint, although it is not ruled out by its lower-ranking opponent.

5.2.4.2 *Prefix deletion*

We have seen in section (5.1.3.3) above that regressive rather than progressive assimilation is resorted to because progressive assimilation would alter the first member of the root and would, as a result, affect the meaning of the relevant form. Likewise, when we consider deletion it is the prefix, rather than the first segment in the stem, that is likely to be deleted on the same grounds mentioned in section (5.1.3.2).

Deleting the prefix, however, would yield forms like **sallif* whose ungrammaticality can be attributed to disregarding the faithfulness constraint MAX. Note that an asterisk is placed before this form not because it violates any phonotactic or semantic constraints. The form is acceptable both semantically and phonetically. The intended meaning, however, cannot be expressed unless the detransitivizing prefix is appended as assimilated. The form *sallif* (i.e without the prefix) means 'he lent', rather than 'he borrowed', which is achieved by prefixation and total assimilation of /t-/.

(17)

Input: t-sallif	MAX	IDENT-IO
a. ☞ ssallif		*
b. sallif	*!	*

As can be clearly seen, both candidate (17a) and candidate (17b) violate the bottom constraint. Nevertheless, only the second candidate is excluded as it does not respect MAX.

Let us now place all the constraints introduced thus far in one tableau and see how they interact to produce the correct output.

(18)

Input: t- sallif	OCP[cor]	DEP	MAX	IDENT
a. ☞ ssallif				*
b. tsallif	*!			
c. tisallif		*!		*
d. sallif			*!	*

Candidate (18a) respects all the top-ranking constraints and is thus chosen as the optimal candidate. Each of the three other candidates, on the contrary, incurs a violation of one of these top constraints and is excluded as a result. It is obvious that all candidates, apart from completely faithful (18b), violate the bottom constraint IDENT. This constraint is, therefore, placed at the bottom of the hierarchy.

Chapter 6. Regressive Devoicing of /ʕ/ and /ɣ/ and Progressive Assimilation of /h/

This chapter deals with the process whereby uvular /ɣ/ and pharyngeal /ʕ/ devoice when they occur before suffixes that begin with laryngeal /h/. In such an environment /ɣ/ devoices to [x] while /ʕ/ surfaces as [ħ]. In fact, not only do these two sounds change to some other sounds, the /h/ following them also changes its point of articulation to surface as [ħ] or as [x], e.g. /*minaʕ-hum*/ → [*minaħħum*] 'he prevented them', /lidaɣ-ha/ → [lidaxxa] 'it bit/stung her'. Before seeing how these processes work in the dialect under analysis, we will have a look at them in other varieties of Arabic.

6.1 Devoicing and Assimilation in other Arabic Varieties

This phenomenon is found widely across dialects of Arabic. Generally speaking, however, in Classical Arabic and Modern Standard Arabic vowels that indicate tense and case[1] occur between the stem-final segment and the /h/ with which the suffix begins and thus no assimilation occurs, e.g. *samiʕ**a**ha* 'he heard her', '*difaaʕ**u**ha* 'her defence', *ballaɣ**a**hum* 'he informed them'. In fact, these vowels prevent assimilation not only across a morpheme boundary but also when two words are involved, e.g. *samiʕ**a** hanaaʔ* 'he heard Hana', *yasmaʕ**u** hanaaʔ* 'he hears Hana'. This is true only of the present and past tenses. The imperative form of the verb, on the other hand, is vowelless as the imperative mood is *majzuum* 'jussive' (Fassi Fehri 1993: 164; Benmamoun 2000: 20; Ryding 2005: 616). Since no vowel intervenes between stem-final /ʕ/ or /ɣ/ and the

[1] Of course, vowels indicating tense are attached to the end of verbs, while case vowels are appended after nouns.

following /h/, assimilation takes place. This can be illustrated using forms like /ʔismaʕ-ha/ → [ʔismaħħa] ‘listen to her!’, /balliɣ-hum/ → [ballixxum] ‘inform them!’

Sibawayh (1982: 449), however, says that this process is optional rather than compulsory. Thus *ʔiqṭaʕ hilaalan* “shun Hilal!” may alternate with *ʔiqṭaħ ħilaalan*, where the two sounds at the end of the first word and the beginning of the second influence one another. Sibawayh believes that the unassimilated pronunciation is “better” (ibid).

Al-Nassir (1993: 64) cites the form /maʕahum/ changing into [maħħum] ‘with them’. However, it is obvious that in the former form a vowel intervenes between the /ʕ/ and the following /h/ and, consequently, assimilation cannot possibly occur to produce the latter form. Al-Nassir’s book (originally a PhD thesis) is a “critical study of the phonetic and phonological theory of Sibawayh as presented in his treatise Al-Kitab”. In the original treatise, however, Sibawayh cites the form as [maħħum] (i.e. without the low vowel /a/) and clearly relates it to a particular variety of Classical Arabic, namely that of the Banu Tamiim tribe. It is clear that speakers of that CA variety did not insert a vowel between these two consonants, as evidenced by the form we have just mentioned as well as by the prepositional phrase *maʕ haaʔulaʔ* which is pronounced as [maħ ħaaʔulaʔ] ‘with these’ (Sibawayh 1982: 450). In fact, Sibawayh cites these two forms and says that members of the Banu Tamiim tribe used them instead of the forms [maʕahum] and [maʕa haaulaʔ][2], respectively (ibid). The examples listed so far illustrate that this assimilatory process takes place both across a morpheme and word

[2] In the Arabic orthography, vowels can be indicated by means of diacritics placed over or under certain letters. In this case, the diacritic “ ـَ ”, representing the short vowel /a/, is used over the letter ع (which corresponds to the sound /ʕ/) both in the word مَعَهم ‘with them’ and in the phrase مَعَ هؤلاء ‘with these’.

boundaries with the jussive mood of the verb in most varieties of CA; it occurs word-internally, across a morpheme boundary and across a word boundary in a few varieties of CA. (The only CA variety I am aware of where such a process takes place word-internally and across a morpheme boundary with all verb forms is the one mentioned in this paragraph and referred to by Sibawayh (1982: 450), i.e. the Banu Tamiim dialect.)

Similar to the Banu Tamiim examples cited by Sibawayh, Alusstrabadi (1982: 276) refers to the (rare) recitation of the verse "faman zuħziʕ ʕaninnaar" '… and whoever is removed away from the Fire …' (Qur'an, Chapter 3, verse 185). The last sound in the second word of this verse is an underlying /ħ/. When this /ħ/ occurs immediately before /ʕ/, it undergoes regressive voice assimilation and surfaces as [ʕ]. In fact, this verse is most often recited as "faman zuħziħa *ʕaninnaar*", with the underlined vowel separating the two sounds and thus preventing assimilation of these otherwise adjacent segments (as we have seen in the preceding paragraph).

