المعهد الملكي للثقافة الأمازيغية
INSTITUT ROYAL DE LA CULTURE AMAZIGHE

Centre de l'Aménagement Linguistique

Khalid ANSAR

SIBILANTS IN AMAZIGH

2020

المعهد الملكي للثقافة الأمازيغية
ⵜⴰⵙⴷⵍⵙⵜ ⵜⴰⴳⵍⴷⴰⵏⵜ ⵏ ⵜⵓⵙⵙⵏⴰ ⵜⴰⵎⴰⵣⵉⵖⵜ
INSTITUT ROYAL DE LA CULTURE AMAZIGHE

Sibilants in Amazigh

Khalid Ansar

2020

Publications de l'Institut Royal de la Culture Amazighe
Centre de l'Aménagement Linguistique
Série : Etudes et Recherche N° 80

Titre
Sibilants in Amazigh

Auteur
Khalid Ansar

Editeur
Institut Royal de la Culture Amazighe

Impression
Editions OKAD - Rabat - 2020

Dépôt légal
2020 MO 0744

ISBN
978-9920-739-09-2

CONTENTS

Abbreviations and symbols

AAA	Ayt Atta Amazigh
ABA	Asht Bouyelloul Amazigh
Ant	anterior
Approx	approximant
AZ	Ayt Iznassen
c.g.	constricted glottis
Con	constraint
Cons / C	consonant
Cont	continuant
Cor	coronal
D	domain
Dep-IO	dependence of the output on the input
Dor	dorsal
e.g.	*exempli gratia*, for example
F	feature
FG	Feature Geometry
Fric	fricative
G cat	grammatical category
Gem	geminate
Gen	generator
GOCP	generalized obligatory contour principle
HSPG	half-spirantised partial geminate
i.e.	*id est*, that is, namely
I. F.	intensive form
Id	identity
Ident-IO	identity of input and output
IPA	International Phonetic Alphabet
Lab	labial
Lat	lateral
Liq	liquid
μ	mora

Max-IO	maximal correspondence between input and output
MF	minor features
Nuc	nucleus
Obs	obstruent
OCP	obligatory contour principle
OM	OCP-as-markedness
OT	Optimality Theory
p	prominence
P cat	prosodic category
Prog	progressive
R	rendaku
Rt	root
σ	syllable
Sib	sibilant
SL	supralaryngeal
Son	sonorant
Spir	spirantise
Str	strident
Surf. F.	surface form
Under. F.	underlying form
Uvu	uvular
V	vowel
Vc	voice
Vel	velar
Z. F.	zero form
α	alpha

“The job of the linguist, like that of the biologist or the botanist, is not to tell us how nature should behave, or what its creations should look like, but to describe those creations in all their messy glory and try to figure out what they can teach us about life, the world, and, especially in the case of linguistics, the workings of the human mind.”

Arika Okrent, in *The Land of Invented Languages : Esperanto Rock Stars, Klingon Poets, Loglan Lovers, and the Mad Dreamers Who Tried to Build a Perfect Language*.

INTRODUCTION

INTRODUCTION

This book is meant to provide a thorough treatment of sibilants in Amazigh, of most concern here sibilants of Asht Bouyelloul Amazigh (hereafter ABA). In particular, the work focuses on three salient phonological phenomena that largely condition the occurrence of sibilants in ABA roots. The first and the second phenomena are spirantisation and glide assimilation; the third is identity avoidance. Under spirantisation, the underlying dorsal stops *k* and *g* are mapped onto a whole range of consonants (/k/ > [ʃ] or [ç], /g/ > [ʒ] or [y]). Crucially, the choice of which segment spirantisation selects falls in large measure to constraint rankings as well as to the nature of the constraints posited. More often than not, the spirantised dorsal stop and the assibilated glide are conditioned by OCP constraints. Put more strictly, the identity avoidance exhibited by OCP constraints becomes operative when dorsal spirantisation or glide assimilation yields a derived sibilant within the confines of a root that already contains a sibilant. However, OCP effects are not observed unless the two sibilants, the derived sibilant and the underlying sibilant, lie to each other within a distance that knows principled limits. Specifically, identity avoidance effects obtain if the distance that holds between the two sibilants is Sib Sib or Sib ə Sib. Under these two distances, the strident feature of the derived sibilant is sacrificed if the two sibilants exhibit identity with respect to anteriority, and sometimes voice, or both. Put in another way, if the two sibilants that abut against each other within distances like Sib Sib or Sib ə Sib are different in terms of voice and anteriority, no identity avoidance is observed and the sibilants' features of stridency are preserved.

The analysis in this work is propelled by the tenets of Optimality Theory (henceforth OT), as conceived in Prince and Smolensky (1993) and McCarthty and Prince (1995). To accommodate the identity avoidance exhibited by sibilants in ABA, we appeal to the Generalized OCP (henceforth GOCP) as proposed in Suzuki (1998). The GOCP theory conflates insights from the classic OCP, as construed in Leben

(1973) and Goldsmith (1976), along with insights from identity and proximity effects displayed by identical or near-identical segments (cf. Pierrehumbert (1993)).

Among the many works on Amazigh phonology, this work seeks to provide a fresh look at sibilants. The major contribution of the work is broaching the inextricable relationship that holds between spirantisation and identity avoidance, an issue that has remained in the dark and has received very little attention. The use of OT to nail down the behaviour of sibilants is another contribution both in understanding how identity avoidance operates in ABA and in constructing a factorial typology of spirantisation in different Amazigh lects. The core idea is that the difference observed between various Amazigh lects in terms of the degree of spirantisation is reminiscent of different rankings of the same constraints.

The book is organized as follows. The first chapter provides a brief retrospective on Amazigh phonology, most notably on ABA. The geographical and linguistic contexts of ABA are displayed. Afterwards, we proceed by offering a sketch of the basic premises of OT. Then, we present a body of OT concepts that are of prime utility to a proper understanding of our forthcoming analysis. Foremost among these concepts, we have the concept of local conjunction whose insights will be deployed in various ways along the course of developing this work. Another concept of interest is constraint encapsulation. Constraint encapsulation is fleshed out in the first chapter to cater for the GOCP hierarchies that abound in this work (cf. Chap. III and Chap. IV).

The second chapter can be set within the very general purpose of characterizing the OCP theory to be adopted. The chapter gives a handle on all the theoretical tenets of the GOCP theory, as construed in Suzuki (1998). We flesh out the illuminating tenets of the theory we espouse with an eye to getting around the different phonological phenomena displayed by the interaction of spirantisation and identity avoidance. The chapter records a number of differences that hold between the classic OCP and the GOCP. It also sketches issues related to locality, proximity and identity.

In chapter III we pursue a GOCP analysis of phenomena wedding spirantisation effects with identity avoidance effects in Sib Sib clusters. In particular, spirantisation evinces different dispositions to attend to identity avoidance. Sometimes, the strictly adjacent sibilants stand in fine accord with the requirements of identity avoidance; other times, they stand in fundamental conflict with the same requirements. When they strictly obey the requirements of identity avoidance, the two sibilants are resolved by assimilation or dissimilation under strict requirements of identity of voice, anteriority or both. When sibilants exhibit an outright violation of identity avoidance, they must be different in terms of both anteriority and voicing. We conclude the chapter by arguing that the applicability or non-applicability of the requirements of identity avoidance is mainly charged to the position of the GOCP constraints relative to the constraints requiring spirantisation and faithfulness. The final ranking exhibits and respects the requirements of gradient similarity as purported in Suzuki (1998).

Following the same line of analysis adopted for Sib Sib clusters, we proceed to analyze the interaction of identity avoidance effects with spirantisation and glide assimilation in the clusters Sib ə Sib in Chapter IV. A variety of GOCP constraints evincing different degrees of identity are posited. In the same vein, the identity displayed by sibilants in Sib ə Sib clusters largely condition identity avoidance effects. Only sibilants identical in terms of anteriority, regardless of voice, are respectful of identity avoidance requirements. The merest difference in terms of voice and anteriority, or just anteriority, is sufficient to blunt the force of identity avoidance constraints. The chapter is brought to a close by discussing the proximity and identity implications displayed by both Sib Sib and Sib ə Sib clusters.

Chapter V falls within the purview of characterizing the factorial typology of spirantisation in some Amazigh lects. It is shown that difference in terms of the degree of spirantisation, i.e. which obstruent stops are affected, falls out from constraint re-ranking. Re-ranking the constraints recruited to accommodate spirantisation in ABA yields an array of typological predictions. We formulate four rankings illustrating various degrees of spirantisation in four Amazigh lects, namely Ayt Baamrane, Iboudraren, Ayt Atta, and Ayt Yeznassen lects.

Finally, the conclusion sums up the results and sketches some residual problems that need further investigation.

CHAPTER I

A BACKGROUND ON OT AND ABA

Chapter I

A BACKGROUND ON ABA AND OT

1. Introduction

Since the theoretical framework adopted in this work falls within the purview of OT, we deem it necessary, as a first step, to provide a retrospective on the fundamentals of OT. We have also considered it of prime utility to introduce an overview on ABA, the Amazigh variety under study in this work. To achieve these two goals, we have organized the chapter in this way. First, the geographical, economic and linguistic contexts of Asht Bouyelloul are displayed. Next, we offer a view on the inventory of ABA. Afterwards, we present a sketch of the basic principles of OT. We also supply a glimpse on the broad vista of constraints interaction so as to make the reader get a better sense of how OT works. Then, we give a body of OT concepts that are of prime utility to a proper understanding of our forthcoming analysis. The first concept addressed is Correspondence Theory as conceived in McCarthy and Prince (1995). The second is Constraint Encapsulation (Prince and Smolensky (1993)), and the last one is Local Conjunction (Smolensky (1993 [95])).

2. The geographical and economic context of Asht Bouyelloul

Accord

ing to Idil (1982), Asht Warayn geographical space is divided into two major areas which are separated by the Bouyblane chain of mountains. The northern area is called Asht Warayn of the North (north of Bouyblane and south east of Taza), and the southern area is dubbed Asht Warayn of the South (south of Bouyblane and east of Berkine). The northern area is divided into a couple of Amazigh tribes that comprise Asht Ettelt, Asht El farh, Asht GGout, Zerarda and Meghraoua, while the southern area encompasses Asht Bouyelloul, Asht Bhar, Asht Meqbel, Asht Aziz, Asht Taida and Asht Taizirt.

Asht Bouyelloul tribe, whose Amazigh is studied in this work, is situated around 40 km to the East of Imouzzar Mermoucha, and around

80 km to the South-West of Taza. Being located between Bouyeblane and Bounasser mountains, which are the highest mountains in the Middle Atlas, Asht Bouyelloul is characterized by the coldness of its climate. As regards the economy of the region, it is a poor economy which is based on agriculture and cattle herding. The poverty of the region is basically ascribed to the limited space that can be cultivated and the scarcity of arable lands. Sheep herding is also fraught with many problems. Foremost among these problems is the coldness of the climate which causes the death of a considerable number of cattle every year. The above economic problems have propelled a lot of people to immigrate to cities such as Taza, Imouzzar Mermoucha and Outat El Haj.

3. The context of Asht Warayn Amazigh in Amazigh phonology

The interest in Amazigh has presumably started around the 1830's, the time at which the French invaded Algeria. Since then, a variety of works that accommodate several aspects of Amazigh sound system have been carried out. Crucially, the studies covered a wide range of geographical areas where Amazigh is spoken. There is, therefore, plenty of literature on Amazigh and Amazigh phonology, of which we can cite (Destaing (1907, 1920), Biarnay (1917), Laoust (1928, 1929), Basset (1952, 1959), Chami (1979), Saib (1976), Chaker (1977), Chtatou (1982), Boukous (1979, 1994), Elmedlaoui (1985, 1995) and Bensoukas (2001)).

It is, therefore, not striking that Asht Warayn Amazigh, to which the Amazigh variety - ABA - under study in this work belongs, received its share of interest by many scholars, most notably by French scholars. Among the most influential works that are concerned with the Northern Amazigh lects, there is Laoust (1929), Renisio (1932) and Destaing (1920). These scholars contend that the Znati variety which encompasses a whole range of dialects, ABA included, is characterized by a couple of common attributes. These attributes, it has been argued, lend compelling support to considering the Northern Amazigh lects as belonging to one group, namely the Znati group[1]. Nonetheless, Destaing (1920) holds that no matter how similar Znati varieties are, they should be divided into two types: (a) the ‘Rif proper’, and (b) the Ayt Iznasen group which encompasses Asht Warayn and Ayt Seghrouchen. This distinction is

[1] The Znati group also conflates some Algerian Amazigh varieties like Taqbaylit.

presumably warranted and justifiable as there are more similarities between the lects of the Ayt Iznasen group than between the Ayt Iznasen lects and the Rif lects.

If compared with the southern Amazigh varieties, the Znati lects exhibit a complex assortment of phonological affinities. Chief among the phonological phenomena that pervade the Znati lects is spirantisation (cf. Renisio (1932), Saib (1976), Guerssel (1976), El kirat (1987) and Bouhlal (1994)).Under spirantisation, all the dorsal, coronal, and sometimes labial singleton obstruent stops surface as spirantised fricative consonants. Contrarily, their counterpart geminate stops tend to foil the attempt to create spirantised forms. The southern varieties are in large measure non-spirantising. However, exceptions are observable (see Bouhlal (1994) for a more comprehensive analysis of spirantisation in Tashlhiyt Amazigh lects).

From the foregoing, it emerges that ABA, the object of our study, ought by right to be a spirantising lect. It, indeed, is. However, a striking mismatch holds between ABA on the one hand and the Rif and Yeznesni lects on the other. ABA spirantises only dorsal k, g and q while the Yeznasni lects (El kirat (1987)) and the Rif lects (Chami (1979)) spirantise all dorsal, coronal, and sometimes labial, stops.

The remainder of this work will bear on ABA, of which we are a native speaker, with a special focus on spirantisation which can be viewed as the notorious phonological phenomenon of all Znati lects.

4. The inventory of ABA

Not unlike Hamitic-Semitic languages, ABA displays a phonemic system where consonants are replete but vowels are scarce. The underlying system of ABA vowel sounds comprises the generally agreed upon three vowels / a, i, u / (see Basset (1952), Chami (1979), Chaker (1977) and El Kirat (1987)). Phonetically, the front vowel /i/ and the back vowel /u/ are realized as [e] and [o][2] respectively in emphatic contexts. The back vowel /a/ is also shifted phonetically to [æ] when it abuts against a coronal consonant. With respect to the schwa vowel [ə], I

[2] For the sake of simplicity of transcription and exposition, I shall not use the positional phonetic variants of the vowels a, i, and u, namely [æ], [e], and [o], in the output form while presenting data in the forthcoming chapters.

follow the lead of Basset (1952), Penchoen (1973), Guerssel (1976) and Bader (1985) in viewing it as an epenthetic vowel that does not obtain in the underlying form[3]. With respect to weight, ABA vowels are not contrastive.

As regards the consonantal system of ABA, it is far richer than the vowel system as the chart below illustrates.

(1)

	Labials	**Coronals**	**Dorsals**	**Gutturals**
Stops	b	t, d, T, D	k, g, kʷ, gʷ, q[4]	
Affricates		tʃ, dʒ		
Fricatives	f	s, z, S, Z, ʃ, ʒ	χ, ɣ	ħ, ʕ, h
Sonorants	m	n, l, r, L, R		
Glides	w	y		

Nearly all the consonants[5] in the chart above contrast with geminate counterparts (see El Kirat (1987) and Saib (1976)). With respect to the phonemicity of the consonants in the chart above, many works like Saib (1976), Chami (1979), and Chtatou (1982) have undertaken such work; we do not need to repeat it here.

5. Optimality Theory: a theory of constraints

Departing from what can best be described as operational, serial or rule-based theories, Optimality Theory (OT) (see Prince and Smolensky (1993) and McCarthy and Prince (1993b)) is a framework where constraints are construed to be the main component. More specifically, OT is not concerned with the sequence of ordered rules that derive the output from the input; rather, it is concerned with the interaction of a composite of violable universal constraints whose

---

[3] The reduced vowel schwa [ə] has for long been under dispute between Berberists. Saib (1976) and El Kirat (1987) defend the line of thinking that considers schwa as an underlying vowel. Basset (1952), Penchoen (1973), and many other scholars consider schwa as epenthetic.

[4] Counter to McCarthy (1988), I consider /q/ as a dorsal segment (see Clements (1991) and Shaw (1991)).

[5] The transcription adopted in this work is IPA. There are, however, some exceptions. We use capital letters to denote emphatic consonants. [y] stands for IPA [j].

ordering determines the well-formedness of the output. It is worthwhile as a first step to note that the appeal to constraints has been around for many years in phonology. According to La Charité and Paradis (1993) the emergence of constraints in generative phonology is traced back to Stanley (1967). The concept of constraints knew some refinements along the history of generative phonology. Morpheme Structure Constraints, adopted by the landmark work of Chomsky and Halle (1968), were interpreted more like conditions on the possible morphemes of a language than is the case with morpheme structure rules, whose chief mandate as claimed by Halle (1959) is to add information. Over the decade that followed SPE's era, non-linear phonology was introduced. Along with it emerged an explosion of refinements in phonological representation which led to an increasing need for constraints to regulate the relations between units both on the same and on different representational tiers. For example, Goldsmith (1976) proposes the No Line Crossing Convention, which prohibits association lines linking units belonging to two different tiers from crossing each other. Many other theories deploying constraints have emerged ever since, but most if not all of these theories viewed constraints as inviolable entities. In this respect, they largely diverge from the concept of constraints in OT where violability is a premise not to be overridden.

5.1 The core concepts of OT

According to the influential work of Prince and Smolensky (1993), OT conflates a range of components which can be outlined as follows: the *Input*, *Gen*, *Con*, *Harmony*, *Evaluation* and the *Output*. While the *Input* and the *Output* are in no way different from the classic underlying and surface forms adopted in pre-OT frameworks, the other components are in large measure an innovation in phonological theorizing. Under the definition originally proposed by Prince and Smolensky (1993) and adopted subsequently by a variety of authors such as McCarthy and Prince (1993b), McCarthy (2000) and Kager (1999) among a host of others, *Gen* (short for Generator) is viewed as a component that generates outputs from inputs. Put in another way, *Gen* is responsible for all the changes that are observed on the output and that are in former approaches ascribed to phonological rules. Furthermore, *Gen* is universal. This means that the candidate forms emitted by *Gen* from a given input are the same in every language. In other words, just because Gen is universal, it must emit candidates (outputs) varied enough to fit the whole range of ways in which languages differ. McCarthy (2000) offers an example. He contends that languages differ in terms of syllabifying a consonant cluster like br (cf. English *alge.bra* vs. Arabic *jab.ri* 'algebraic'). He explains that it is the responsibility of *Gen* to offer competing candidate outputs that disagree with respect to this dimension, leaving the choice of the right one to the language-particular ranking of constraints in *Harmony*. *Gen* is also input-dependent, in that all the output forms emitted by *Gen* bear an immanent underlying form. The output candidates record, by some means, how they differ from the input.

When *Gen* emits a body of candidates, two other components termed *Con* and *Evaluation* are called into play. *Con* refers to the set of universal constraints that can be ranked in a multitude of ways – every language has its own ranking of constraints- and *Evaluation* refers to the process of checking the candidates emitted by *Gen* against a hierarchy of ranked constraints. Put in another way, for a candidate to be optimal - that is to say grammatical and attested in the language under study-, it must be the candidate that outperforms all the other competing candidates on the hierarchy of constraints posited for that language. The process of evaluating candidates against each constraint proceeds from the top-ranked constraint and proceeds till the lowest ranked constraint in the hierarchy. Usually the candidate that fares well on the top-ranked constraint(s) is evaluated as optimal.

The last component *Harmony* refers to the degree of relative success of each output candidate with respect to the other candidates against a constraint hierarchy. When it happens that some candidate A outperforms another candidate B, candidate A is said to be more harmonic than candidate B. In formal writing, the relation is schematically shown as follows: cand A › cand B.

5.2 OT principles

Five architectural principles regulate the operation of *Con*, *Gen* and *Evaluation* (see McCarthy and Prince (1994a)).

- ***Universality***: This principle requires that all constraints hold in all grammars; this is the formal counterpart of the requirement that constraints reflect universal linguistic tendencies.
- ***Ranking and Violability***: They formalize the idea of hierarchical ranking of violable constraints, subject to the

requirement that any violation should be the minimum needed to secure compliance with higher ranked constraints.

- ***Inclusiveness***: This principle prevents *Gen* from being unduly selective in producing candidate outputs. It is responsible for the need to augment the list of candidates to include further reasonable possibilities.
- ***Parallelism***: It requires optimal satisfaction of the constraint hierarchy to be determined by reference to all the constraints and all the candidate outputs, with no serial derivation.

5.3 How OT works

We have thus far presented the fundamental concepts of OT; it is high time now to explore how OT operates. Providing a glimpse on the whole vista of how constraints select the optimal candidates is, thereby, our purpose in this subsection. We have already shown that *Gen* generates a whole range of output candidates that are evaluated against a set of universal constraints. We have also pointed out that the universal constraints must be ordered in consonance with the requirements of the language under study. This means that every language chooses a particular ranking of the same universal constraints. Let us now aid the reader get a closer look on how OT functions in real life. To give more content to our presentation, let us consider an example from a hypothetical language. We shall assume that a language A does not tolerate the presence of identical segments within the root. The hypothetical word * $[\text{kamak}]_{\text{root}}$ ought by right not to surface in this language owing to its infraction of the co-occurence restriction (or constraint) that bans identical segments in roots. Let us term this restriction or constraint The Obligatory Contour Principle (OCP) (see Leben (1973) and Goldsmith (1976) among others). Under the OCP, identical segments are not allowed within the root.

Let us also assume that when some affixes are affixed to the root, some changes may affect the affix if it happens to have a consonant identical to one of the consonants of the root. For the sake of clarification, we offer an example. We suppose that the underlying form of the word $/\text{ab}_{\text{affix}}+\text{erab}_{\text{root}}/$ surfaces as [aderab]. In this word the affix *ab* is altered to *ad.* This change is undoubtedly ascribed to the constraint OCP which not only bans the coexistence of identical segments in the root but also in the word. Since the OCP is operative in both of the root and the word, outputs must always respect the constraint either by avoiding the coexistence of two identical segments in unaffixed forms (as in the ungrammatical root *[kamak] $_{root}$), or by resolving the violation through dissimilation (as in /ab-erab/$_{word}$ > [aderab]$_{word}$). Avoiding wrong outputs or resolving the restriction against identical consonants via dissimilation are strategies that subserve the OCP constraint. Hold also that in the affixed form /ab-erab/ $_{word}$, the affix *ab* which surfaces unscathed throughout the language now emerges as *ad* in the output. This means that the force that preserves the identity of the labial stop b in *ab* is sacrificed to another force that triggers the change. The force that strives to preserve identity is the constraint Faith (short for faithfulness), and the force that drives the change is the OCP constraint. Since the force of the OCP outweighs the force of Faith, we say that the OCP dominates Faith. Schematically, we represent this relation of dominance in this way.

(2) OCP >> Faith

OCP >> Faith also means that the satisfaction of the OCP can be achieved at the expense of a violation of Faith. The relation of domination is demarcated by the sign >> or by precedence in a tableau (the leftmost constraint dominates the constraint to its right if a solid line separates the two constraints).

(3)

/ab+erab/ $_{word}$	OCP	Faith
☞a. aderab		*
b. aberab	*!	

Let us translate the tableau into plain English. /ab+erab/ $_{word}$ is the input. [aderab] and [aberab] are the two competing output candidates generated by *Gen* from input /ab+erab/. OCP and Faith are the two constraints against which [aderab] and [aberab] will be evaluated. Since the OCP constraint is placed on the left of Faith and since the two constraints are separated by a solid line[6], the OCP is said to dominate Faith. This domination relationship amounts to the imperative that

[6] Constraints may also be separated by a dotted line. If this holds, it means that the constraints are unranked.

[aderab] and [aberab] are evaluated first against the OCP and then against Faith. Since the OCP dominates Faith, if one of the two candidates satisfies the OCP and the other violates it, the one that satisfies the OCP is the winner. Satisfaction is denoted by a blank cell and violation is annotated by an asterisk *. The winner, or in OT terms, optimal candidate in tableau (3) is [aderab] since it satisfies the OCP constraint at the expense of a violation of Faith. The optimal candidate [aderab] is called out by the pointing hand ☞. The output [aberab], on the other hand, violates the top-ranked OCP constraint while satisfying the lower constraint Faith. [aberab]'s satisfaction of Faith does it no good since satisfaction of the OCP constraint is prioritized owing to the ranking OCP >> Faith. The exclamation mark ! stands for the stage at which [aberab] loses.

Constraints can stand to each other as dominant to dominated or as constraints of equal status. When two constraints stand in a dominance relationship, a solid line separates the two constraints. When none of the constraints dominates the other, the two constraints are separated by a dotted line.

(4)

/aberab/	OCP	Faith
aderab		*
aberab	*	

When OCP and Faith are unranked as in (4), no privileged status is given to OCP over Faith or to Faith over OCP. Furthermore, since each candidate satisfies one constraint and violates the other, no candidate is called out optimal unless we posit another constraint that stands in a relationship of dominance with respect to OCP and Faith, and which selects one of the candidates over the other.

When a set of candidates all violate, or all satisfy, the top-ranked constraint, the decision is passed to the next lower constraint, and if the next lower constraint cannot decide, evaluation proceeds recursively till a constraint that can decide about the optimal candidate is reached.

5.4 Correspondence theory

Abstracting away from former works in OT (Prince and Smolensky (1993), McCarthy and Prince (1993a, b)), I will adopt Correspondence Theory as conceived in McCarthy and Prince (1995) and revised in a variety of subsequent works (McCarthy and Prince (1999, 2000)). McCarthy and Prince (1995) purport that a broad range of parallels hold between requirements on base-reduplicant identity in reduplicative morphology on the one hand, and requirements of input-output faithfulness in phonology on the other. With an eye to generalizing over the two domains, McCarthy and Prince (1995) suggest that candidate sets derived by *Gen* emerge with a correspondence relation which evinces the dependency of the output on the input and the reduplicant on the base[7].

(5) ***Correspondence*** (McCarthy and Prince (1995)).

> Given two related strings S_1 and S_2, correspondence is a relation $\Re$ from the elements of S_1 to those of S_2. An element $\alpha \in S_1$ and any element $\beta \in S_2$ are referred to as *correspondents* of one another when $\alpha \Re \beta$.

When deriving candidates, *Gen* exhibits a lot of freedom in imposing some kind of correspondence, or none at all, on the elements of S_2. *Con* is, as already noted, responsible for the evaluation of candidates which evince different $S_1 - S_2$ correspondence relations. It, thereby, chooses the optimal candidate on the basis of the candidates' satisfaction or violation of the constraints.

Con refers to a set of violable constraints that hold in all languages, but whose ranking is effected on a language-particular basis[8]. *Con* conflates a whole range of constraint types, of most concern here markedness constraints and faithfulness constraints. Markedness constraints assess the well-formedness of a linguistic structure at levels

---

[7] Correspondence relations have also been extended to output output sets, most influentially in McCarthy (1995), Buckley (1995), Benua (1995, 97), Kager (1995) and Burzio (1995).

[8] Along Prince and Smolensky's (1993) line of thinking, language-particular rankings exhibit strict dominance relations between violable constraints. There are other works that do not assume strict dominance relations between constraints like Nagy and Reynolds (1997).

that range over as different aspects as featural, segmental and syllabic. A couple of markedness constraints are set out in (6).

(6) **ONSET**: *σ]v

"Every syllable has an onset" (Prince and Smolensky (1993: 25)

***Vd OBSTRUENT**:

"Obstruents must not be voiced" (Lombardi (2001))

The degree of markedness of a constraint is determined by means of markedness constraints and their relative ranking. Highly-ranked constraints usually regulate structures which are more marked cross-linguistically. The reverse holds true for lower ranked constraints.

Faithfulness constraints exhibit a relation of matching and preciseness between two correspondent strings (input and output, base and reduplicant or output and output). The central thrust of faithfulness constraints is to militate against any deviation from the original string. The improvisational whims of Gen are reined in by faithfulness constraints which discriminate against a whole range of changes including addition or deletion of features and segments, changes in the linear order of segments and fusion of segments.

Notable examples of faithfulness constraints are presented below[9].

(7) *Examples of faithfulness constraints*

MAX[10]: Every segment in S_1 has a correspondent in S_2.

"Deletion is not allowed"

DEP: Every segment in S_2 has a correspondent in S_1.

"Insertion is not allowed"

[9] Prince and Smolensky's (1993) faithfulness constraints FILL and PARSE relatively do the same job as MAX and DEP. For more discussion of related issues, see Pulleyblank (1994) and Ito, Mester and Padgett (1995).

[10] An important debate holds between phonologists relative to whether to incorporate MAX and DEP Features in OT. Among the phonologists who believe that MAX and DEP Features should hold in OT, there is Lombardi (1995), Causely (1996), La Montagne and Rice (1995) and Walker (1997).

IDENT (F): Correspondent segments in S_1 and S_2 have identical values for some feature [F].

Faithfulness constraints are of prime utility to OT. Without them, all inputs will coalesce into a single unmarked output (see McCarthy and Prince (1994a), McCarthy (1997) and Kager (1999)).

5.5 Encapsulating hierarchies

Because fixed hierarchies consist of usually an intricate number of constraints, a means to simplify the theory of hierarchies is desirable. The move to attain this simplification was first broached by Prince and Smolensky (1993). The core idea that underlies this simplification is termed Constraint Encapsulation. Constraint encapsulation raison d'être is to encapsulate constraint packages with an eye to reducing the number of constraints, and enhancing the interpretability of an analysis.

To get a better sense of what constraint encapsulation means, let us have a look at Sonority Hierarchy (cf. Dell and Elmedlaoui (1985), (1988), (1989)). Under Sonority Hierarchy, segments are arranged in a hierarchical way in terms of the degree of sonority immanent within each segment or class of segments. Most phonologists concur with the hierarchy proposed below.

(8) *Low Vowels > High Vowels > Glides > Liquids > Nasals > Voiced Fricatives > Voiceless Fricatives > Voiced Stops > Voiceless Stops*

A notable example displaying the activity of Sonority Hierarchy is drawn from Imdlawn Tashlhiyt Amazigh (ITA). ITA (see Dell and Elmedlaoui (1985)) exhibits a massive potential ambiguity in syllabification, since any segment at all can form the nucleus of a syllable. However, the choice of which segment to function as a nucleus falls to sonority requirements. The more sonorous segment outperforms less sonorous ones as illustrated in the data below.

(9) <u>*Sonority effects on nuclear status*</u>

tz**M**t[11]	-	*t**Z**mt	'm beats z as a nucleus'
rat.l**U**lt	-	*ra.t**L**.w**L**.t	'u beats l as a nucleus'

[11] Capital letters stand for nuclei.

Deploying insights from Prince and Smolensky (1993), we shall appeal to the use of Peak to express the requirement that more sonorous segments should function as nuclei of syllables.

Information from Sonority Hierarchy suggests that some peaks are more sonorous, thereby more harmonic than some other peaks.

(10) Peak a ≻ Peak u ≻ Peak l ≻……. ≻ Peak t

(≻ = more harmonic)

Under the peak harmony presented in (10), peaks that are more sonorous are more harmonic than peaks that are less sonorous. From the foregoing, it emerges that syllables containing **A** as a nucleus, say for example [d**A**], are more acceptable than syllables bearing **L** as a nucleus, say for example [d**L**]. If we translate this harmony in terms of constraints, the display would look as in the hierarchy below.