So in CA this process takes place only with the (vowelless) imperative form of the verb or in the speech of a particular group of people. In MLA, on the other hand, the process can be heard in all verb forms and tenses (present, past, and imperative). This is because this dialect, like other Arabic vernaculars, does not add vowels to the ends verbs or nouns to indicate tense or case.

Furthermore, when the order of this combination is reversed (i.e. when /h/ precedes /ʕ/), the outcome in CA is not the same as that in MLA. In the former variety, the result would still be a sequence of geminate [ħħ], e.g. /waajah ʕinabah/ → [wajaħ ħinabah] 'meet ʕinabah' (Al-Nassir 1993: 64-65). Conversely, in MLA a sequence of /h/ immediately followed by /ʕ/ would optionally surface as a geminate /ʕʕ/ with the

first segment assimilated to the second, e.g. /laagaah ʕaadil/ → [laagaaʕ ʕaadil] ‘Adel met him’, /duwaah ʕindi/ → [duwaaʕ ʕindi] ‘I have his medication’. Abumdas (1985: 144) cites the example /yakrah ʕammah/ → [yakraʕ ʕammah] ‘he hates his uncle’.

We have said that in CA a geminate [ħħ] is produced whether the order of the sequence is *hʕ* or *ʕh*. In the first case, Sibawayh argues, the first sound /h/ changes into [ħ] through regressive place assimilation; after that the second sound /ʕ/ undergoes progressive voicing assimilation to become [ħ] as well.

Shawish (1982) gives an autosegmental account of this process in Libyan Colloquial Arabic (LCA) and presents examples representing Tripoli, Misrata, and Benghazi dialects on the one hand and Derna dialect on the other. According to Shawish (1982: 12), the dialect spoken in the city of Derna (about 1300km east of Tripoli) differs from the other three main varieties of Libyan Arabic in that in addition to assimilating the /h/ in the suffixes to /ʕ/ and /ɣ/ this dialect assimilates the /-h/ to all the voiceless consonants it follows, e.g. /ħaraθ-ha/ → [ħaraθθa] ‘he ploughed it f.’, /ɣaras-ha/ → [ɣarassa] ‘he planted it f.’. As will be discussed below, however, this process is attested also in the speech of the inhabitants of Benghazi and Ajdabiya, among others. (Both cities are located to the west of Derna; Benghazi is about 300 km and Ajdabiya is approximately 450 km west of Derna.) Therefore, a more comprehensive term than *Derna dialect* is *Eastern Libyan Arabic* (ELA) (see Owens 1980, 1984; Mitchell 1952).

Furthermore, Shawish says that in Derna dialect the voiceless emphatic segments /ṭ/ and /ṣ/ do not trigger assimilation of /h/, unlike the other voiceless consonants. Thus, according to Shawish (1982: 13), phonetic forms like *[ħaṭṭa] ‘he put

it', *[xuruṣṣa] 'her earring', cannot be derived from the underlying forms /ħaṭ + -ha/ and /xuruṣ + -ha/ respectively. However, the blocking of assimilation here seems to be irrelevant to the presence of the feature [+covered], which Shawish uses to denote emphatic segments. The reason why /h/ does not assimilate to the /ṭ/ in /ħaṭ + -ha/ is that this /ṭ/ is actually a geminate rather than rather than a singleton. So, this form is in fact /ħaṭṭ + -ha/ underlyingly: blocking of /h/ assimilation to geminate consonants will be detailed in section (6.2.2) below. I could hear the form [ʔiħtiyaaṭṭa] 'her precaution' (for /ʔiħtiyaaṭ + -ha/) in the speech of a speaker from the North of Jordan. Likewise, I could hear the form /xabaṭ + -ha/ pronounced as [xabaṭṭa] 'he hit it f.' by a speaker from the Syrian city of Dar'a. Both varieties manifest similar assimilatory processes to those found in ELA. In both forms, the second /ṭ/ is obviously a product of /h/ assimilating progressively to /ṭ/. As for the form [xuruṣ + ha], the expectation is that assimilation will take place. For example, Owens (1984: 46) cites the example /xallaṣ + hin/ surfacing as [xallaṣṣin] (see also the first in the Qatari Arabic examples in (2) below).

Egyptian Arabic is another variety that manifests this process. Here /ʕ/ devoices into /ħ/ when "in the course of word formation" (Gairdner 1925: 54) it is immediately followed by not only /h/, as is the case in the Libyan Arabic dialect under investigation, but also by /t/. Two relevant examples are: *biħħa* 'sell it' (for *biʕha→ biħha →* biħħa)[3]; *bitaħtu* 'belonging to him' (for *bitaʕtu*) (ibid). As we will see below, the devoicing of

[3] Note that this complex form originally consist of the free morpheme /biiʕ/ and the suffix/-ha/. Egyptian Arabic syllables are either light (CV) or heavy (CVC or CVV). Superheavy syllable are allowed only in final positions (Abu-Mansour 1990: 168; Broselow 1992: 8; see also McCarthy 1979: 23). The concatenation of morphemes or the operation of phonological processes may result in a non-final superheavy syllable. When this happens, Egyptian Arabic resorts to shortening the vowel of the otherwise superheavy syllable, changing it into a heavy syllable (Abu-Mansour 1992: 53; Broselow 1992: 10). The shortening of closed syllables in non-final positions is a direct consequence of the "Bimoraicity Constraint", which requires syllables to be maximally and optimally bimoraic (Broselow 1992: 10).

/ʕ/ before a following /t/ is typical of Eastern Libyan Arabic dialects (which are geographically closer to Egypt) but not of the dialects spoken in the western part of Libya, including MLA. For example, in Eastern Libyan Arabic dialects a form like /aʕtaqid/ surfaces as [aħtaqid] 'I think'; a form like /ʔiʕtiraaf/ is realised as [ʔiħtiraaf] 'recognition/ confession', with /t/ in both examples causing the preceding /ʕ/ to devoice to [ħ].

According to Holes (1990: 277-78), Gulf Arabic displays such a process. Here, as well, /h/ becomes [ħ] when attached to words ending in /ħ/ or /ʕ/. The latter sound /ʕ/ devoices to [ħ] in a coalescent assimilatory process. This is evident from the following forms:

(1) /jirajjaħha/ → [jirajjaħħa] 'he relieves her'
/jiglaʕha/ → [jiglaħħa] 'he pulls it out'

These are the only examples given by Holes (1990). Holes adds that stem-final /ħ/ frequently causes a following /h/ to assimilate to it progressively, as when, for example, /saṭħ/ 'roof' + /hum/ 'their' surfaces as [saṭħħum] (p. 263). Holes adds that /h/ undergoes total progressive assimilation to the final consonants of the nouns and verbs to which it is suffixed, e.g. /ḍirbat-ha/ → [ḍirbatta] 'she hit her', /ʕaadaat-hum/ → [ʕaadaattum].