(11) *P/t >> …>> *P/l >> *P/u >> *P/a

Under this hierarchy, ITA's favouring of more sonorous segments to function as nuclei would be straightforwardly accommodated. The underlying form /dl/ would be syllabified either as [**D**l] or as [d**L**]. The decision of which form is optimal falls to the peak hierarchy in (11). The tableau below schematizes the scenario.

(12)

/dl/	*P/t	*P/d	……	*P/l	*P/u	*P/a
a. **D**l		*!				
☞b. d**L**				*		

Because *P/d is the second constraint that reigns supreme in the hierarchy, it has strict veto power over the lower-ranking constraints, of most concern here *P/l. Since (12a) incurs a fatal violation of *P/d while (12b) is in full accord with the requirements of *P/d, (12b) is evaluated as optimal. (12b)'s violation of *P/l does it no harm so long as it obeys the top-ranked *P/d.

In some instances, hierarchies, such as the Peak hierarchy, are interrupted by some other constraint. When this scenario holds, appealing to constraint encapsulation would be useful. We shall see how this move would enable us to give an adequate characterization of the phenomenon. Consider the same hierarchy interrupted by constraint x.

(13) *P/t >> … >> *P/l >> constraint X >> *P/n >> *P/a

Constraint Encapsulation makes it possible for specific groups of constraints (from the top down to the point of interruption, indicated in (13) by *P/t >> … >> *P/l) to be encapsulated into a single, equivalent constraint, as in (14).

(14) **Poss-Nuc** (Π Nuc):

Segments with sonority less than Π Nuc may not be parsed as peaks.

Abbreviates: [*P/t >> … >>*P/l], where l is the most sonorous segment with $|l| <$ Π Nuc.

(See Prince and Smolensky (1993: chap 8))

What (14) asserts is that the encapsulated constraint Poss-Nuc has a language-particular parameter Π Nuc. This parameter decides what cannot be parsed as a peak. Put in another way, the parameter evinces the degree of sonority that cannot be allowed as a nucleus. What Constraint Encapsulation tries to achieve is the avoidance and the reduction of constraints clutterings by conflating many constraints in one constraint. Compare the readability of constraints in the two tableaux (15) and (16).

(15)

	Poss-Nuc	Con x
☞da		*
dl	*!	

(16)

	*P/t	…	*P/l	Con x	*P/n	…	*p/a
☞da				*			*
dl			*!				

It is patently clear from the comparison of the two tableaux above that tableau (15) is more readily interpretable than tableau (16). Constraint Encapsulation conflates a number of constraints into one constraint making its interaction with other constraints simple and clear.

5.6 Local Conjunction

Local Conjunction, originally conceived by (Smolensky (1993, 1995), refers to a scenario where two constraints yoke into one constraint. When a constraint is locally conjoined, this means that the two constraints of which it is made substantially consolidate each other in a particular domain. This also means that it is worse to violate two constraints the same time than it is to violate either constraint independently. From the foregoing, it emerges that violating one constraint of the two locally conjoined constraints does not entail the violation of the conjoined constraint. Suppose a language bans the appearance of codas, so that codas do not hold in the language unless licensed by other high-ranking constraints. Suppose there is another active constraint that bans voiced obstruents in the same language. From the foregoing, it can be established that both No Coda and *Voice exercise some influence on the mapping of the output. However, if the two constraints are locally conjoined, they exercise more severe requirements on the mapping of the output. More explicitly, if a potential candidate, say [dab], is evaluated against the locally conjoined No Coda & *Voice, the candidate does not violate just one constraint while satisfying the other. It incurs a violation of both No Coda (b is the coda) and *Voice (b is voiced). Local Conjunction, according to Smolensky (1993, 1995) is defined as follows.

(17) *Local Conjunction*

Local conjunction of C_1 and C_2 (C_1 and C_2) in some domain D.

a. C_1 & C_2 is violated when there is some domain of type D in which both C_1 and C_2 are violated.

b. Universally, C_1 & C_2 >> C_1, C_2

The issue of local conjunction has been accommodated by a variety of phonologists, of most concern here are Hewitt and Crowhurst (1995), Kirchner (1995), Ohno (1998), Alderete (1996, [97]), Suzuki (1995b, [97], [98]), Lubowicz (1998) and Ito and Mester (2000). However a final consensus about which constraints should be conjoined has not been reached. Most phonologists concur with the prevalent view that only markedness constraints can be conjoined. Kirchner's (1995) position stands in fundamental conflict with the prevalent view; he concurs that two faithfulness constraints can also be conjoined. Lubowicz (1998) purports that a markedness constraint can be conjoined with a faithfulness constraint. Mester and Ito (1996, 97), Suzuki (1998) and Alderete (1997) hold that not only can two different markedness constraints conjoin, but also two identical markedness constraints. A dramatic example of local conjunction of two identical markedness constraints is offered by Mester and Ito (1996, 97). Mester and Ito ((1996, 97) cite two fundamental phenomena that pervade the Japanese lexicon. The first one is the putative oft-noted Lyman's Law and the second is dubbed Rendaku. In Japanese compound words, Lyman's Law [12] is responsible for the absence of two voiced obstruents in the second member of a compound. Rendaku, on the other hand, alters the first voiced obstruent of the second member of a compound into a voiced obstruent. Rendaku, more specifically, foils the attempt to faithfully render [-voice] obstruents in the output. However, Rendaku emphatically fails to obtain when the to-be-voiced obstruent is followed by an already voiced obstruent. Clearly, the stubborn resistance of the first voiceless obstruent to undergo voicing is ascribed to Lyman's Law. Lyman's Law, as already mentioned above, stands in fundamental conflict with two voiced obstruents in the second member of a compound. The data below displays forms where Rendaku holds (18a, b) and forms where Rendaku fails (18c, d).

(18)

a. natsu+sora	→	natsuzora	'summer sky'
b. kawa+hata	→	kawabata	'river book'
c. mori+soba	→	morisoba	'Soba serving'
d. onna+kotoba	→	onnakotoba	'woman's speech'

To accommodate the failure of Rendaku in Japanese compounds (18c, d), Mester and Ito (1996, 1997) posit two constraints. The first constraint is termed Rendaku (sequential voicing).

(19)

Rendaku: the beginning of second compound members should be voiced.

[12] Lyman's Law falls out from OCP effects.

The second constraint is a local conjunction of two identical markedness constraints. They call it $*[+voice, -son]^2_{stem}$.

(20) **$*[+voice, -son]^2_{stem}$** : No cooccurrence of voiced obstruency with itself within stems. (Mester and Ito (1996a, b))

What the locally conjoined constraint says is that the local conjunction of the markedness constraint *[+voice, -son] with itself in the local domain of the stem is not permitted. This constraint militates against stems containing two obstruents with identical [-voice] specifications. The fact that one voiced obstruent occurrence is possible is guaranteed by the faithfulness constraint Ident-IO Voice (a constraint that requires identity of voice specification in input and output forms) which outranks the markedness constraint *[+voice, -son] (Ident-IO Voice >> *[+voice, -son]). Since Rendaku manages to alter the voicing of the initial obstruent of a second member of a compound, then it must dominate Ident-IO Voice. Rendaku, in turn, must be dominated by $*[+voice, -son]^2_{stem}$. This ensues from the fact that when there is a conflict between $*[+voice, -son]^2_{stem}$ and Rendaku, it is $*[+voice, -son]^2_{stem}$ that is satisfied at the expense of a violation of Rendaku. With the above in mind, the ranking of constraints can be laid out as follows.

(21) $*[+voice, -son]^2_{stem}$ >> Rend >> Ident-IO Vc >> *[+voice, -son]

Let us see how these constraints play out in a tableau.

R = Rendaku

(22)

/$(natsu)_{stem}+(sora)_{stem}$/	$*[+voice,-son]^2_{stem}$	R	Id Vc	*[+voice,-son]
☞a. natsuzora			*	*
b. natsusora		*!		

As the reader may verify, both candidates (22a) and candidate (22b) satisfy the locally conjoined constraint $*[+voice, -son]^2_{stem}$; none of the candidates has two voiced obstruents. Evaluation proceeds to Rendaku which happens to be the decisive constraint. Rendaku is satisfied by candidate (22a) but crucially violated by candidate (22b). At this stage, candidate (22b) yields the palm to candidate (22a), which notwithstanding its violation of Ident-IO Voice and *[+voice, -son], is evaluated as optimal.

Let us have a look at the form /mori+soba/ where the locally conjoined constraint *[+voice, -son]$^2_{stem}$ is active.

(23)

/mori+soba/	*[+voice, -son]$^2_{stem}$	R	Ident Vc	*[+voice, -son]
☞a. morisoba		*		*
b. morizoba	*!		*	**

In tableau (23), the locally conjoined constraint *[+voice, -son]$^2_{stem}$ discriminates against two identical [+voice] obstruents in the local domain of a stem. Being top-ranked, *[+voice, -son]$^2_{stem}$ penalizes and disqualifies candidate (23b) which is in outright violation of the requirements of the constraint. Candidate (23a) is chosen as optimal, due to its satisfaction of the locally conjoined constraint. Candidate (23a)'s violation of Rendaku does it no harm so long as it satisfies the locally conjoined constraint *[+voice, -son]$^2_{stem}$.

6. Conclusion

The central thrust of this chapter has been to provide a retrospective on Amazigh phonology, most specifically ABA phonology, along with a presentation of the fundamentals of OT. We have offered an overview on the geographical, economic and linguistic background of Asht Bouyelloul. Then, we have addressed the basic premises of OT, its principles and core concepts. We have also cast light on Correspondence Theory, exhibiting the relationship of matching and preciseness that holds between the input and the output as well as between different morphological elements. We have addressed Constraint Encapsulation whose chief mandate is to simplify and reduce the number of constraints and enhance the interpretability of an analysis. Finally, we have brought to the fore the basic percept of Local Conjunction, a strategy used to account for some phonological phenomena by combining the force of two constraints in a particular context or domain.

<u>**CHAPTER II**</u>

THE GENERALISED OBLIGATORY CONTOUR PRINCIPLE

Chapter II

THE GENERALIZED OBLIGATORY CONTOUR PRINCIPLE

1. Introduction

This chapter aims at casting a close look at the Generalized Obligatory Principle (GOCP) as construed in Suzuki (1998)[1]. Providing an overview on the GOCP theory derives much of its appeal from the theory's ability to contend with a composite of identity avoidance effects. Crucially, the GOCP theory proves to have a subtle and important range of consequences. Its ability to generalize over different types of arguments coupled with its efficacy in getting around various identity avoidance problems has propelled us to utilize its insights to accommodate the complex twists displayed by the interaction of identity avoidance with spirantisation and glide assimilation in Chapters III and IV. The GOCP brings two new full-fledged concepts to the fore. The first is a new concept of identity. Under this new concept, the gradient aspect of increasing similarity is given a handle along the percepts of Local Conjunction (Smolensky (1993, 1995)). The second is a new concept of proximity. In the literature on identity avoidance, it is observed that identity avoidance becomes weaker when the distance is larger between two identical segments. This observation is attained in the GOCP theory by positing a proximity hierarchy where arguments are gradiently separated by larger and larger intervening material.

The chapter is organized as follows. The second section handles the limitations of the classic OCP. These limitations range over as different

[1] There are many works that have addressed identity avoidance and the OCP under an optimality-theoretic approach, works such as: Alderete (2003), Alderete and Frisch (2007), Bacovic (2005a), Bensoukas (2010b), Bensoukas (2012b), Bensoukas (2014), Frisch (2004), Frisch and Zawaydeh (2001), Hurch (2006), Kawahara and Sano (2014), Keer (1999) and Walter (2007). This book is driven by the underpinnings of Suzuki (1998) whose OCP theoretical approach better accommodates ABA identity avoidance phenomena.

aspects as similarity effects, adjacency effects, non-identical dissimilation, failure of interlinking and lack of generalisability. We offer all these limitations to pave the way to a presentation of an alternative theory in section 3. The alternative theory is labeled the Generalized Obligatory Contour Principle Theory (GOCP) (see Suzuki (1998)). Section 4 provides a detailed overview on the GOCP theory as construed in Suzuki (1998). In particular, we offer an overview about the elements of the GOCP in 4.1. We also motivate the need for phonological and morphological domains for the GOCP. In 4.3 we provide the basic strategies on how to compute similarity effects within the GOCP theory. Finally, we present the different adjacency relations required by the GOCP theory.

2. Limitations of the classic OCP

Before introducing any new OCP theory, I contend that any theory addressing the OCP must be committed to the truth of the assertion that identity avoidance, as construed in the classic OCP, is a sine qua non and must therefore be preserved. Identity avoidance is indeed the centre-piece concept that cannot be eschewed in defining the OCP in any theory. However, the classic OCP, notwithstanding the identity avoidance concept immanent in its definition in (1), is fraught with a whole range of limitations with respect to its applicability to a body of assimilatory and dissimilatory phenomena. It is the goal of this section to address the limitations of the classic OCP with an eye to motivating the need for a new OCP theory.

(1) *The classic OCP*

At the melodic level, adjacent identical elements are prohibited.

McCarthy (1986)

In the remainder of this section, I intend to present the most notable limitations of the classic OCP. These limitations can be sketched as follows:

- Similarity effects
- Adjacency issues
- Non-identical dissimilation
- Markedness
- Lack of generalizability

Each of these limitations will be handled and studied thoroughly.

2.1 Similarity effects

The inextricable relationship that holds between the OCP and the concept of similarity is traced back to the Feature Geometry era. Many phonologists have pinpointed the importance of similarity in the different phenomena exhibiting instances of OCP activity. Crucially, Padgett (1991, 1992), Yip (1989), Selkirk (1988, 1991, 1993), and most markedly Pierrehumbert (1993), have observed that cooccurrence restrictions are notably enforced when two segments share more than one feature. Both Yip (1989) and Pierrehumbert (1993) discuss instances of cooccurrence restrictions displayed by Arabic. They observe that a strong cooccurrence restriction holds between two coronal consonants if they agree in [son] values. Specifically, a triconsonantal root may not freely tolerate the cohabitation of two coronal consonants identical for sonority. As an approximation, the root *rasam* is well formed but **ralam*[2] is not.

The classic OCP, as formulated in (1), is unable to capture this similarity effect, since it is sensitive only to two features on a particular tier, in this case [cor]. This is illustrated as follows.

(2)

a.	Cor	Cor	b.	Cor	Cor
	[-son]	[-son]		[-son]	[+son]

In the display established above, both (2a) and (2b) violate the OCP on the coronal tier. The classic OCP, owing to its tier-based definition 'at the melodic level', is unable to assess the additional similarity exhibited on the [son] tier in (2a). Put in another way, the classic OCP cannot distinguish forms like *rasam* from illicit *ralam, since it only looks at a particular tier. In assessing the identity of two [cor] segments, the agreeing value of the subsidiary feature [son] must come into play.

OCP effects ensuing from increasing similarity between segments are well attested in many languages like Tokelma, (Lee (1991)), Alur (Mester (1986)), Javanese (Mester (1986)), Pomeo (Yip (1989)),

---

2 This is not a categorical reality but a statistically significant tendency (see Pirrehumbert (1993)).

Cambodian (Yip (1989)) and others. The robust generalisation that emphatically catches our eyes in the languages mentioned above is that identity avoidance is more readily observed when two segments are increasingly more similar. Suzuki (1998) purports that instances exhibiting the reverse case are not observed; it is never the case that more different segments are subject to a stronger co-occurrence restriction.

The traditional OCP reflects an undeniable failure in accommodating similarity effects. The fact that the OCP assesses similarity along only one tier is behind this failure. Such an observation suggests that a reconsideration of the classic OCP is essentially necessitated. A notable move has been adopted by Selkirk (1991, 1993) and Padgett (1991, 1992) who argue that the OCP must be able to assess more than one tier at a time. Padgett (1991) elaborates a FG tree where subsidiary features that evince additional similarity are dependent of primary features.

2.2 Adjacency issues

The other limitation that besets the classic OCP, especially as it is construed within the rubric of FG, is adjacency or locality. In the different representational trees espoused by a variety of phonologists, the notion of tier is presumably the ineradicable element that expresses the adjacency requirements that circumscribe the domain of a phonological phenomenon or process (see Clements (1985), Sagey (1986), McCarthy (1988), Mester (1986), Selkirk (1988), Archangeli (1984), Steriade (1987) among others). The appeal to tiers proper was emphatically criticised by a host of phonologists (Myers (1987), Archangeli and Pulleyblank (1994), Odden (1987)). It was found that dependence on tiers alone fails to get around the different fashions in which adjacency requirements are satisfied.

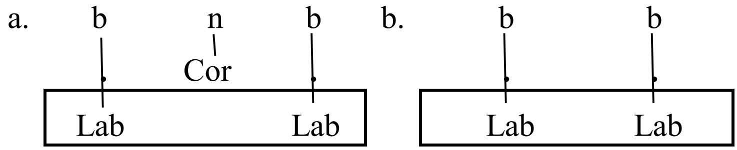
Odden (1987), for instance, supplies a theory which is aimed at circumscribing the various adjacency requirements displayed between any target or trigger of a phonological operation. In his paper, Odden (1987) divides the different adjacency relations that obtain in all languages into four categories: root adjacency, syllabic adjacency, transplanar adjacency and unbounded adjacency. The choice of which adjacency to be adopted is left for a language particular parameterisation of a particular rule or constraint.

Undoubtedly, Odden's (1987) theory of adjacency is a notable advance in phonological theorising. However, Odden was unable to consider the correlation between the strength of the OCP-effects and the proximity between the two elements. The core idea that locality is no more than a parametric choice stands in fundamental tension with the consistent observation that the closer the two elements are, the stronger the effect of the OCP (Smolensky (1993), Pierrehumbert (1993), Archangeli and Pulleyblank (1994a)).

In an influential paper, Pierrehumbert (1993) asserts that Arabic is a dramatic example of the interaction of proximity and the OCP. By conducting an analysis of identical segments within the root, she explains that the frequency of co-occurrence of two identical segments within a morphological domain is inextricably related to the distance that holds between the two identical segments. Crucially, it is demonstrated that the strength of the OCP is reduced, the larger the distance between the identical segments.

Pierrehumbert (1993)[3] demonstrates that such a gradient aspect of the OCP cannot be accommodated under classic theories such as FG. The core idea underlying this failure is reminiscent of the notion of 'tier' which is the only device that expresses locality in feature tree theories. This pernicious limitation is schematised on the adjacencies in (3a) and (3b) below.

(3)



Both (3a) and (3b) display an instance of OCP activation. Put in another way, both (3a) and (3b) are subject to the OCP on the [lab] tier. And since 'tier' is the only tool that expresses adjacency, the intervenance of the [cor] nasal n between the two labials in (3a) affects in no way the adjacency that holds between the two labials. The labial feature acts in a tier which is beyond the scope of sight of the coronal tier. Therefore, on

[3] Pierrehumbert's (1993) survey of Arabic co-occurrence restrictions is based on a statistical study of adjacent and non-adjacent identical segments.

the basis of a tier-based approach, adjacency between the two labial features is equal between (3a) and (3b). Put more strictly, there is no way to nail down the reason why OCP effects are reduced in (3a) and not in (3b)[4]. Pierrehumbert's statistics provide ample evidence to the effect that identity avoidance is not an all or nothing affair, but a gradient effect in proportion to the proximity between the two elements. As a result, tier-based approaches emphatically fail to capture the relationship that holds between proximity and the strength of the OCP due to tier-dependence.

2.3 Non-identical dissimilation in the classic OCP.

Another insuperable problem that befalls the classic OCP has to do with notion of identity in dissimilatory processes. Implicit in the classic OCP is a notion of total identity avoidance. In other words, OCP effects apply only when two elements are totally identical. Although most dissimilation cases can be viewed as identity avoidance, instances of dissimilation are well attested in cases where there is no identical feature specification to be avoided. It is impossible to get around such cases in terms of the traditional OCP, because the rationale behind dissimilation cannot be ascribed to the avoidance of two identical feature specifications.

A notable example, usually dubbed dissimilative jakan'e (Davis (1970), Halle (1995), Kuznetsov (1973)) obtains in Russian. In a variety of southern Russian dialects dissimilation holds between two vowels if the two vowels lie in adjacent syllables. An eccentric fact which pervades the aforementioned dialects is that dissimilation applies even when the two vowels are not identical.

(4)

a.	/r'ek'i/	r'ak'i	*'rivers'*
b.	/n'es'i/	n'as'i	*'carry'*
c.	/v'al'u/	v'al'u	*'I order'*
d.	/c'em'yu/	c'am'yu	'*seven*'

Kuznetsov (1973, p.58)

The point of interest here is that the non-high vowels (e, o, ɛ, a) are realised as low [a] when the following vowel is high [i] or [u]. Under a feature or rule-based theory, the process can be descriptively stated as

[4] Pierrehumbert contends that the frequency of co-occurrence in (3a) is more than the frequency of co-occurrence in (3b).

follows: [-high] vowels become [+low] when followed by [+high] vowels. This stands as a thorny problem for the classic OCP since there is no identical feature to be avoided. Crucially, what we have here is an instance of difference maximization along the vowel height dimension. In short, the way the definition of the classic OCP is formulated cannot capture instances of non-identical dissimilation cases, such as dissimilative Jakan'e.

2.4 Failure of interlinking markedness and the OCP.

This issue has been extensively studied by Alderete (1996, 1997) and Mester and Ito (1996a, b). The idea is that the traditional OCP provides no tools whatsoever to accommodate the relationship that holds between the OCP and markedness. Put in another way, the traditional OCP overlooks the fact that it is the marked features that tend to be avoided and dissimilated. The traditional OCP needs adjunct theories of feature specification to be able to set a link between the OCP and markedness (see Smolensky (1993), McCarthy and Taub (1992), Mohanan (1993), Steriade (1995), Ito, Mester and Padgett (1995) for relevant discussion of issues related to markedness).

2.5 The classic OCP and the lack of generalizability

On the basis of the definition of the classic OCP spelled out in (1), it is clear that the OCP operates only on features on autosegmental tiers. The appeal to autosegmental tiers is in itself a limitation. Various instances of OCP effects have been observed on a variety of phonological or morphological units outside the domain of tiers. If we sidestep features, the units that can undergo OCP effects are length in Gidabal (Geytenbeek and Geytenbeek (1971)), Latin (Ito and Mester (1996a, b)), Slovak (Kenstowic and Kisseberth (1979)), NC dissimilation in Yindjibarndi (Wordick (1982)), Gurindji (McConvell (1988) and Evans (1995), Gooniyandi (McCregor (1990)) and others. Since all the above instances exhibit OCP effects, they should be subsumed to fall under the same rubric, namely identity avoidance. Generalising identity avoidance over elements other than features does not obtain in the traditional OCP owing to the traditional OCP's dependence on tiers. Put in another way, the classic OCP is unable to handle cases of identity avoidance other than tier-based dissimilation; therefore, generalisability is not achieved.

To review, we have presented a variety of problems that befall the traditional OCP. We have considered similarity effects, proximity effects, non-identical dissimilation cases, markedness correlation and the lack of generalizability. We have considered each of these problems with an eye to shedding light on the inadequacies of the traditional OCP. Crucially, what all these limitations evince is that the classic OCP should be reconsidered. It is the goal of the next section to present an alternative theory, the GOCP, championed by Suzuki (1998). The GOCP theory makes provision for the gaps evinced by the classic OCP. In what remains we are going to present the most important tenets of the GOCP.

3. An alternative theory

To get around the different problems evinced by the classic OCP, Suzuki (1998) proposes an alternative theory termed The Generalised Obligatory Contour Principle[5] (GOCP). As Suzuki (1998: 27) puts it, "[The GOCP is] a model in which the traditional OCP is reinterpreted as a more general constraint on identity avoidance". For Suzuki the GOCP constraint is formulated in the following fashion:

(5) **Generalised OCP**:

***x…x**: A sequence of two x's is prohibited.
Where
x $\in$ { P Cat, G Cat }
"…" is intervening material. (Suzuki (1998, p:27))

Before handling the definition in (5), we shall start by displaying the important mismatches that distinguish the GOCP from the classic OCP. Suzuki (1998) contends that the landmark tenets of the GOCP ought by right to be tangential to the central principles of the traditional OCP. Suzuki (1998) presents the fundamentals of the GOCP as follows:

- *Tier independence.*

  The GOCP constraints are defined independently of the notion of autosegmental tier.

- *Specification of arguments.*

[5] In his GOCP theory, Suzuki (1998) retains the term 'OCP' in his definition to reflect the traditional notion of identity avoidance existing in the putative classic OCP.

> The GOCP constraints must be provided with a set of arguments specified for a particular aspect of identity avoidance.

- *Violability*

> The GOCP constraints are, in essence, violable.

- *Interconnectedness*

> The GOCP constraints are closely tied to the sub-theories governing various phonological dimensions. (p.27)

The first fundamental tenet of the GOCP is tier-independence. Tier-independence is of prime utility and importance to the GOCP, a point which has already been partly handled before. A body of insuperable problems obtain owing to circumscribing the domain of the traditional OCP to tiers. The putative clause 'at the melodic level…' which is notorious in most traditional OCP definitions is charged for the deficiency of lack of generalizability. From the standpoint of the classic OCP, features located within the same tier are the only units that are countenanced when identity avoidance is in force. This limitation emphatically constrains the traditional OCP from generalizing to non-autosegmental entities, like prominence and prosodic elements. This limitation is also responsible for the increasing focus on the property of tiers rather than on identity avoidance itself.

The second aspect of the GOCP is the universality of its constraint schema which consists of specific arguments. Put more strictly, while the GOCP universal schema provides a formal mechanism of capturing identity avoidance effects, the specific GOCP constraints accommodate the particular instance of assimilatory and dissimilatory phenomena.

Violability, the third tenet of the GOCP, is in large measure driven by the premises of OT. Conceiving of constraints as violable entities is attributed to the landmark works of Prince and Smolensky (1993) and McCarthy and Prince (1993a, b).Viewing the GOCP as a set of violable rankable constraints opens up the possibility that GOCP constraints may interact with markedness or faithfulness constraints.

The last tenet, interconnectedness, is meant to show that the GOCP is closely tied to other subtheories such as markedness, alignment and proximity. This inextricable relation lends tacit support to the arguments deployed and imposes an appropriate restrictiveness on what can logically be considered as arguments.

3.1 OT and the GOCP

From the standpoint of OT, Suzuki (1998) views the GOCP to be a violable, rankable constraint that can be expressed as follows.

(6) **Generalised OCP**

***X…X**: A sequence of 2 X's is prohibited.
Where
$X \in \{P\ cat, G\ cat\}$
"…." is intervening material.

The definition presented above lays out the basic GOCP constraint schema[6], to which specific arguments can be instantiated (Pierrehumbert 1993, Yip 1988). Put more strictly, X in GOCP can either belong to phonological categories such as [cor], [str], Rt (root node), σ (syllable) or grammatical categories (root, stem, word, etc.). The approximation of constraints in this way largely eschews the classical OCP's notion of 'tier', and avails us with a wide range of attested manners in which identity avoidance is observed. Therefore, identity avoidance should by right be operative on syllables and morphemes as much as it is operative on features.

Suzuki (1998) also notes the importance of defining what a sequence is. For him a sequence of 2 X's (as in (7)) falls into one of two sequences : A SEQUENCE (portrayed in one of the 3 relations ①, ②, ③) and a STRICT SEQUENCE (portrayed in ① and ② but not in ③). Put in another way, a strict sequence of X requires no intervening tokens of X while a sequence allows intervening tokens of X.

(7)

③

X ……….. X ……… X

① ②

[6] By constraint schema, Suzuki (1998) intends to mean a meta-constraint whose theoretical status is akin to Generalized Alignment (Prince and Smolensky (1993)).

Under formal writing, Suzuki distinguishes STRICT SEQUENCE from SEQUENCE by deploying two notational conventions, X ... X for sequence and X ~ X for strict sequence. He defines the 2 relations as follows.

(8) a. **SEQUENCE (X ... X)**:

In a string, any linearly ordered pair of X's is a sequence of X.

b. **STRICT SEQUENCE (X ~ X)**:

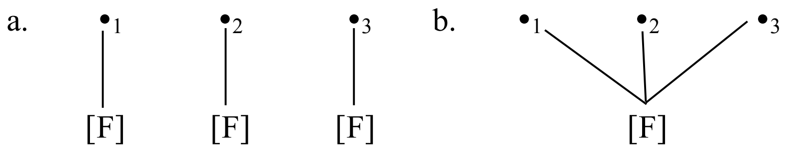
In a string, any linearly pair of X's which does not contain any proper subsequence of X is a strict sequence of X.

Suzuki (1998:43)

Under the definition sketched above, it must be noted that all element pairs that are in strict sequence are also in sequence but not vice versa.

On the basis of McCarthy and Prince (1995) and Alderete et al. (1996), Suzuki suggests that locality between features is always mediated by the segments which bear those features. To get a better sense of what is meant by locality and its relationship to sequences and strict sequences, Suzuki (1998) presents a dramatic example illustrating the usefulness of representation in distinguishing between sequence and strict sequence.

(9)



Suzuki (1998:43)

Suzuki holds that the sequential relations between the pairs $\bullet_1 \ldots \bullet_2$, $\bullet_2 \ldots \bullet_3$ and $\bullet_1 \ldots \bullet_3$ are identical in (9a) and (9b).Put in another way, Suzuki purports that representational linking does not change the sequential relationships between the root nodes sponsoring the identical feature. Both $\bullet_1 \ldots \bullet_2$ in (9a) and $\bullet_1 \ldots \bullet_2$ in (9b) are strict sequences, and both $\bullet_1 \ldots \bullet_3$ in (9a) and $\bullet_1 \ldots \bullet_3$ in (9b) are sequences.

Suzuki (1998) further explains that computing locality in terms of tiers should be abandoned in toto. He explains that there are cases where two feature sets are adjacent and where it is necessary to distinguish sequence from strict sequence. Consider the adjacency relations exhibited in (10).

(10)

$$\begin{array}{ccc} \bullet_1 & \bullet_2 & \bullet_3 \\ | & | & | \\ [F, G] & [F, H] & [F, G] \end{array}$$

Suzuki (1998) explains:

> "In this configuration, for the pair $\bullet_1 \ldots \bullet_3$, the sequential relations are different with respect to [F] and with respect to [G]: with respect to [F], the pair $\bullet_1 \ldots \bullet_3$ is a sequence, but not a strict sequence, whereas with respect to [G], the pair $\bullet_1 \ldots \bullet_3$ is a strict sequence. The issue here is that languages[7] vary in whether the two [F, G] segments are involved in dissimilation or not[8]." (p.45)

Thus far, Suzuki (1998) has argued that tiers are to be rejected entirely and replaced by the two locality relations: SEQUENCE and STRICT SEQUENCE. However, computing locality along these two relations alone emphatically fails to give a handle to a body of phenomena exhibiting identity avoidance. The core idea is broached by Pierrehumbert (1993) and substantially fleshed out by Suzuki (1998). The essential insight is that the size of intervening material plays a crucial role in strengthening or blunting the force of the GOCP. By appealing to Constraint Encapsulation (see Chap. I), Suzuki devises a proximity hierarchy to get around the GOCP effects which prove to be sensitive to intervening material. The proximity hierarchy is laid out as follows:

---

[7] Utilizing SEQUENCE and STRICT SEQUENCE enables us to draw a distinction between languages where $\bullet_1 \ldots \bullet_3$ are subject to the OCP-driven changes (Japanese, Akkadian…etc.) and languages like Latin and Georgian where $\bullet_1 \ldots \bullet_3$ does not trigger OCP effects. The distinction between sequence and strict sequence becomes of prime utility to properly accommodate the way GOCP effects obtain in typologically different languages.