It should be pointed out that Holes says that "… /h/ assimilates to the final consonants of the verbs and nouns to which it is attached …" This implies that /h/ assimilates to all consonants. However, as we have just seen from Holes' examples (as well as other examples cited here), only [-voice] consonants cause this /h/ to undergo assimilation.

This process is operative in Qatari Arabic as well. Al-Sulaiti (1993: 154) presents examples in which /h/ in the pronominal clitic *-hum* 'theirs' and *-ha* 'hers' undergoes total regressive assimilation to all the voiceless obstruents it follows. This is similar to what is found in Eastern Libyan Arabic (the variety referred to as "Derna dialect" by Shawish (1982)). Al-Sulaiti says that this rule is "simply a delinking of all the laryngeal features" and believes that it lends further support to dividing the features into laryngeal and supralaryngeal. This can be seen in the following examples:

(2) /xallaṣ-hum/ → [xallaṣṣum] 'he finished them'
/ʃeex-hum/ → [ʃeexxum] 'their sheikh'
/ʃigaħ-ha/ → [ʃigaħħa] 'he jumped over it'

Al-Sulaiti gives examples of /-h/ assimilating to all voiceless obstruents. Here, however, only three of her examples have been carefully selected. The first example represents assimilation of /-h/ to the voiceless emphatic /ṣ/, a process which is non-occurring according to Shawish (1982: 13). The last two are similar to what is found in the dialect under investigation. Al-Sulaiti, however, does not deal with /h/ when it is preceded by pharyngeal /ʕ/ and uvular /ɣ/.

Kabrah (2011) deals with regressive voicing assimilation in Cairene Arabic. She maintains that adjacent obstruents are required to agree in voicing in that variety of Arabic. She further deals with the class of guttural sounds and divides them into three groups: laryngeals /ʔ, h/, uvulars /x, ɣ/ and pharyngeals /ħ,ʕ/. Kabrah concludes that the laryngeals /ʔ/ and /h/ as well as the pharyngeal /ʕ/ behave as sonorants since they neither devoice nor cause adjacent segments to undergo voicing assimilation. The uvulars /x/ and /ɣ/ pattern with obstruents: /ɣ/ becomes [-voice] in coda position before a voiceless obstruent and when /ɣ/ is in onset position, it spreads the [+voice] specification to a preceding obstruent. /x/ causes a preceding obstruent to devoice, and it

loses its voicelesness when followed by a voiced obstruent. The voiceless pharyngeal /ħ/, according to Kabrah, behaves in an interesting way. On the one hand, /ħ/ can remain voiceless when immediately preceding a voiced obstruent, and can thus be classified as a sonorant since it is exempt from the requirement that adjacent obstruents must agree in voicing. On the other hand, this voiceless pharyngeal causes an obstruent that occurs to its left to become [-voice], suggesting that it is an obstruent (2011: 29-31).

What is particularly relevant to our discussion in Kabrah's analysis is the behaviour of the voiced pharyngeal /ʕ/. In MLA, this sound does behave like sonorants in that (as we saw in the previous chapter) it does not trigger voicing in prefix /t/.[4] However, Kabrah's claim that /ʕ/ does not devoice can be called into question. Kabrah examines the behaviour of this sound when it precedes a voiceless obstruent (e.g. /muʕtaʔal/ → [muʕtaʔal] 'prison' *[muʕdaʔal]), and when it follows one (e.g. /mitʕallim/ → [mitʕallim] 'educated' *[midʕallim]). She further says that /ʕ/ does not become [-voice] when it is immediately followed by voiceless obstruents, e.g. [maʕṣara] 'juicer', [muʕtaʔal] 'prison'. But Kabrah does not tell us what happens to /ʕ/ when it is followed by voiceless /h/. In fact, /ʕ/ in Egyptian Arabic behaves exactly the same way it behaves in MLA; /ʕ/ devoices when it precedes /h/, especially when it occurs in a stem-final position and a suffix beginning with /h/ is attached to the stem. In addition, the voiceless pharyngeal /ħ/, resulting from the devoicing of /ʕ/, causes the following /h/

[4] It is, in fact, not just the prefix /t/ that fails to acquire the [+voice] specification from the voiced pharyngeal /ʕ/. This is also true of all [-voice] obstruents that occur before it, e.g. *tisʕidhum* 'it makes them happy' *tizʕidhum, *yaʃʕil* 'kindle/ignite'**yaʒʕil*, *makʕil* 'bungle!' **magʕil*.

to become /ħ/ as a result of progressive place assimilation to the preceding /ħ/[5]. This can be seen in Gairdner's example above: *biʕha→ biħha → biħħa* 'sell it'.

In addition to devoicing before /h/, Cairene /ʕ/ may devoice also before /t/; again see Gairdner's example *bitaħtu* 'belonging to him' (for *bitaʕtu*) (Gairdner 1925: 54). It should be pointed out that Gairdner states that he is dealing with Egyptian Arabic but does not state precisely which variety of Egyptian Arabic he is dealing with. However, a linguistically trained native speaker of Cairene Arabic has told me that this is exactly the case in her own speech as well as in the speech of inhabitants of Maadi, a suburb south of Cairo. According to this informant, unless in careful speech, *simiʕha* surfaces as *simiħħa* 'he heard her' and *kaʕka* is realised as *kaħka*.

I am not trying to reject Kabrah's conclusion that some gutturals can be classified as sonorants. Evidence in support of Kabrah's (as well as other researchers', e.g. Halle (1995) and Abu-Mansour (1996)) claim about the classification of gutturals as sonorants is provided in chapter (5) of this thesis. We have seen that the voiced laryngeal fricative /ʕ/ devoices both in Cairene Arabic and in MLA. Kabrah, however, builds her classification of /ʕ/ as a sonorant on the observation that /ʕ/ neither devoices nor spreads voice to voiceless obstruents. Only the second part of Kabrah's observation about /ʕ/ is true (i.e. the observation that it does not cause voiceless obstruents to become voiced). This is to say that, we cannot claim that a certain sound is [+sonorant] because it does not devoice. Sonorants may devoice in certain environments. For example, sonorant consonants may be deprived of voice in utterance-final position (Watson 2002: 252) in the Arabic dialects spoken in Cairo and Sana'a. The examples in

[5] Compare this with the MLA examples in (5b) below.

(3a) show how sonorants are devoiced in Cairene Arabic, while the examples in (3b) represent cases of sonorant devoicing in San'ani (ibid; see also Watson and Asiri 2007: 135).