[8] It will be explained through the course of developing chapter 3 that instances of dissimilation which require more than one feature to take place are to be contended with by the appeal to the local conjunction of two GOCP constraints.

(11) **GOCP + Proximity Hierarchy**

***X…X**= {*XX >> *X-C_0-X >> *X-μ-X >> *X-μμ-X >> *X-σσ-X >> *X-∞-X}

Suzuki (1998: 82)

Under this hierarchy, the core GOCP constraint *X…X is divided into gradiently ranked constraints where the intervening material ranges from zero to ∞ - ∞ stands for any distance larger than σσ. It is clear in the hierarchy in (11) that the closer the two identicals are, the more dominant the constraint is. Furthermore, the hierarchy immediately explains the putative observation that identity avoidance effects are stronger the nearer the two X elements.

Under OT, a GOCP constraint interacts with other faithfulness constraints. Suzuki explains that identity avoidance effects are notably observed when the GOCP constraint outranks Faith constraints.

(12) *X…X >> FAITH [X]

If the ranking in (12) holds in a language, the forces driving identity avoidance are more prominent, thereby leading to dissimilation or assimilation. Under the opposite ranking, Faith [X] dominates and identical elements are freely tolerated.

3.2 The OCP and markedness.

In their influential papers, Alderete (1996,1997) and Itô and Mester (1996a,b) provide tacit evidence to the effect that the OCP is to be viewed as a constraint prohibiting the concatenation of two identical markedness constraints within a particular domain – hence, the name of the OCP-as-markedness (OM) . Alderete (1997) and Mester and Itô (1996a, b) utilize insights from local self-conjunction of constraints (Smolensky (1993, 1995)) to achieve this end. The similarities between the GOCP and OCP-as-markedness are indeed many. However, differences also hold.

Suzuki (1998) summarizes these differences and similarities in the following fashion.

(13) a. **Similarities**

- *Tier-independence*

Both the OM and the GOCP approaches are proposed to be independent of the notion of autosegmental tier.

- *Generalizability*

Both the OM and the GOCP approaches are flexible enough to account for cases that the traditional OCP cannot deal with.

- *Violability*

Both the OM and the GOCP constraints are, in essence, violable.

b. **Differences**

- *Fundamental claim*

The OM approach differs in the fundamental claim regarding identity avoidance effects from the GOCP approach.

- *The theory of sequence adjacency and domain*

The GOCP approach invokes a rich articulated theory of sequence, adjacency and domain, while the OM approach employs the theory of adjacency of Odden (1987) which is developed under the autosegmental theory, and so is heavily representational.

- *Applicability to complex cases*

It is not clear how the OM approach deals with complex cases such as dissimilation of Jakan'e (Russian).

Suzuki (1998: 60-61)

4. The generalized OCP: a detailed presentation

This section is meant to provide a detailed overview on the GOCP theory as proposed in Suzuki (1998). It has formerly been established that various identity avoidance phenomena[9] ensue from the ranking posited in (15), repeated here for the sake of clarity.

(14) **Generalized OCP**

*X…X: A sequence of 2 X's is prohibited.

Where

---

[9] Suzuki (1998) limits his GOCP to dissimilatory phenomena.

X∈{P cat, G cat}
"…." is intervening material.

(15) **General scheme**

X … X >> FAITH [X]

In the remainder of this section, we shall follow the lead of Suzuki (1998) by addressing a variety of identity avoidance phenomena that are literally driven by the schema in (15). Through the course of developing this section, the questions that are meant to be answered can be sketched as follows.

a. What can count as elements?

b. What are the domains over which the GOCP holds?

c. What are the similarity implications of the GOCP?

d. What are the adjacency relations between two identicals?

4.1 The elements of the GOCP

As has already been pointed out, the GOCP is a restriction whose end result is to achieve identity avoidance. The GOCP, as has formerly been noted, has specific arguments in its scheme. If we consider the definition of the GOCP in (14), it is patently clear that X, as it lies in the definition, refers to no specific phonological entity but stands for all phonological and morphological elements that can hold as arguments for the GOCP. Under this definition, there is a prime departure from the traditional concept of the OCP which is fraught with the limitation that arguments are viewed as autosegmental elements only. GOCP's arguments range from phonological to morphological entities (see also Yip (1995a, b)). Put in another way, the GOCP, as conceived in Suzuki (1998), can deal with prosodic, featural, segmental or morphological elements.

(16) *Possible elements*

a. ***[F] … [F]**: no sequence of the same feature.

b. ***Rt… Rt**: no sequence of the same root node.

c. ***P cat … P cat**: no sequence of the same prosodic category.

d. ***G cat … G cat**: no sequence of the same morpheme.

Yip (1995a, b)

Following the footsteps of Suzuki (1998), we shall see how every element can be addressed. First, specifying F-elements as the arguments of the GOCP generates normal featural OCP effects between features (McCarthy (1986), Yip (1988)). Suzuki has carried out a survey with an eye to spotting the features that can undergo GOCP effects. Under this survey, the following features have been observed to exhibit GOCP effects: place features, such as Labial, Coronal and Pharyngeal; liquid features, such as [lat] and [rhotic] or [retroflex]; laryngeal features, such as [voice], [spread glottis] and [constricted glottis]; the feature [nasal]; stricture features, such as [cont]; vocalic features, such as [high], [low] and [back]; tonal features, such as [H] and [L]. He presents the languages that evince identity avoidance effects with regard to these features.

(17)

	Features	**Languages**
Place	[place]	Arabic, Cambodian, Javanese, Russian, Yucatec Mayan
	[labial]	Akkadian, Berber, Cantonese, Palauan, Ponapean, Yao, Zulu
	[coronal]	Akan, Dakota
	[pharyngeal]	Moses –Columbia Salish
Liquid	[liquid]	Javanese
	[lateral]	Kisi, Kuman, Latin, Yidin, Yimas,
	[rhotic]	Ainu, Georgian, Modern Greek, Sundanese, Yindjibarndi
Laryngeal	[voice]	Many Bantu languages, Gothic, Huamelultec/Oaxaca Chontal
	[spread glottis]	Sanskrit (Grassmann's Law)
	[constricted gl]	Seri
Nasal	[nasal	Chukchi
Stricture	[continuant]	Modern Greek, Northern Greek
Vocalic	[high]	Guere, Ngbaka, Southern Russian dialects (dissimilative Jakan'e), Woleaian
	[low]	Ainu, many Bantu languages

	[back]	Ainu, Tzeltal
Tonal	[H]	Arusa, many Bantu languages
	[L]	Peɲoles Mixtec

Suzuki (1998: 68)

Suzuki (1998) notes that nearly every conceivable feature can undergo GOCP effects and be involved in identity avoidance.

Thus far, we have presented a sketch of the features that can be conditioned by the GOCP. Under the GOCP, root nodes (i.e. segments) can also function as arguments (see Fukazawa (1999)). This is observed in languages banning the coexistence of two identical segments usually ensuing from morphological concatenation - an issue extensively taken by McCarthy (1986) usually dubbed 'antigemination'. The GOCP constraint *Rt … Rt prominently figures when a language discriminates against any occurrence of geminates or long vowels[10]. Under this conception, long vowels and geminates are viewed as marked owing to repetition of identical segments (see also Suzuki (1997)).

The third category that should be incorporated within the arguments that evince GOCP effects are syllables and feet (i.e. prosodic units). Suzuki (1998) argues that a compelling evidence for incorporating prosodic units as arguments falls to phenomena like length dissimilation that hold in Dinka, Finnish Gigabal, Japanese, and Latin. In these languages what dissimilates is prosodic length in adjacent syllables. Suzuki's view concerning such dissimilations is that these cases are a GOCP effect where the identity of syllables is evaluated in terms of their quantity (see also Kenstowicz and Kisseberth (1979)).

Other pieces of evidence for the syllabic GOCP effects stem from clash avoidance (Yip (1988) and Kager (1994)). Under a quantitative approach to syllables, the identity of syllables is assessed and checked against their prominence. The GOCP is thereby violated whenever two adjacent syllables are of equal prominence. Following Prince and Smolensky (1993), viewing stress in terms of prominence makes it possible to explain the phenomenon of clash avoidance as another instance

[10] The GOCP constraint *Root~Root is in good part consistent with the two constraints dubbed No Geminate (Ito and Mester (1996a, b)) and No Long Vowel (Rosenthall (1994), Alderete (1996,1997)).

of identity avoidance. The constraint posited to express the identity avoidance can be formulated as follows: *σ(p) … σ(p) ('p' for prominence). As regards feet, we know of no evidence that identity avoidance is evinced by feet. We also know of no reason why such identity avoidance should not hold. We leave the issue undecided until more decisive evidence is available.

The fourth category is morphemes. Evidence to the effect that morphemes undergo GOCP effects figures prominently in Yip (1995a, b). She strenuously argues that at least two types of dissimilatory phenomena are found in morphology, as shown in (18).

(18)

a. The same morpheme cannot appear twice in the same word.

b. Different but homophonous morphemes cannot appear adjacent in the same word, or otherwise adjacent in the sentence.

c. Homophonous morphemes cannot appear on adjacent words.

d. The output of reduplication cannot be totally identical.

Yip (1995a: 4)

On the basis of Ross (1972), Yip (1995a) gives an example of morphology OCP-effects from English. Yip explains that sequences of words ending in –ing are disfavoured in English, as noted in the examples below.

(19)

a. *John was standing reading the book.
b. *John was keeping reading the book.
c. *John was start<u>ing</u> reading the book.
d. *John was starting read<u>ing</u> the book.

To accommodate why these sentences are not tolerated, Yip (1995b) posits a constraint called OCP (ing) which, if translated in GOCP terms, can be entirely consistent with *ing … ing. She also posits some other constraints (see (20)).

(20)

a. **Prog = ing**: the progressive must surface marked by –ing.

b. **OCP (ing)**: outputs must not contain two –ings.

c. **Realize Verb**: verbs must not be deleted.

In a tableau format, the whole range of constraints are ranked as set out below.

(21) *Identity avoidance in English –ing* (Yip (1995a: 16))

Candidates	Prog = ing	OCP(ing)	Realize Verb
a. [V-ing…V-ing]		*!	*
b. [V-ing…V]	*!		
c. [V…V]	**!		
d. [V]	*!		*
☞ e. ø			**

The way constraints play out in this tableau provide ample evidence that morphology can also be subject to identity avoidance. From the foregoing, it can be concluded that the morphological category can stand as an argument among the GOCP arguments. Some other morphological instances of identity avoidance are well attested; one such case, termed Haplology, has been discussed by Stemberger (1981).

Thus far, we have presented the whole range of elements that are subject to the OCP. The first element is features. We have shown that nearly all features display OCP effects. The second element is the syllable which can also be subject to the GOCP. Morphological elements, not unlike other elements, may also exhibit instances of GOCP effects, as noted by Yip (1995a, b).

4.2 The GOCP and its domains

Suzuki (1998) also specifies the domain of the GOCP. Put in another way, he specifies the domain within which two identicals may interact. This section is meant to provide a brief retrospective on the domains of the GOCP as conceived in his theory. Dramatic examples exhibiting different domains will be given a handle through the course of developing this section. Suzuki (1998) holds that the domains of identicals interaction may well be either grammatical or phonological. The core idea of delimiting constraints to particular domains has already been around in phonology (see Archangelli and Pulleyblank (1994b), for grounded constraints see Mester and Ito (1996a, b)). As a first move, we need to provide a briefing about the necessity of domains for GOCP constraints.

4.2.1 Specifying domains is necessary

Suzuki (1998) purports that specifying domains in phonology is essentially necessitated. This necessity falls out from the fact that a composite of languages evince instances where domains are in full play with identity avoidance. Foremost among these languages is presumably Japanese, which may well be viewed as a dramatic example of domain activity. The Rendaku-Lyman's Law, a phenomenon that pervades the Japanese lexicon, is one such notable instance where domains are in full play. Rendaku is responsible for the voicing of voiceless obstruents belonging to the second member of a compound. However, if the second member of the compound happens to have a voiced obstruent, Rendaku is emphatically blocked. The picture is displayed in the data below.

(22)

a.	/kami-kaze/	kami-kaze	*kami-gaze	'divine wind'
b.	/onna-kotoba/	onna-kotoba	*onna-gotoba	'feminine speech'
c.	/kuzu-kago/	kuzu-kago	*kusu-kago	'waste basket'
d.	/geta-hako/	geta-bako	*geta-hako	'footwear case'

Suzuki (1998:91)

As the data shows, (22a, b) display instances of blockage. Candidates (22c, d) show that the domain of Rendaku is clearly not the whole span of the compound. If it were, then one of the voiced obstruents (each belonging to a different member of the compound) would have to dissimilate. (22c) shows that Rendaku does not tolerate two voiced obstruents only if the two voiced obstruents surface some place in the span of the second member of the compound. From the foregoing, it can be concluded that the domain of Rendaku is the stem[11] of the second member of the compound. Following Mester and Ito (1996a, b), Suzuki formulates the constraint that expresses the requirement of Rendaku in the following

[11] Mester and Ito (1996a, b) use 'stem' to refer to each member of the compound.

fashion: *[voice]…[voice] and *[-son]…[-son]$_{stem}$. The constraint asserts that no two voiced obstruents may hold within the span of a stem.

The necessity to use the domain 'stem' ensues from the restrictive nature of Rendaku itself. This necessity is translated into a comparative tableau where *[voice]…[voice] & *[-son]…[-son] and *[voice]…[voice] & *[-son]…[-son]$_{stem}$ drive different optimal forms.

(23)

/geta-hako/	*[voice]…[voice] & *[-son]…[-son] $_{stem}$	R
☞a. [[**g**eta]-[**b**ako]]		
b. [[**g**eta]-[hako]]		*!

/geta-hako/	*[voice]…[voice] & *[-son]…[-son]$_{stem}$	R
a. [[**g**eta]-[**b**ako]]	*!	
💣b. [[**g**eta]-[hako]]		*

*[voice]…[voice] and *[-son]…[-son]$_{stem}$ correctly predicts that Rendaku voicing is not affected by the voiced obstruent [g] in the first member [geta]. Nonetheless, in the second tableau, the GOCP constraint – which applies to the whole span- incorrectly picks the winner in which Rendaku is blocked due to the voiced obstruent in the first member. To this end, we conclude that domain specification is sorely needed to limit the application of the GOCP to specific domains.

4.2.2 Morphological domains.

Suzuki (1998) divides morphological domains into two categories, morphophonemic and root co-occurrence. He also attempts to derive these categories in terms of the GOCP-based theory of dissimilation.

In morphophonemic terms, identity avoidance is operative under morpheme concatenation. Put more strictly, identity avoidance in many languages favour morphophonemic domains where stem and affix are adjoined. This observation is confirmed by Latin, where lateral dissimilation obtains across morphemes as in sol-*aris* but emphatically fails within the span of a single morpheme, as in *diluculo* 'down' (Nelson (1996)). However, there is a subtlety that deserves mention. It has been cited before that proximity is of prime utility in computing the activity of the GOCP. Such reality runs counter to the morphophonemic example of identity avoidance exhibited by Latin. To get a proper understanding of the reasons driving such discrepancy, Suzuki (1998) strenuously argues that in stems like *diluculo* root faithfulness must reign above the constraint requiring identity avoidance. This explains why it is usually affixes that surface altered and it is roots[12] that are reproduced unscathed. Prince and Smolensky (1993) hold that a universal ranking must hold between Root-Faith and Affix-Faith as laid out below.

(24) **Root-Faith >> Affix-Faith**

Availing himself of this ranking, Suzuki (1998) contends with the Latin instance of dissimilation. With both Root-Faith and Affix-Faith along with the GOCP constraint *[liq]~[liq] & *[lat]…$[lat]_{stem}$[13] intercalated between the two first constraints, root elements surface unscathed.

(25)

/sol-alis/	Root-Faith	*[liq]~[liq] & *[lat]…$[lat]_{stem}$	Affix-Faith
a. [sor-alis]	*!		
☞b. [sol-aris]			*
/calculus/	Root-Faith	*[liq]~[liq] & *[lat]…$[lat]_{stem}$	Affix-Faith
☞c. [calculus]		*	
d. [calcurus]	*!		

As the display evinces in the first tableau, (25a) is ruled out as it incurs a fatal violation of Root-Faith. We are left with (25b) as the optimal candidate. In the second tableau, (25c) is evaluated as optimal owing to (25d)'s fatal violation of Root-Faith.

Let us turn now to the other morphological restrictions dubbed root co-occurrence restrictions. Suzuki (1998) purports that such restrictions are solidly attested in Semitic languages like Arabic as well as in

[12] See Beckman (1997, 1998) for root faithfulness.

[13] The constraint asserts that the local conjunction of *[liq]~[liq] and *[lat]…[lat] is prohibited in the stem.

Camobodian, Javanese, Russian and Yucatec Mayan. In these languages Suzuki explains that 'the multiple occurrence of a certain phonetic property or complex of phonetic properties inside a morpheme is highly restricted'. While morphophonemic constraints hold across morphemes, root co-occurrence restrictions are tautomorphemic and limited to the domain of the root. To get around instances exhibiting root co-occurrence restrictions, Suzuki (1998: 123) posits the following ranking.

(26) $\text{GOCP}_{\text{Root}}$ >> Root-Faith >> Affix-Faith >> $\text{GOCP}_{\text{Stem}}$

He thinks that this ranking can contend successfully with root co-occurrence restrictions. He provides an example from Javanese, where roots may not tolerate more than one labial consonant (Mester (1986), Uhlenbeck (1949)). He explains that the coexistence of labials like *bb, *mm, *pp, *bm, *mb, *mp is not at all attested. Suzuki (1998) argues that the ranking laid out in (26) can provide an adequate characterization of the phenomenon displayed in Javanese.

4.2.3 Phonological domains

On the basis of works championed most notably by Mester and Ito (1996a, b) and Alderete (1996a, b), Suzuki (1998), following the lead of the aforementioned phonologists, purports that phonological domains like syllables and feet are of prime importance in phonology. Where the phonological domain is the syllable, Suzuki (1998) provides a notable example from Seri. He argues that Seri is one of the dramatic examples that call on the syllable to act as a phonological domain. He embarks on an analysis with an eye to showing that dissimilation in Seri is only admitted within the boundaries of a syllable, and that the two identicals that are subject to the GOCP cannot be accommodated under other types of adjacency. To cast more light on the revelatory twists exhibited by Seri, Suzuki (1998: 125) provides the schematic examples in (27) where sequences of two X's are subject to the GOCP.

(27) a. *[X V X]σ

b. …X V] σ [XV…

The display presented in (27) refers to two scenarios that are well attested in Seri. Suzuki (1998) explains that the way the GOCP should approximate the two scenarios in (27) ought by right to be identical. The instances exhibited by (27a) and (27b) are all identical with respect to adjacency. The two X's in (27a) and (27b) are both separated by a vowel. Therefore, if dissimilation holds between the two X's in (27a), there is no reason why it should not hold in (27b). Suzuki explains that we need to show that the domain of the syllable is essentially necessitated if we are to argue that (27b) is well-formed and (27a) is not. The only difference observed between (27a) and (27b) is the existence of a syllable boundary in (27b) and its absence in (27a). We need to explain that it is this difference that is responsible for the well-formedness of (27a) and the ill-formedness of (27b).

By presenting more details, Suzuki (1998) contends that Seri, a Hokan language of north Mexico, exhibits instances where a glottal stop preceded by another glottal stop is deleted if the two glottal stops belong to the same syllable, as the data below shows.

(28)

a.	/ʔa-aaʔ-sanx/	ʔ-aa-sanx	[ʔaa.sanx]	'who was carried'
b.	/ʔa-aaʔ-otʃ/	ʔ-aa-otʃ	[ʔaa.otʃ]	'what was sucked'
c.	/ʔa-aaʔ-aχʃ/	ʔ-aa-aχʃ	[ʔaa.aχʃ]	'what was hit'
d.	/ʔi-ʔ-aaʔ-kaʃni/	ʔi-ʔ-aa-kaʃni	[ʔi.ʔaa.kaʃ.ni]	'my being bitten'

While the second of the two glottal stops manages to surface unscathed in (28d), it emphatically fails to surface in (28a, b, c). Under close scrutiny, it emerges that in (28d) the first and the second glottal stops are not tautomorphemic while they are in (28a, b, c). Following Yip (1988), Suzuki (1998) argues that these instances should by right ensue from requirements of the OCP. He posits a substantive constraint *[c.g.]…[c.g.][14] that acts within the domain of a syllable.

(29) ***[c.g.]…[c.g.]σ** : A sequence of [c.g] is prohibited within the syllable.

This constraint, suitably ranked within a constraint hierarchy, can achieve the goal intended here. Consider the display exhibited in a tableau.

(30)

/ʔi-ʔ-aaʔ-kaʃni/	*[c.g.]…[c.g.]σ	Faith	*[c.g.]…[c.g.]
a. ʔi.ʔaaʔ.kaʃni	*!		**

[14] [c.g.] stands for constricted glottis.

☞b. ʔi.ʔaa.kaʃni		*	*
c. ʔi.aa.kaʃni		**!	

The tableau shows that limiting dissimilation to a syllable derives the right optimal output. Candidate (30a), owing to its fatal violation of *[c.g.]…[c.g.]σ fails to achieve any degree of success. It thereby yields the palm to candidate (30c) and (30b). Candidate (30b) outperforms candidate (30c) because it incurs a single violation mark of Faith while (30c) incurs two violation marks. Candidate (30b) is therefore chosen as optimal. As the reader may verify, not specifying the domain of dissimilation entails the derivation of (30c) as optimal. From the foregoing, it emerges that specifying the syllable as a phonological domain is sorely needed to accommodate dissimilation in Seri[15]. Given the necessity of the syllable as a phonological domain, we shall, following in that the steps of Suzuki (1998), motivate the need for the foot domain.

Identity avoidance is also confirmed to operate in feet. In Woleaian, a language spoken in Woleai Island (Odden (1987), Alderete (1996)), Suzuki (1998) observes a phenomenon of dissimilation that pervades the lexicon of Woleaian. Interestingly, dissimilation is only operative within the bounds of feet. The phenomenon can be laid out as follows: a short vowel [a] becomes a mid vowel [e] (bolded) when the next syllable contains another low vowel [a, aa, ɔɔ] (underlined). Information derived from Woleaian suggests that the vowel of the causative prefix ga- undergoes raising and surfaces as ge- when followed by another low vowel in the next syllable, as in (31c, d, e).

(31) Suzuki (1998: 128)

a.	/ga-boso/	ga-bosO	'[caus.] cause him to show off'
b.	/ga-kere/	ga-kerE	'[caus.] to make happy'
c.	/ga-taŋi/	g**e**-taŋI	'[caus.] to make him weep'
		*ga-taŋI	
d.	/ga-maaro/	g**e**-maarO	'[caus.] make him starve'
		*ga-maarO	
e.	/ga-mɔɔwa/	g**e**-mɔɔwE	'[caus.] erase it'

15 Domain specified constraints dominate non-domain specified constraints in fine agreement with Pãnini's Theorem (Prince and Smolensky (1993)).

		*ga-mɔɔwE	
f.	/ga-gofagiiye/	ga-gofagiiyE	'[caus.] make it slow down'
		*g**e**-gofagiiyE	

Suzuki explains that these data necessitates positing a constraint against the coupling of two low vowels.

(32) ***[low]…[low]** : A sequence of two low vowels is prohibited.

Since our concern here is the specification of GOCP domains, our focus will fall on specifying the domain of the GOCP in Woleaian. Typical of Woleaian is the revelatory iterative application of dissimilation. In words containing a sequence of more than two a's, the alternating pattern emerges.

(33)

a.	/marama/	m**e**ramE	'moon'
b.	/marama-li/	mar**e**malI	'moon of'
c.	/marama-mami/	m**e**ram**e**mamI	'our (excl.) moon)'
		*mar**e**mam**e**mI	
d.	/yafara/	y**e**farE	'shoulder'
e.	/yafara-i/	yaf**e**raI	'my shoulder'
f.	/yafara-mami/	y**e**far**e**mamI	'our (excl.) shoulders'
		*yaf**e**ram**e**mI	

As the data shows, the place of the dissimilated [e] is ascribed to the number of successive a's. (33a) evinces that in unaffixed forms, it is the first vowel which is dissimilated. Conversely, in (33b), it is the second vowel that is dissimilated. In (33c) both the first and the third vowels dissimilate.

To accommodate this alternating pattern, Suzuki contends that the GOCP constraint *[low]…[low] must be domain-specified for a foot, in this case an iambic foot. The constraint can be written as follows.

(34) ***[low]…[low]$_{\mathbf{Foot}}$**: A sequence of two low vowels is prohibited within a foot.

Suzuki provides a whole range of pieces of evidence with an eye to proving that dissimilation takes place in an iambic (right headed) foot. For instance, literature on prosodic phonology offers compelling evidence that changes figure prominently in the first syllable of an iambic foot (see in particular Hayes (1987,1995) and Prince (1990)). Since dissimilation in Woleaian affects the first syllable, the phenomenon should by right be consistent with the cross-linguistic behaviour of iambic feet as evidenced by many phonologists (see McCarthy (1994), Suzuki (1995a), and Bacovic (1996).

To successfully contend with -a- dissimilation in Woleaian, Suzuki (1998), in agreement with the mainstream work on foot phonology, assumes that the analysis should be implemented via Foot Binarity, Foot Form=Iamb, Nonfinality and Alignment (Prince and Smolensky (1993), McCarthy and Prince (1993b)).

Suzuki (1998) assumes that head elements are more faithful than non-head elements. The requirement that head elements are more faithful than non-head elements is expressed by the constraint Head-Faith.

(35) **Head-Faith**: Corresponding head elements have identical values for the feature F.

Head-Faith ensures that the head syllable of the iambic foot (right head) will be reproduced unaltered and guarantees that the change will be effected in the non-head syllable (the first syllable). With the constraint in (35) in hand, we ensure that dissimilation will hold in the left syllable and not the right syllable of an iambic foot. The following tableau schematizes the interaction of *[low]…[low]$_{Foot}$, Head-Faith and Faith.

(36)

/ga-tɔɔ-tɔɔ-wa/	Head-Faith	*[low]…[low]$_{Foot}$	Faith
a. ga(**tee**tɔɔ)wE			**
b. (gatɔɔ)tɔɔwE		*!	
☞c. (g**e**tɔɔ)tɔɔwE			*
d. (gat**ee**)tɔɔwE	*!		**

Let us see the candidates in turn. The first candidate (36a) has an ill-formed iamb and thereby violates the higher ranked Foot Form. All remaining candidates have a well-formed iambic foot. The first candidate (36b), although faithfully rendering the input, stands in fundamental conflict with *[low]…[low]$_{Foot}$. (36d), owing to its unfaithful rendering of the head of the iambic foot, emphatically fails on Head-Faith. (36c), by satisfying both Head-Faith and the GOCP constraint *[low]…[low]$_{Foot}$, beats all the other candidates and is thereby selected as optimal.

However, the ranking posited thus far fails to accommodate mappings like /marama-li/ > [maremalI] as set out in the following tableau.

(37)

/marama-li/	Head-Faith	*[low]…[low]$_{Foot}$	Faith
☺ a. ma(**re**ma)lI			*
☺ b. (m**e**ra)malI			*

Under the posited ranking, both (37a) and (37b) achieve the same degree of success. To contend with this conundrum, Suzuki (1998) purports that we have to incorporate the GOCP constraint *[low]…[low][16]. We need to place it below Faith to get the right optimal output. Suzuki (1998) explains that even if the constraint is placed at the bottom of the hierarchy, it can select the right optimal output.

(38)

/marama-li/	Head-Faith	*[low]…[low]$_{Foot}$	Faith	*[low]…[low]
☞a. ma(**re**ma)lI			*	
b. (m**e**ra)malI			*	*!

To wind up our discussion about Woleaian a-dissimilation, we posit the final ranking in (39).

(39) **Final ranking**

Head-Faith, *[low]…[low]$_{Foot}$ >> Faith, *[low]…[low]

From the foregoing, it emerges that the specification of foot as a domain for a- dissimilation in Woleaian is sorely needed. Under foot-based GOCP, the alternating pattern is given an explanatory account.

In this section, we have presented a variety of domains that are confirmed to condition identity avoidance. Along Suzuki's line of thinking, we have shown that domains conflate two types of families, a

[16] *[low]…[low] must be ranked below *[low]…[low] $_{Foot}$. This follows from Pãnini's theorem that the more specific constraint must dominate the more general one.

morphological family and a phonological family. The morphological family encompasses roots, stems and words, and it can either be morphophonemic or a root co-occurrence restriction. The phonological family conflates syllables and feet.

4.3 Similarity in the GOCP theory.

Within the elements of the GOCP, it has been noted before that nearly all features are observed to undergo identity avoidance effects. However, findings by (Mester (1986), McCarthy (1986, 1988, 1994), Selkirk (1988, 1991, 1993), Padgett (1991, 1992), Yip (1989), Pierrehumbert (1993)) lend tacit support to the fact that identity avoidance is strenuously enforced when minor dependent features are also identical. Put more strictly, it was observed that some root co-occurrence restrictions are more consolidated when two tautomorphemic segments that share identical place features share also some minor place or stricture features. As indeed has been noted before, the disposition that ensued from discovering the effect of added similarity on the strength of the OCP was to change the representation of geometrical trees so as to meet the effect of added similarity on the OCP. This leads to what Padgett (1992) calls 'OCP-Subsidiary Features Effects'.

This section is meant to address similarity along Suzuki's (1998) GOCP approach. We shall contrast Padgett's (1991) similarity approach with Suzuki's (1998) GOCP with an eye to evincing that Suzuki's GOCP offers more explanatory appeal and offers a unified account thanks to the use of the underpinnings of local conjunction (Smolensky (1993, 195)).

4.3.1 Similarity in a representational approach.

Because representational trees are the strategy pursued to accommodate different phonological phenomena at the FG era, Padgett's (1991) analysis of different phonological phenomena is based on the same strategy. Padgett (1991) contends that accounting for added similarity must be handled along the reformulation of the feature geometrical tree. Let us see how Padgett's approach of similarity gets around identity in ABA.

Not unlike other Berber and Semitic varieties, ABA is notorious for root co-occurrence restrictions. Under these restrictions, no two consonants may be homorganic within a root[17] (see Ansar (2003, 2004)). That is to say, if a labial consonant, for instance, holds within the root, no other labial consonant may hold in the same root, regardless of whether the two consonants are identical in terms of [cont] and [son]or not (*(b…b), *(m…m), *(f…f), *(b…m), *(b…f), *(f…m)). This restriction holds with the same degree of consistency with respect to dorsal and pharyngeal consonants. However, the restriction is markedly weakened at the coronal place. Put more clearly, while coronal identicals do not cohabit in ABA roots, coronal stops (t, d, T, D) may coexist freely with coronal fricatives (s, z, S, Z, ʃ, ʒ), and coronal obstruents are freely tolerated to co-occur with coronal sonorants (n, l, r). This freedom of distribution is presumably attributed to the richness of the coronal consonantal system as well as the richness of the consonantal oppositions at the coronal place in ABA. Look at the data below.