(3)	a.	/ism/	[ism̥]	'name'
		/ʔifl/	[ʔifl̥]	'lock'
		/ʔabr/	[ʔapr̥]	'grave'
	b.	/kabiir/	[kabiir̥]	'big, old'
		/samn/	[samn̥]	'clarified butter, ghee'
		/ʕiyyaal/	[ʕiyyaal̥]	'boys, children'

Similarly, French /m/ becomes voiceless through progressive assimilation to a preceding /s/ or /t/, as in *asthme* [asm̥] 'asthma', *rythme* [ritm̥] 'rhythm' (Price 2005: 126).

Even vowels can devoice in the right context. In Japanese, for instance, the high vowels /i/ and /u/ surface without voice when flanked by voiceless consonants or when they precede a pause and follow a voiceless consonant, that is, in the configuration /C̥VC̥/ or /C̥V#/ (where the vowels are [+high]) (Kondo 2005: 229; Sugito 2005: 247).

In spite of the above argument that /ʕ/ does not spread voice to adjacent voiceless obstruents, Sudanese Arabic /ʕ/ seems to be behaving differently. In this variety of Arabic /ʕ/ may spread voice to a preceding obstruent, as in, for example, /tisʕa/ → [tizʕa][6] 'nine' (Mustapha 1982: 228, cited in Dickins 2007: 84).

It should also be stressed that /ʕ/ fails to spread voicing to obstruents but not to gutturals; across a word boundary, /ʕ/ may influence a preceding /h/. We have already

[6] According to Mustapha (1982: 228-9), Sudanese Arabic requires that the following voiceless consonants become voiced before phonetically voiced consonants: /f/, /t/, /ṭ/, /s/, /ṣ/, /š/, /k/, /x/ and /h/. Dickins (2007: 84) adds /č/ to this list. The following forms represent such voicing assimilation process (Mustapha 1982: 228-9, cited in Dickins 2007: 84) /nafzaʕ/ → [navzaʕ] 'we go to find wood to burn', /gaṣdak/ → [gaẓdak] 'your (m.sg.) intention', 'your (m. sg.) meaning' /maxzan/ → [maɣza] '(largish) shop'.

cited Abumdas's (1985: 144) example /yakrah ʕammah/ → [yakraʕ ʕammah] 'he hates his uncle'. Non-guttural obstruents, by contrast, do not assimilate in voice to /ʕ/ neither within the word nor across a boundary, e.g. [lasʕa] 'sting', [ħooʃ ʕammi] 'my uncle's house'.

Likewise, Watson (2002: 246) observes that /ʔ/ assimilates totally to a following /ʕ/. This can be seen in forms like /yuʔʕud/ → [yuʕʕud] 'he stays'. The same applies to /ħ/, e.g. *raaħ ʕalbeet → raaʕ ʕalbeet* (ibid). Note, however, that in the first example /ʔ/ assimilates totally to /ʕ/ within the word; in the second example, /ħ/ gets all the features of /ʕ/ across a word boundary.

Kenstowicz *et al* (2003: 276) classify pharyngeal /ʕ/ as an obstruent in Daragözü Arabic (spoken in Turkey). Daragözü devoices obstruents in word-final positions. Its obstruents also assimilate voice regressively. Jastrow (1973: 24) comments on Daragözü voicing assimilation saying that "If a voiced and voiceless consonant come in contact, then the group is uniquely voiced or voiceless such that the first consonant assimilates to the second" (quoted in Kenstowicz *et al* (2003: 276)).

(4) Daragözü regressive voicing assimilation (Kenstowicz *et al* 2003: 277)

	1st person	2nd person	3rd person
Singular masculine	[qᵃṭáħ-tu]	[qᵃṭáħ-t]	[qᵃṭáħ]
Singular feminine	[qᵃṭáħ-tu]	[qᵃṭáħ-te]	[qᵃṭáʕ-et]
Plural	[qᵃṭáʕ-na]	[qᵃṭáħ-to]	[qᵃṭáʕ-o]

In this paradigm for the verb /qataʕ/ 'kill', /ʕ/ devoices to [ħ] in the expected positions, i.e. word-finally and before a voiceless consonant.

6.2 Devoicing and Assimilation in MLA

It is now time to see how this process works in the dialect under scrutiny. Representative examples are listed in (5)

(5) a. /ʕaam+ -ha/ → [ʕaamha] ‘her year’
/kitab+ -ha/ → [kitabha] ‘he wrote it f.’
/ʃaaf+ -ha/ → [ʃaafha] ‘he saw her/ it’
/xaal+ -ha/ → [xaalha] ‘her maternal uncle’
/liħas+ -ha/ → [liħasha] ‘he licked it f.’
/daar+ -ha/ → [daarha] ‘her room’
/rikan+ -ha/ →[rikanha] ‘he put it aside’
/rifaḍ+ -ha/ → [rifaḍha] ‘he refused her/it’
/sirag+ -ha/ → [siragha] ‘he stole it f.’

But

b. /draaʕ+ -ha/ → [draaħħa] ‘her arm’
/simaʕ+ -ha/ → [simaħħa] ‘he heard her/it’
/raʒʒaʕ+ -ha/ → [raʒʒaħħa] ‘he returned it f.’
/farriɣ+ -ha/ → [farrixxa] ‘he emptied it’
/balliɣ+ -ha/ → [ballixxa] ‘he informed her’
/daɣdiɣ+ -ha/ → [daɣdixxa] ‘he tickled her’

The data sets in (5) show that the suffix *-ha* represents the third person singular feminine object pronoun or possessive pronoun morpheme (Shawish 1982: 10). In the examples in (5a), this suffix is preceded by both voiced and voiceless sounds and no assimilation takes place. However, in the examples in (5b) we can see that /ʕ/ alternates with /ħ/ while /ɣ/ alternates with /x/. It should be observed that the alternating sounds share the same place of articulation: both /ʕ/ and /ħ/ are pharyngeal sounds, while both /ɣ/ and /x/ are uvular.

Now, from the examples in (5b) above we see that /ʕ/ and /ɣ/ devoice to /ħ/ and /x/, respectively, and when they become adjacent to a following /h/ this /h/ assimilates totally to them, resulting in a sequence of [ħħ] or [xx].

It can be seen that the /h/ of the appended suffix /-ha/ undergoes total assimilation to the preceding /ħ/ or /x/ both when these result from the devoicing of /ʕ/ and /ɣ/, as listed in the suffixed forms in (5b), and when they are underlying, as can be seen in the following examples:

(6)

/ʃiraħ+ -ha/ → [ʃiraħħa]	'he explained it f.'
/ribaħ+ -ha/ → [ribaħħa]	'he won id f.'
/miftaaħ+ -ha/ → [miftaaħħa]	'her key'
/dawwix+ -ha/ → [dawwixxa]	'he made her dizzy'
/wabbix+ -ha/ → [wabbixxa]	'he reprimanded her'
/maṭbix+ -ha/ → [maṭbixxa]	'her kitchen'

The processes mentioned above are strongly related. That is devoicing of /ʕ/ and /ɣ/ occurs only in the presence of the following /h/. Moreover, the assimilation of this /h/ results from devoicing. Thus the two processes do not seem to take place independent of one another.

We will first deal with the devoicing of /ʕ/ and /ɣ/. Again, if we focus on the feature specifications for the sounds involved in the voice assimilation, we see that they are characterised by the following features:

(7)

/ʕ/	/ħ/	/h/
[+*pharyngeal* +*voice* +*cont*]	[+pharyngeal -voice +cont]	[+*laryngeal* −*voice* +*cont*]

Thus /ʕ/ retains all its features except for the feature [voice]. That is, it loses its voice feature under the influence of the following /h/, which is [-voice]. As these feature matrices show, the sound triggering change (i.e. /h/) is specified as [+laryngeal] while the sound that undergoes change (i.e. /ʕ/) has the place feature [+pharyngeal]. The same is true of the alternation between /ɣ/ and /x/ in the vicinity of /h/. Here as well the

alternating sounds differ in voicing (/ɣ/ is [+voice], /x/ is [-voice]) but share the same place of articulation (both are uvular).

6.2.1 *The relevant constraints*

The constraints responsible for this process can be formulated as follows:

(8) *Clash voice cont.
Adjacent continuants must agree in voicing.

(9) I**DENT**Voice
Input and output must have the same voice values.

The markedness constraint in (8) tries to guarantee that adjacent continuant sounds have the same voicing features. On the other hand, the faithfulness constraint in (9) militates against output forms which have voice features that are different from their input counterparts. Tableau (10) demonstrates the interaction taking place between the two constraints:

(10)

Input: simaʕ-ha	*Clash voice cont	I**DENT** Voice
a. ☞ simaħħa		*
b. simaʕha	*!	

Candidate (10a) survives because it does not violate the top constraint, as opposed to candidate (10b) which is ruled out due to incurring a violation of this constraint.

The question that should be answered at this stage is why it is the first sound that devoices rather than the second sound voicing. The answer to this question might be attributed to the fact that in MLA, in accordance with the crosslinguistic observation, regressive assimilation is much more frequent than progressive assimilation.

Let us now pay more attention to the total assimilation of /h/ to the preceding /ħ/ or /x/. As already stated, /h/ assimilates totally to the preceding voiceless sounds /ħ/ and /x/ both when they are underlying and when they result from the devoicing of /ʕ/ and /ɣ/ respectively. The examples representing such an assimilatory process are listed in (5b) and (6) above. Some of these examples are repeated in (11a & 11b) for ease of reference:

(11) a. /draaʕ+ -ha/ → [draaħħa] 'her arm'
/simaʕ+ -ha/ → [simaħħa] 'he heard her/it'

/farriɣ+ -ha/ → [farrixxa] 'he emptied it'
/balliɣ+ -ha/ → [ballixxa] 'he informed her'

b. /ʃiraħ+ -ha/ → [ʃiraħħa] 'he explained it f.
/miftaaħ+ -ha/ → [miftaaħħa] 'her key'
/wabbix+ -ha/ → [wabbixxa] 'he reprimanded her'
/maṭbix+ -ha/ → [maṭbixxa] 'her kitchen'

In these examples, the laryngeal sound /h/ alternates with the pharyngeal /ħ/ and the uvular /x/. The three sounds mentioned here have the same features, except that for place of articulation. Thus /h/ acquires this place feature from preceding /ħ/ and /x/ and becomes identical to them. This is, of course, an instance of progressive assimilation where a sound becomes more like a preceding sound.

The constraints governing this process are similar but not identical to those responsible for the devoicing of /ʕ/ and /ɣ/ before /h/, stated in (8) and (9) above. The difference between them is that those constraints militate against voice clashes between adjacent continuants. The constraints we will mention now, on the other hand, impose restrictions on clashes in place of articulation between these adjacent continuants. These can be stated as in (12) and (14) below:

(12) *CLASH PLACE CONT.
Adjacent continuants must have identical place features.

6.2.2 *Classifying the continuants further*

The constraint in (12) requires adjacent continuants to have the same place features. Nevertheless, looking at more examples shows that the dialect has some forms in which adjacent continuants may have different places of articulation. For instance, consider the following forms:

(13)	ʕafsa	'footprint'
	ʕaṣfuur	'sparrow'
	maʒruuħ	'wounded'
	masħuur	'bewitched'

In these examples, we see that continuant sounds of different places of articulation occur next to one another. Thus we seem to have a paradoxical situation here.

This paradox can be dealt with if we further classify continuant sounds into those that are articulated inside the mouth cavity as opposed to the ones produced outside this cavity. The former group of sounds can be referred to as "non-guttural" sounds while the latter group can be referred to as "guttural"[7]. (cf. sections 4.2 & 5.1.2 above) The adjacency restriction seems to apply only to guttural sounds[8].

Building on this classification, it is necessary that we modify the constraint introduced in (12), so that only guttural sounds are included. This constraint can be rephrased as in (14).

[7] Shawish (1982) refers to these as groups of sounds as "buccal" and "non-buccal", respectively.

[8] [x] and its voiced counterpart [ɣ] are typically uvular in Libyan Arabic (Mitchell 1960: 370; Shawish 1982: 8; Elgadi 1986: 6; Harrama 1993: 21). Ghalib 1984: xii; Heath 1987: 14; Ingham 1994: 15; Zawaydeh 1999: 15, and Bin-Muqbil 2006: 41, 53 also classify these sounds as uvular ones in Iraqi Colloquial Arabic, Moroccan Colloquial Arabic, Najdi Arabic, Ammani-Jordanian Arabic and MSA, respectively. Gairdener (1925: 15) lists them with the velar sounds in (classical) Arabic.

(14) *CLASH PLACE [+GUTTURAL] CONT (*CLASH PLACE, for short).
Adjacent guttural continuants must have identical place features.

This constraint is in competition with I**DENT**-IO which requires input and output forms to be the same.

All the examples listed so far illustrate that the markedness constraint outranks its faithfulness rival. We can see the contest between these opposing constraints by looking at this tableau:

(15)

Input: wabbix-ha	*CLASH PLACE	I**DENT**-IO
a. ☞ wabbixxa		*
b. wabbixha	*!	