(40) *Data from ABA*

Cor. Fric + cor. stop		*Cor. Obst + cor. son*	
asid	'light'	adal	'green'
iZiD	'ghost'	innəT	'he turned'
idis	'near'	iTəR	'he went down'
aTTaS	'a lot of'	adan	'bowels'

To focus our discussion, let us consider the weakened identity avoidance effects which trigger the free cohabitation of coronal fricatives with coronal stops on the one hand and coronal obstruents with coronal sonorants on the other (see (40)). If we use Padgett's (1991) approach, this means that we have to use his concept 'Designated OCP-Subsidiary Feature'. Under Padgett's account, the feature [cont] and [approximant] ([son]) should be specified as designated OCP-subsidiary features. This is due to the fact that identity avoidance is not triggered at the coronal area unless identity of [cont] and [approx] is ensured. To account for the fact that OCP effects are not limited to place but also to [cont] and [approx], we are forced to recruit his revised version of the OCP.

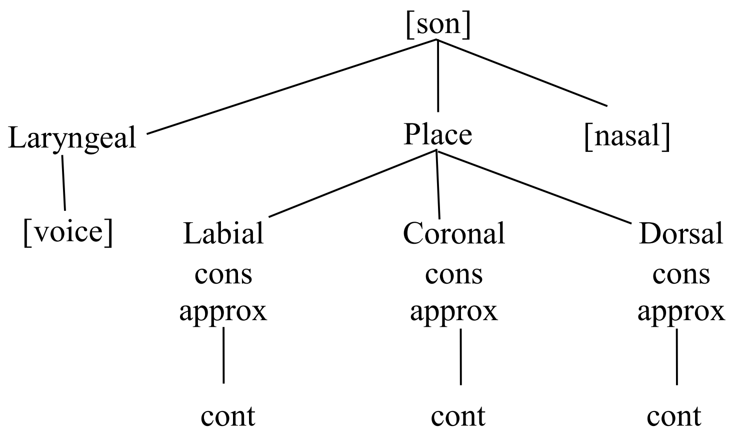
[17] There is a good number of ABA roots where two identical segments hold in specific places in the root, as in *udad*, *aməssas*, *anrar* …etc. These cases are, to our belief, reminiscent of Long Distance Consonant Correspondence (see Ansar (2004)).

(41) **Revised Version of the OCP (Padgett (1991: 181))**

At the melodic level, adjacent identical segments 'FF' are prohibited, iff all subsidiary features stipulated for F are also identical.

This modified form of the OCP can readily account for ABA similarity facts. The modified form of the OCP takes care of similarity effects by making the OCP[place] operative for two adjacent [cor] segments only when they agree in [cont] and [approx] values. Crucially, the revised OCP proposed in Padgett (1991) is consistent with his geometrical tree. Under his geometrical tree, stricture features ([cons], [approximant], [cont]) are dominated by place features.

(42)



Because the designated OCP-subsidiary features [cons], [approx] and [cont] are dependent of place (Lab, Cor, Dor), OCP effects on place entail the same OCP effects on the stricture features [cons], [approx] and [cont].

In the remainder of this section, I propose an analysis along the GOCP theory and see in what ways the new analysis is better than Padgett's analysis.

4.3.2 Similarity under a GOCP approach.

In a constraint-based analysis, I assume that place cooccurence restrictions in ABA roots are attributed to a constraint against identical place. The constraint against identical place directly accounts for labial, dorsal and pharyngeal places where homorganic place is not tolerated in the root. The constraint is termed *[Place]…[Place]$_{Root}$. To account for coronal consonants where identity avoidance is only observed under identity of [cont] and [son], we need to recruit two other constraints. The end result of the first is to ban the sequence of two [cont] features in the root. The second has to discriminate against the sequence of two [son] features in the root. The three constraints can be laid out as follows.

(43) a. ***[Place]…[Place]$_{Root}$**: A sequence of two identical [place] features is prohibited in the root.

b. ***[cont]…[cont]$_{Root}$**: A sequence of two identical [cont] features is prohibited in the root.

c. ***[son]…[son]$_{Root}$**: A sequence of two identical [son] features is prohibited in the root.

The added similarity requirement observed in ABA coronals suggests that the three constraints ought to be grouped together if an adequate characterization is to obtain. In fine accord with the line of thinking of Suzuki (1998), I suggest that the use of locally conjoined constraints will enable us to contend successfully with the behaviour of coronals in ABA. The triple requirement of local conjunction in *[Place]…[Place]$_{Root}$ & *[cont]…[cont]$_{Root}$ & *[son]…[son]$_{Root}$ is how we approximate the added similarity requirements exhibited by coronal consonants. Put in another way, an optimal candidate must not violate the trilateral requirements of the locally conjoined GOCP constraint, but it may violate one or two of the requirements. In OT terms, this means that *[Place]…[Place]$_{Root}$ & *[cont]…[cont]$_{Root}$ & *[son]…[son]$_{Root}$ must dominate the non-locally conjoined constraints *[Place]…[Place]$_{Root}$, *[cont]…[cont]$_{Root}$, *[son]…[son]$_{Root}$.

(44) ***[Place]…[Place]$_{Root}$ & *[cont]…[cont]$_{Root}$ & *[son]…[son]$_{Root}$**

a. *[Place]…[Place]$_{Root}$ & *[cont]…[cont]$_{Root}$ &

*[son]…[son] $_{\text{Root}}$ is violated when the sequence of two segments in the root violate all of *[Place]…[Place] $_{\text{Root}}$, *[cont]…[cont] $_{\text{Root}}$ and *[son]…[son] $_{\text{Root}}$.

b. *[Place]…[Place] $_{\text{Root}}$ & *[cont]…[cont] $_{\text{Root}}$ & *[son]…[son] $_{\text{Root}}$ >> *[Place]…[Place] $_{\text{Root}}$, *[cont]…[cont] $_{\text{Root}}$, *[son]…[son] $_{\text{Root}}$

To see how the locally conjoined constraint plays out with Faith and the non-locally conjoined constraints, let us look at a tableau.

(45)

/d….d/ $_{\text{Root}}$	*[Place]…[Place] $_{\text{Root}}$ & *[cont]…[cont] $_{\text{Root}}$ & *[son]…[son] $_{\text{Root}}$	Faith	*[cont] … [cont] Root	*[son] … [son] Root
a. d….d	*!		*	*
☞ b. z….d		*		*
☞ c. n….d		*	*	

As the display shows, the locally conjoined constraint manages to choose the right output that satisfies similarity requirements. To this end, we conclude that local conjunction is an effective solution to problems triggered by similarity effects. We can also conclude that both Padgett's account and Suzuki's account have offered a satisfactory treatment of root co-occurrence restrictions in ABA. Nonetheless, in the remainder of this subsection, I shall argue that similarity as local conjunction is superior to the representational account by Padgett (1991), Yip (1989), Selkirk (1988, 1991, 1993), and McCarthy (1986) for many reasons.

For one thing, similarity as local conjunction makes use of independently motivated constraints only. We have seen that every constraint emerges out of a particular phonological need. Local conjunction is itself independently motivated as argued in a variety of works like Suzuki (1997), Kirchner (1995) and others. Conversely, representational approaches draw heavily on geometrical and hierarchical relations, underspecification or the OCP itself. Under Padgett's 'revised OCP approach', there is nothing that shows that the principle is independently motivated, while under GOCP analysis both the OCP as well as local conjunction are independently motivated.

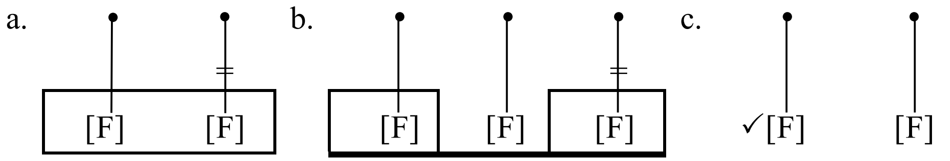
For another, similarity as local conjunction can contend successfully with cases that representational accounts emphatically fail to accommodate. Representational approaches' Achilles heel figures prominently in assimilation and dissimilation processes which are blocked by features that are not designated subsidiary feature.

In concluding, our discussion of co-occurrence restrictions in ABA roots has shown that viewing similarity within the GOCP approach proves to be better than viewing it within representational approaches such as Padgett's revised OCP. The GOCP approach derives much of its appeal from two reasons. First, it does not necessitate any revision of the OCP just for the purpose of accounting for similarity effects; secondly, it can accommodate cases which are viewed to be insuperable for representational approaches.

4.4 Adjacency in the GOCP theory

Adjacency which also goes by the name of locality has been around in phonology for a long time. Works on adjacency date back to Steriade (1987), subsequently refined in a variety of ways in Myers (1987), Odden (1987), Steriade (1995) and others. In representation-based locality terms, phonological rules apply between elements adjacent on some tier. Put more strictly, phonological rules cannot skip a feature that exists in the tier targeted by the rule. To provide a schematic view of how this holds in a Feature geometry approach, let us consider the representations below borrowed from Suzuki (1998: 80).

(46)



The representations in (46) are meant to show instances of dissimilation. (46a) portrays the putative instance of dissimilation where two [F]'s belong to the same tier, the second dissimilates. Adjacency in (46b) asserts that dissimilation fails to obtain owing to the existence of an intervening [F] on the same tier. The conundrum arises in (46c) where the second [F], though on the same tier with respect to the first [F], emphatically fails to dissimilate, counter to what might be expected. The answer to why dissimilation in (46c) fails is ascribed to distance. The distance between the two [F]'s in (46c) is larger than the distance between the two [F]'s in (46a)[18]. This shows that locality is violated in (46c), a situation that cannot be contended with under representational approaches. Propelled by the tenets of the GOCP theory, we shall address Suzuki's (1998) account of four different types of distance requirements from Ainu, Yimas, Kera and Japanese.

4.4.1 Root adjacency in Ainu

Languages that exhibit instances where identicals are not tolerated in strictly adjacent contexts are replete in the world. McCarthy (1986) has put his hand to elucidating a variety of languages that are notorious for precluding the creation of geminates. In a set of the aforementioned languages, syncope is blocked just in case it would create tautomorphemic adjacent identical consonants. Crucially, syncope is blocked where its occurrence is merited by surface conditions. In another set, one of the two identical segments is altered to ensure identity avoidance. Ainu, a Japanese variety spoken in Hokaido, is a language that belongs to the second set. According to Shibatani (1990: 13), Ainu turns /-rr-/ sequences into [-nr-].

(47)

a.	/kukor rusy/	kukon rusy	'I want to have something'
b.	/kor rametok/	kon rametok	'his bravery'
c.	/kor mat/	kor mat	'his wife'
d.	/kukor kur/	kukor kur	'my husband'
		*kukon kur	

The data above schematizes the situation that arises when the two r's are root adjacent and when they are not. When the two r's are strictly adjacent, the first is altered into an [n]. When the two r's are not root adjacent, no change holds and the r's surface unscathed.

To accommodate the phenomenon and to reify the distinction observed between root adjacent rhotics and non-adjacent rhotics, we shall appeal to the gradient proximity hierarchy conceived by Suzuki (1998), repeated here for the sake of clarity.

[18] Distance is annotated by ellipsis in (46a) and (46c).

(48) ***X…X**= {*XX >> *X-C_0-X >> *X-μ-X >> *X-μμ-X >> *X-σσ-X >> *X-∞-X}

Under the above hierarchy, distance is a prime factor for the application of the GOCP. The closer the distance is between two identicals, the stronger the GOCP effects. Ainu displays a phenomenon that is in fine accord with the hierarchy laid out in (48). /r/ is mapped onto [n] only if the second /r/ is root adjacent with the first. To handle this phenomenon, Suzuki (1998) recruits a constraint labeled *[rhotic]…[rhotic]. Under the proximity hierarchy in (49), *[rhotic]…[rhotic] is extended as follows.

(49)***[rhotic]…[rhotic]** :{*[rhotic][rhotic] >> … >> *[rhotic]-σσ-[rhotic] >> *[rhotic]-∞-[rhotic]}

Because dissimilation obtains only in root adjacent rhotics, and emphatically fails on rhotics separated by larger distance, Suzuki (1998) contends that Faith should be ranked below *[rhotic][rhotic] and above any GOCP constraint banning rhotics separated by any larger distances, such as *[rhotic]-μ-[rhotic]. Consider how this is displayed in (50).

(50)

/kukor rusuy/	*[rhotic][rhotic]	Faith	*[rhotic]-μ-[rhotic]
a. kukor rusuy	*!		
☞b. kukon rusuy		*	
/kukor kur/	*[rhotic][rhotic]	Faith	*[rhotic]-μ-[rhotic]
☞c. kukor kur			*
d. kukon kur		*!	

When the two rhotics are root adjacent (50b), dissimilation holds, but it patently fails when the rhotics are not root adjacent (50c). The approach deployed thus far presents us with compelling evidence that the posited proximity constraint *[rhotic] [rhotic], along with Faith placed right below it, is sufficient to trigger dissimilation. This ranking ensures that no dissimilation would take place under larger distances – i.e. if the two rhotics are farther away.

4.4.2 Syllable adjacency

Suzuki (198) cites a dramatic example of syllable adjacency from Yimas[19], a Papuan language spoken in New Guinea. Under dissimilation in Yimas, the inchoative suffix –ara surfaces as –ata if a r̲ holds exactly in the preceding syllable; elsewhere the suffix -ara surfaces unaltered. As the reader may verify, only (51b) exhibits an instance of dissimilation. In the other forms, dissimilation patently fails owing to the non-existence of a preceding rhotic r̲ (51a) or to the presence of a farther-placed rhotic – more than one syllable away (51c, d, e).

(51)

a. pak-ara	'break open'
b. apr-ata	'open spread'
c. kkrak-ara	'loosen'
d. araŋ-ara	'tear into pieces'
e. wurpi-ara	'slacken'

Foley (1991: 54)

Suzuki (1998) follows Odden (1987) in treating /r/ as lateral. The reason underlying this treatment is reminiscent of the discovery that the Yimas rhotic /r/ is in free variation with a lateral [l]. Suzuki (1998) starts his analysis by positing a constraint requiring dissimilation of laterality. It is the GOCP constraint *[lat]…[lat] that is involved, of most concern here the specific GOCP constraint *[lat] μ [lat], which discriminates against the sequence of two rhotics up to one yllable away. The picture is displayed in the following tableau.

(52)

/apr-ara/	*[lat]-μ-[lat]	Faith	*[lat]-σσ-[lat]
a. apr-ara	*!		
☞b. apr-ata		*	
/araŋ-ara/	*[lat]-μ-[lat]	Faith	*[lat]-σσ-[lat]
☞c. araŋ-ara			*
d. araŋ-ata		*!	

[19] See Foley (1991) for a detailed analysis of Yimas.

In the first tableau in (52), candidate (52a) fatally violates *[lat] μ [lat]; it thereby loses the competition to (52b) which is evaluated as optimal. In the second tableau, both (52c) and (52d) satisfy *[lat] μ [lat]. However, since Faith is the first dominated constraint, the more faithful (52c) outperforms (52d) and is thereby chosen as optimal. As the reader may see, the approach utilizing the GOCP constraint captures the important observation that rhotics belonging to adjacent syllables are not tolerated in Yimas[20].

In closing, it has been proved that the GOCP account can readily get around dissimilation in Yimas. Furthermore, it provides ample evidence that syllable adjacency can condition the GOCP effects.

4.4.3 Single consonant adjacency

Most phonological literature concurs that root adjacency and syllable adjacency are the only ways of computing adjacency (see McCarthy (1995), Odden (1987) and Alderete (1996, 1997)). Counter to the prevalent view, Suzuki (1998) purports that there are other instances of adjacency. One such adjacency is termed single consonant adjacency. In single consonant adjacency terms, GOCP effects obtain between two segments that are at most one consonant away from each other. A notable example obtains from Kera, a language spoken in Chad. In this language the low vowel /a/ is mapped onto [ə] (a high back unrounded vowel) when followed by another [a]. The data below exemplifies the phenomenon.