Given the fact that regressive assimilation is crosslinguistically much more common than progressive assimilation, the question arises as to why it is the following sound (i.e. /h/) that undergoes change rather than the preceding sound (i.e. /ħ/ or /x/). The answer is quite simple; if we changed the first sound instead of the second, we would end up having the ill-formed forms, for example, *[ʃirahha] or *[maṭbihha] (cf. the first and last examples in (11b.) above).

It should be emphasised that the constraint militating against the clash in place of articulation feature applies only when we have two adjacent guttural sounds. This constraint does not hold when a guttural sound is adjacent to a non-guttural one, as the following examples illustrate:

(16) maɣsila ‘laundry’
masħuun ‘minced’
fxaad ‘thighs’
ʃiɣʃiir ‘a pair of socks’

Elgadi (1986: 60) presents a general constraint which he dubs the "Adjacency Structure Constraint (ASC)". This constraint bans the uvulars or pharyngeals /x, ɣ, ħ, ʕ/ from being adjacent within the same syllable. This is stated as in (17).

(17) **Adjacency Structure Constraint Principle[9]:**
No uvular or pharyngeal sound segments can be adjacent within the same syllable

The pharyngeal and uvular sounds (e.g. a sequence of [ħħ] or [xx]) presented here do not disobey this requirement as they are heterosyllabic rather than tautosyllabic.

Owens (1984: 45-46) cites examples of /h/ assimilating to preceding guttural continuants in ELA, as in /nifaʕ + ha/ → [nifaħħa] 'he benefited her'. Owens adds that in this Libyan Arabic variety /h/ assimilates to all preceding voiceless sounds not just to the guttural continuant ones mentioned earlier[10]. This can be seen in the following examples (ibid: 46).

(18) sho:k + ha → sho:kka 'its (f) thorns'
shifit + hum → shifittum 'I saw them (m)
shamis + ha → shamissa 'its sun'
kfu:f + hum → kfu:ffum[11] 'their palms (of hands)'

Owens further observes that if the final voiceless consonant is a geminate, no assimilation takes place. For example, *daff + ha → daffha* 'he pushed it f.', where *ff* blocks assimilation (ibid), c.f. /ħaṭṭ + -ha/ in the previous section.

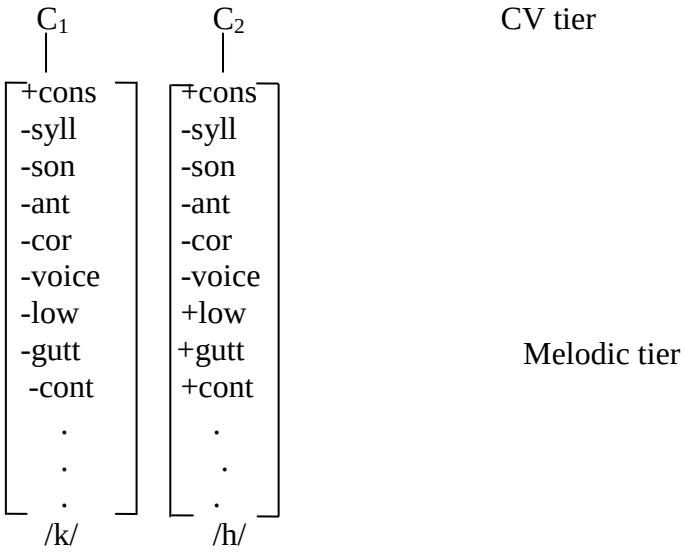
[9] In the original source (Elgadi 1986) the principle in (17) is called "Adjaceny Structure Constraint **Rule**". It is, however, more appropriate to call it a 'principle' rather than a 'rule'.

[10] I noticed this assimilation also in the pronunciation of a native speaker of Egyptian Arabic, and inhabitant of Maadi in the southern part of Cairo. This speaker, however, assimilates /-h/ only to voiceless fricative; she told me that this pronunciation is dominant in the area where she lives. Thus in this variety of Egyptian Arabic, we can find alternations like: /muʃrif + -ha/ → [muʃriffa] 'her supervisor', /darris + -ha/ → [darrissa] 'he taught her', /xarbiʃ + -ha/ → [xarbiʃʃa] 'he scribbled it', etc. According to the same speaker, this sort of pronunciation is also characteristic of the speech of inhabitants of Upper Egypt.

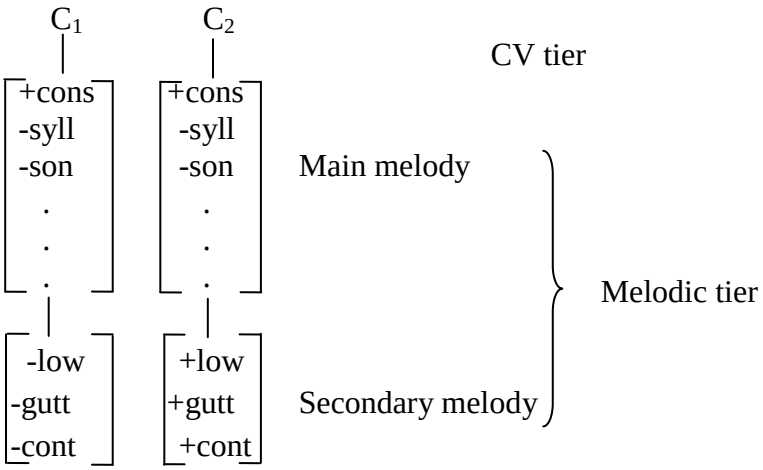
[11] In Owens (1984) this word is written as *uxfu:f + hum → uxfu:ffum*. However, I think the correct forms are the ones cited in (18).

We now need to see why geminates block assimilation. Abu-Salim (1988) gives an autosegmental analysis of consonant assimilation in Arabic. He argues that both partial and total assimilation are the same in their manner of application and can be dealt with using the same mechanism whereby the melodies of the assimilated consonants are decomposed and then the secondary melody of the triggering consonant is linked with the main melody of the consonant that undergoes assimilation. For example, the total assimilation of /h/ to a preceding /k/ we have just presented in (18) goes on as follows (c.f. Abu-Salim 1988: 61).

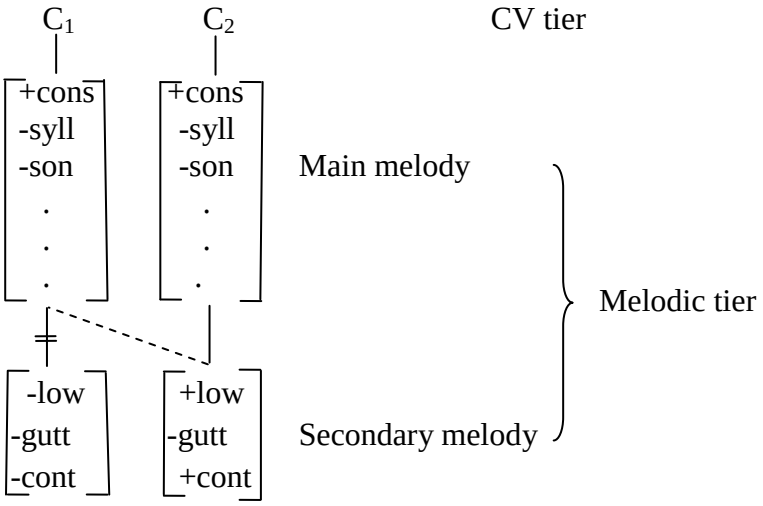
(19) a. Underlying representation



b. Tier decomposition



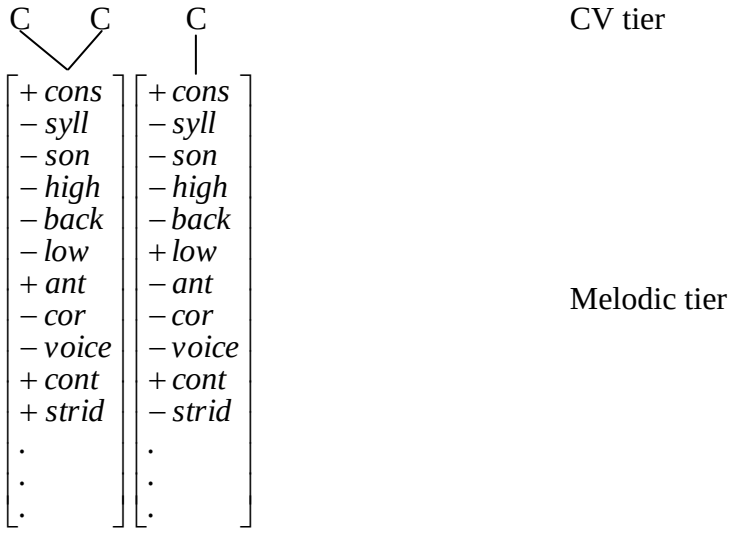
c. Assimilation/ spreading



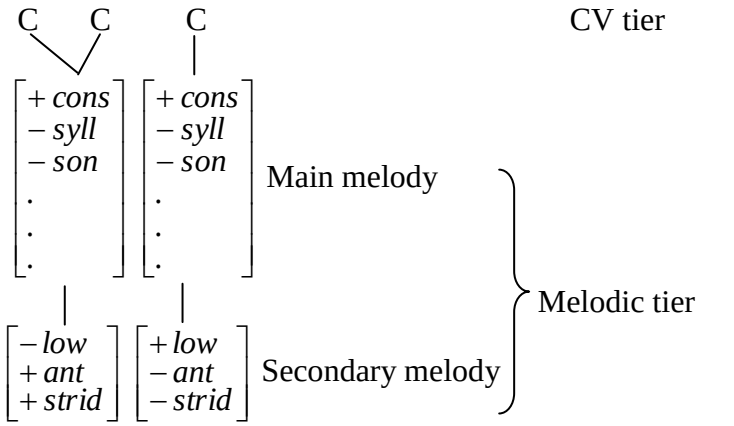
Here the OCP should be allowed to act on the result of the assimilation so that sequences of identical melodies are disintegrated into one melody (See the representations in (22).)

Abu-Salim, however, says that this analysis fails to block the assimilation of /h/ to the geminate consonant in *daff-ha* as assimilation rules "refer to the melodic tier, the others being irrelevant. The underlying representation of the intervocalic consonant cluster meets the requirements of /h/ assimilation" (p: 61). However, if this assimilatory process takes place, it will give rise to the ill-formed structure **daff-fa*, as can be seen in the following derivation:

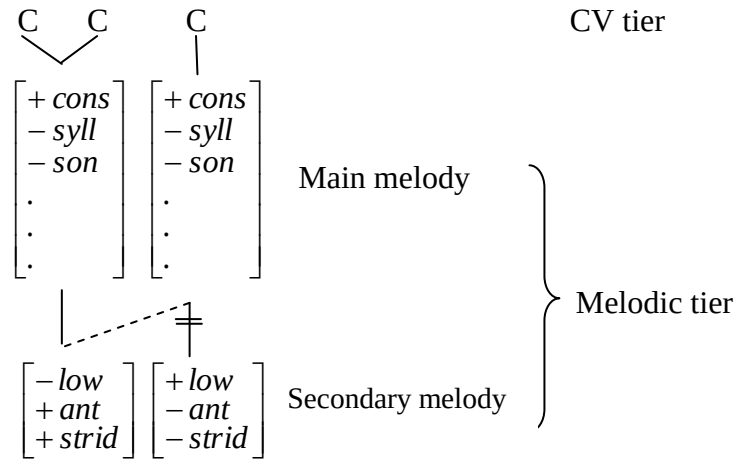
(20) a. Underlying representation



Tier decomposition



Assimilation



The failure of assimilation to take place can be attributed to the fact that there is no "three-way length contrast in Arabic" (Abu-Salim 1988: 60). Segments can be

represented only in a one-way or two-way length-contrast, as they can only be long or short but not overlong. Put differently, we cannot find a single feature matrix that is associated with more than two elements of the CV tier (ibid). The different representations of short and long segments can be illustrated schematically as in (21a-b) and (22a-b). A short segment (vowel or consonant) is represented as in (22) in which one feature matrix is associated with only one element of the CV tier.

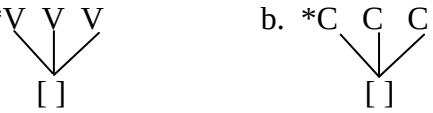
(21) a. Short vowel b. Short consonant

Long segments (vocalic or consonantal), by contrast, are given the representation in (22a-b) in which one feature matrix is connected to two identical adjacent parts of the CV tier.

(22) a. Long vowel b. Long consonant

The enforcement of the OCP in the derivations in (19) and (20) creates multiply-linked structures like the ones in (23a) and (23b) respectively:

(23) a. *V V V b. *C C C



Because overlong structures like the one in (23) do not occur in Arabic, and because phonological rules are not expected to result in incorrect forms, Abu-Salim argues that the ill-formed structure in (23) is prohibited by a ban on triply-linked structures that can be stated as a condition on assimilation rules as follows.

(24) Assimilation is blocked if it would create triply-linked melodies.

Both this condition on assimilatory processes and the OCP jointly explain the blocking of assimilation on words ending in a geminate consonant such as *daff-ha*[12].

Other phonological processes fail to apply if they would create a triply-linked sequence. For example, Damascene Arabic syncopates a schwa (which may be the result of reducing a nonlow vowel) in an open syllable: (McCarthy 1986: 241; Abu-Salim 1988: 63):

(25)	a.	btəskon	(for *bitəskon*)	'you (m. sg.) dwell'
		btəskni	(for *bitəskni*)	'you (f. sg.) dwell'
	b.	bisaaʕed		'he helps'
		bisaaʕdu		'they help'

However, syncope is inapplicable if it would yield clusters of three identical consonants, as can be seen in the following forms:

(26)	a.	bisabbeb	'he causes'
		bisabbəbu	'they cause'
		*bisabbbu	
	b.	taxaṣṣoṣ	'specialization'
		taxaṣṣəṣak	'your (m. sg.) specialization'
		*taxaṣṣṣak	

Moreover, no syncope is witnessed if it would result in three nongeminate consonant clusters that would become identical through assimilation (McCarthy 1986: 242).

[12] Assimilation is not the only phonological process that fails to affect geminates. Other processes also fail to apply when geminate segments are involved. For example, Tiberian Hebrew has a rule of spirantization which changes stops into fricatives post-vocalically, e.g. kâθaβ 'he wrote', mixtâβ 'letter'. Spirantization, however, is blocked when the stops are geminates, even if they occur post-vocalically, e.g. giddel 'he raised (educated)': *gððel, *giðdel, *giðel (from underlying / giddel/) (Keer 1998: 151-52). Keer says that he has found no language where spirantization can have any effect on geminates. In addition to the inapplicability of Spirantization to geminates, vowel epenthesis also fails to affect such a sequence. For a detailed discussion of this issue, see Guerssel (1978); Frajzyngier (1980); Goldsmith (1990), among others.

(27) a. madd + et ‘she stretched’
maddəto ‘she stretched it’
*maddto → *mattto

b. ħaṭṭ + et ‘she put’
ħaṭṭəto ‘she put it (m.)’
*ħaṭṭto → *ħaṭṭṭo

c. faḍḍ + et ‘silver of’
faḍḍəto ‘his silver’
*faḍḍto → *faṭṭṭo

To account for the inapplicability of phonological processes that may result in triply-linked structures, Abu-Salim (1988: 64) extends the constraint introduced in (24) and rephrases it as in (28).

(28) Phonological rules are blocked if they would ultimately create triply-linked melodies.

The discussion so far can be translated in OT terms into a markedness constraint militating against triply linked structures. This is stated in (29).

(29) *TRIPLY-LINKED
Triply-linked structures are banned.

(30)

Input: daff -ha	*triply-link	IDENT-IO
a. ☞ daff-ha		
b. dafffa	*!	

Candidate (30b) assimilates /h/ to the preceding voiceless consonant; however, it is ruled out on violating higher ranked *TRIPLY-LINKED, unlike candidate (30a) which fails to make /h/ agree with the consonant preceding it but is optimised as it respects the higher ranked constraint.

Conclusion

This thesis has dealt with assimilation as attested in the variety of Libyan Arabic spoken in the city of Misrata, Libya. The study has been divided into two parts, comprising a total of six chapters. The first chapter presented the language investigated, reviewed the related literature and indicated the significance of the study. The sound system of MLA has also been introduced in this chapter. The second chapter has shed light on the topic of the study (assimilation) and on OT, the framework within which the study has been conducted.

The third chapter has dealt with total assimilation of lateral /l/, especially /l-/ of the definite article. It has been shown that /l-/ assimilates to a following coronal segment and that this assimilation is triggered by avoidance of an OCP violation on the coronal tier (Watson 2002). It has also been shown that /l-/ assimilation is not restricted to the definite article, contrary to what some researchers claim (e.g. Owens 1984; Abu-Mdas 1985; Harrama 1993). The segment /l/ in the homophonous morpheme /ʔil-/ 'for/to' undergoes total assimilation to the coronal sonorants it precedes. Thus this /l/ behaves differently from the /l/ of the definite article. The former assimilates solely to [+coronal] sonorants, whereas the latter assimilates to all coronal consonants (i.e. 'solar' consonants) regardless of sonority.

Chapter four has been allocated to dealing with assimilation of nasal /n/. This alveolar nasal assimilates either partially or totally. Partial assimilation takes place both word- internally and across a word boundary when /n/ immediately precedes the obstruents /b/, /k/, /g/ and /f/. Total assimilation, on the other hand, is attested only across a word boundary when /n/ occurs before a sonorant consonant.

Note, in this respect, that Aurayieth (1982: 60) argues that "sonorant sounds do not usually cluster in spoken Libyan Arabic." However, examples presented in this study illustrated that this is a sweeping statement. The ban on the clustering of sonorants is in fact restricted to a sequence of the alveolar nasal and a following sonorant consonant /m, l, r/. Other sonorants can be adjacent both word-internally and across a word boundary.

The fifth chapter has focused on the assimilation of imperfective /t-/ and detransitivizing /t-/. The former becomes [+voice] when prefixed to words beginning with a voiced obstruent; the latter assimilates all the features of a following coronal obstruent. The behaviour of the imperfective prefix lends support to some researchers' classification of guttural consonants as sonorant segments (cf. Halle 1995, Abu-Mansour 1996, Kabrah 2011).

Finally, the sixth chapter has presented an analysis of the regressive voicing assimilation of the continuant gutturals /ʕ/ and /ɣ/ and progressive place assimilation of suffixal /-h/. All the sounds involved in this process are [+guttural]. Guttural segments are therefore shown to be behaving as an independent class whose members are required to share place and voice specifications when they are adjacent.

List of the constraints and their overall rankings argued for in the thesis

Chapter 3

OCP » IDENT-IO

ROOT-IDENT » OCP » IDENT-IO

OCP, DEP-IO » IDENT-IO

OCP, MAX-IO, DEP-IO » IDENT-IO

Chapter 4

SHARE(F) » IDENT-IO

*nS » IDENT-IO

DEP-IO » IDENT-IO

LINEARITY » IDENT-IO

*nS, LINEARITY, DEP-IO » IDENT-IO

Chapter 5 (A)

SHARE(F) » IDENT-IO

DEP-IO» IDENT-IO

MAX-IO» IDENT-IO

IDENT(stem-initial)» IDENT-IO(prefix)

SHARE(F), DEP-IO, MAX-IO, IDENT(S-I)» IDENT(prefix)

IDPRESON-VOI» SHARE(F), MAX-IO, DEP-IO, IDENT(S-I)» IDENT(prefix)

Chapter 5 (B)

OCP » IDENT-IO p.141

DEP-IO» IDENT-IO p.141

MAX-IO» IDENT-IO p.142

OCP, DEP, MAX» IDENT

*Clash voice cont » I**DENT** Voice

*CLASH PLACE » I**DENT**-IO

*triply-link » I**DENT**-IO

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