(53)

a.	ba	'not'
b.	pa	'again'
c.	bə-pa	'no more'
d.	koroŋ	'left'
e.	da	'to here.
f.	fadi	'quickly'
g.	koroŋ-də-fadi	'came here quickly'

Suzuki (1998: 88)

[20] Foley's (1991: 41, 42) findings that root adjacent rhotic clusters –rr- are not observed in Yimas strengthens the analysis carried out here. Satisfaction of *[lat]-μ-[lat] implies satisfaction of the higher ranked constraint *[lat][lat].

As the reader may verify, in the forms (53c, g) portraying /a/ dissimilation, the two a's are one consonant away from each other. Interestingly, if the two /a/'s are more than one consonant away a-dissimilation does not hold.

It is clear from the foregoing that the above dissimilation can neither fall under root adjacency nor under syllable adjacency. It should by right be characterized as a single consonant adjacency. Therefore, any account accommodating Kera's a- dissimilation should view the phenomenon under single consonant adjacency if satisfactory results are to obtain. With this investigation as background, Suzuki (1998) deploys the GOCP constraint *[low] C_1 [low] to accommodate this phenomenon. He concurs that faithfulness – in this case Ident-IO Low- should be ranked immediately below *[low] C_1 [low]. Consider how the two constraints play out in the following tableau.

(54)

/ba-pa/	*[low]-C_1-[low]	Faith	*[low]-μ-[low]
a. ba-pa	*!		
☞b. bə-pa		*	
/bal-l-a/	*[low]-C_1-[low]	Faith	*[low]-μ-[low]
☞c. bal-l-a			*
d. bəl-l-a		*!	

In the second tableau, dissimilation fails because the two low vowels are two consonants away from each other.

With this investigation as background, we can securely concur that single consonant adjacency ought to be incorporated within the parameters of adjacency.

4.4.4 Unbounded adjacency

There is a well-known phenomenon in Japanese dubbed Lyman's Law. Under Lyman's Law, morphemes may not tolerate more than one voiced obstruent, a phenomenon handled by a variety of authors like Steriade (1987, 1995), Ishihara (1991), Archangeli and Pulleyblank (1994a) and Mester and Ito (1996, 1997). The point of interest in this phenomenon is that voiced obstruents may not obtain within a morpheme regardless of the distance that may hold between them. Put more strictly, there are no adjacency requirements between the first and the second voiced obstruent. This is why Suzuki terms this adjacency as 'unbounded adjacency'. The remainder of this section is meant to circumvent Lyman's Law with an eye to nailing down and reifying the adjacency requirements in Japanese.

It has been cited before that Rendaku, a phenomenon that requires the voicing of the initial obstruent of the second member of a compound, pervades the Japanese lexicon. The quirk of Rendaku is that obstruents undergo voicing only if followed by a sonorant consonant or a voiceless obstruent. Put in another way, if the obstruent undergoing Rendaku is followed by a voiced obstruent, the first voiceless obstruent fails to undergo voicing. Put more strictly, there is a force that foils the attempt to create two voiced obstruents within one morpheme, usually the second member of a compound. Consider how this is illustrated in the following data.

(55)

a. /ori-kami/	ori-**g**ami	'paper folding'
b. /yama-tera/	yama-**d**era	'mountain temple'
c. /nuri-futa/	nuri-**b**uta	'lacquered lid'
d. /kami-kaze/	kami-kaze	'divine wind'
	*kami-**g**a<u>z</u>e	
e. /onna-kotoba/	onna-kotoba	'feminine speech'
	*onna-**g**oto<u>b</u>a	
f. /nuri-fuda/	nuri-fuda	'lacquered sign'
	*nuri-**b**u<u>d</u>a	

(55 a, b, c) illustrate the application of voicing when the first obstruent is followed by sonorant or voiceless consonants. (55 d, e, f) evince the blockage of voicing when the obstruent is followed by a voiced obstruent. Crucially, when Rendaku is precluded by the second voiced obstruent, the distance between the two obstruents knows no principled limits. No matter how far the second obstruent is, the blockage always holds as in (55e). Hence, the name 'unbounded adjacency' is the expression that best describes the situation.

Let us now turn to the revelatory twists displayed by the interaction of Lyman's Law with Rendaku in Japanese. Suzuki (1998: 92) attributes the blockage of Rendaku to the combination of two GOCP constraints *[voice]…[voice] & *[-son]…[-son]. Under this constraint, a sequence of two voiced segments is prohibited if the two segments form a sequence of two [-son] consonants.

(56) ***[voi]…[voi] & *[son]…[son]** :

a. *[voi]…[voi] & *[son] [son] is violated when the sequence of two segments violate both *[voi]…[voi] and *[son]…[son].

b. *[voi]…[voi] & *[son]…[son] >> *[voi]…[voi],*[son]…[son]

The unbounded nature of the phenomenon is captured via the universal subhierarchy of proximity laid out in (57).

(57) **a. *[voi]…[voi]** =*[voi][voi] >> *[voi]-μ-[voi] >> … >>*[voi]-∞-[voi]

b.*[son]…[son]=*[son][son]>> *[son] -μ-[son] >> … >>*[son]-∞-[son]

The quirk of Rendaku appears when we compare Japanese adjacency requirements with the adjacency requirements of Ainu, Yimas and Kera. Because Rendaku calls for an unbounded type of adjacency, the constraint requiring Lyman's Law must lie at the bottom of the hierarchy. The position of the locally conjoined constraint ensures that no matter how long the distance between the two obstruents is, it will never blunt the force of Lyman's Law. This is schematized in the following tableau.

(58)

/onna-kotoba/	*[voi]-∞-[voi] &*[son]-∞-[son]	Rendaku
☞a. onna-kotoba		*
b. onna-gotoba	*!	

The tableau shows that (58a) will always be evaluated as optimal no matter how long the distance between k and g is. This is due to the supremacy of *[voice]-∞-[voice] & *[son]-∞-[son] over Rendaku. (58b) fares worse with respect to *[voice]-∞-[voice] & *[son]-∞-[son] and thereby awards the palm to (58a).

It is clear from the analysis laid out above that adjacency should be viewed as unbounded in Japanese Rendaku. We have thus far presented a composite of adjacency requirements that hold in Ainu, Kera, Yimas and Japanese. Each adjacency requirement is expressed through an adjacency GOCP constraint that belongs to the proximity hierarchy devised by Suzuki (1998).

In chapter III and IV, we shall provide an account of how adjacency, similarity and domain play a role in conditioning GOCP effects in ABA sibilants. The elements to be studied are sibilants' features of voice and anteriority. The domain within which the GOCP operates is the root, and the distance within which identity avoidance acts is XX and X-ə-X[21].

5. Conclusion

In this chapter we have provided a glimpse into the broad vista of GOCP underpinnings. We have started off by presenting the limitations that beset the classic OCP. The classic OCP, though preserving the central concept of identity avoidance, is fraught with a complex assortment of limitations. These limitations range over as many aspects as similarity effects, adjacency effects, non-identical dissimilation, failure of interlinking and lack of generalizability.

In line with the findings of Suzuki (1998), we have strenuously argued that an OCP theory cannot achieve empirical and theoretical adequacy unless it gets around these limitations. We have presented the basic premises of the GOCP theory with an eye to adopting these premises in our forthcoming account. We have addressed the elements of the GOCP and provided compelling evidence to the effect that elements other than features can be conditioned by GOCP effects. Foremost among the elements that can undergo identity avoidance effects, we have vowel length and identical morphemes. With respect to features, we have surveyed different features and found that nearly all features undergo GOCP effects.

We have also offered a sketch of the domains within which the GOCP can act. Two fundamental types of domains are exhibited. The first

---

[21] X-ə-X is not incorporated in the proximity hierarchy proposed by Suzuki (1998). We, nonetheless, incorporate it in our proximity hierarchy because we find that it reflects an operative distance in ABA. Chapter IV bears heavily on clusters of sibilants where the two sibilants are one schwa away from each other.

type is phonological domains. Phonological domains encompass syllables and feet. The second type is morphological domains. Among the morphological domains that circumscribe GOCP effects, we have roots, stems and words.

Another basic tenet of the GOCP theory is similarity. When identity avoidance effects require more similarity between two segments, we have shown that Suzuki (1998) resorts to local conjunction to contend with such phonological phenomena. We have offered an account of similarity along a representational approach and compared it to a GOCP account. The GOCP account has proven to be more insightful and appealing.

The last premise we have handled is adjacency. We have dealt with root adjacency, single consonant adjacency, syllable adjacency and unbounded adjacency. We have shown that adjacency is to be computed through a proximity hierarchy. The end result of this proximity hierarchy is that identity avoidance effects are reduced the larger the distance between identicals.

<u>**CHAPTER III**</u>

IDENTITY AVOIDANCE IN STRICTLY ADJACENT SIBILANT CLUSTERS

Chapter III

IDENTITY AVOIDANCE IN STRICTLY ADJACENT SIBILANT CLUSTERS

1. Introduction

This chapter is meant to unravel a whole range of GOCP effects that operate in ABA roots, most notably in clusters that are strictly adjacent (see Odden (1987), and Selkirk (1991) among others). The chapter bears heavily on the interaction of spirantised dorsals with underlying sibilants in root adjacent clusters. This interaction yields an array of identity avoidance effects that range from assimilation to dissimilation and sometimes to complete blockage of spirantisation. The interaction of identity avoidance with spirantised dorsals has received very little interest in the literature on Amazigh phonology. Aside from some sporadic mentions of the phenomenon in Pencheon (1973) and Saib (1976), I know of no exhaustive treatment that has elaborated on this interaction.

The basic proposal defended here is that accounting for identity avoidance in Sib Sib clusters cannot be achieved without appealing to local conjunction of constraints. We also argue that GOCP effects are reduced, the more different the two sibilants are. Furthermore, we intend to show that what makes a locally conjoined constraint exhibiting identity avoidance obeyed or disobeyed is its position relative to faithfulness constraints.

This chapter is organised as follows. In section 2, we look at spirantisation in Amazigh. In section 3, we lay out the basic characteristics of spirantisation in ABA. In section 4, we present the data that exhibits the interaction of spirantisation with identity avoidance in ABA. Specifically, we deal with the interaction of spirantisation with underlying sibilants in 4.1. We also set out the different clusters where spirantisation yields strictly adjacent sibilants in 4.2. In section 5, we conduct an OT analysis of the different phenomena displaying the interaction of spirantisation with identity avoidance in Sib Sib clusters. To pave the way to a constraint-based account of such phenomena, we offer an OT treatment of spirantisation in 5.1 and 5.2. Then in 5.3, we carry out an analysis of underlying sibilants. The central thrust of this analysis is to check if underlying sibilants violate identity avoidance effects or not. Next, we conduct a detailed analysis of the different clusters that combine dorsal stops with underlying sibilants in 5.4. Our attention is grounded on how GOCP effects condition the output of spirantisation. Finally, we examine the similarity implications that our analysis yields in 5.5.

2. Spirantisation in Amazigh

An oft-noted process, spirantisation in Amazigh is accommodated by a host of phonologists, most notably by Saib (1974, 1976), El Kirat (1987), Bouhlal (1994), Elmedlaoui (1993), Louali-Raynal (1999a) and Lafkioui (2006). Not dwelling too much on the phenomenon, a variety of other authors have also handled spirantisation in Amazigh; we cite Guerssel (1976, 1978), Chtatou (1982), Kossmann (1999) and Lafkioui (2007) among others. Spirantisation which may well be viewed as a phenomenon that distinguishes northern lects from southern ones (cf. Basset (1952, 1959), Renisio (1932), Biarnay (1917)) either pervades the whole range of obstruent singleton stops or is limited to dorsal obstruents only.

To get a better feel of what is meant by spirantisation in Amazigh, we shall provide a brief overview on how spirantisation holds in some Amazigh lects and what category of segments are affected.

On the basis of the landmark works conducted on the domain of spirantisation in Amazigh (cf. Saib (1974, 1976), El Kirat (1987), Bouhlal (1994) and Ansar (2007, 2012)), spirantisation may affect the uvular stop /q/, the dental stops /t, d/, the labial stop /b/, or the velar stops /k/ and /g/. When spirantisation holds, obstruent stops surface as spirants.

(1)	*Input*		*Output*
	q	→	ɣ
	t	→	θ
	d	→	ð
	k	→	ç, ʃ, y, ø
	g	→	ɟ, ʒ, y, ø
	b	→	β

According to Saib (1976), the spirantisation of the uvular stop /q/ pervades the whole Amazigh group, whether spirantising (cf. the northern lects) or non-spirantising (cf. the southern lects).

(2) Singleton ɣ alternating with geminate qq in ABA

Zero Form	*Intensive Form*	
ɣəR	iqqaR	'to study'
ɣəz	iqqaz	'to dig'
aɣimi	iqqim	'to sit'
taɣuni	iqqən	'to close'
nəɣ	inəqq	'to kill'
zəɣran	izəqqurn	'wood for building roofs'

This phenomenon, as the reader may observe, exhibits the lack of singleton /q/'s[1] in Amazigh. In the guise of a non-geminate consonant, /q/ is always spirantised into its corresponding counterpart [ɣ].

Spirantisation of dental /t/ and /d/[2] does not pervade all Amazigh lects. Bouhlal (1994) and El Kirat (1987) contend that this type of spirantisation is confirmed only in some Amazigh varieties like Tarifiyt, Tamazight and Taqbaylit.

(3)

	ABA	*Ayt Ndhir*	
/t/	atbir	aθβir	'pigeon'
	tafuʃt	θafuʃθ	'sun'
/d/	adrar	aðrar	'mountain'
	tidi	θiði	'sweat'
	amda	amða	'lake'
/dd/	iddər	iddər	'he is alive'

[1] Singleton q's are sometimes observed in Amazigh ([tiqəst] 'stinging' and [iqli] 'interjection'). El Kirat (1987) argues that they are geminates that have diachronically undergone degemination.

[2] A notable difference holds between emphatic coronal stops (or coronal emphatic agents as Benhallam (1980) calls them) and non-emphatic coronal stops. While non-emphatic coronal stops undergo spirantisation, emphatic coronal stops fail to undergo spirantisation.

	iddəz	iddəz	'he crushed'
/tt/	amttin	aməttin	'dead person'
	ittəgg	ittəgg	'he is doing'

(Compiled from El Kirat (1987) and Saib (1976))

Under this category, dental stops emerge as non-strident dental fricatives[3]. The process is unrestricted in some Amazigh lects but restricted in others (cf. Ayt Iznassen (El kirat (1987)). For example, El kirat (1987) reports that dental stops fail to spirantise in Ayt Iznassen Amazigh if followed by the sonorant stops (l, m, and n).

Concerning labials, their spirantisation is observed in Ayt Ndhir, Ayt Mguild, Ayt Seghrouchen and many Tarifiyt lects. Under this spirantisation, a non-geminate labial stop /b/ is realized as a labial fricative [β]. Saib (1976) purports that this spirantisation emphatically fails to take place if the output is a labial geminate /bb/.

(4)

ABA	*Ayt Ndhir*	
tatbirt	θaθβirθ	'pigeon'
abrid	aβrid	'path, road'
baba	βaβa	'dad'
tabrat	θaβraθ	'letter'
iʕəbbəd	iʕəbbəd	'he is praying'
ibbəy	ibbəy	'It is torn.'

On the basis of an investigation of some Amazigh lects, Guerssel (1985) contends that spirantized labial geminates are indeed attested in Ayt Seghrouchen Amazigh.

Chief among the range of consonants that can undergo spirantisation is the category of velar (dorsal) stops /k/ and /g/. This category of segments undergoes spirantisation in a whole range of Amazigh lects. El kirat (1987) and Bouhlal (1994) report a variety of Amazigh lects where this type of spirantisation is well attested. An

[3] More often than not, dental stops spirantise into non-strident fricatives. The only exception that contradicts this observation is observed in Iboudraren Amazigh and some nearby Tashlhiyt varieties. In such varieties the coronal stops /t/ and /d/ are shifted into [s] and [z] respectively.

interesting point that ought to be said about the spirantisation of velars is the different degrees of spirantised forms it yields. Both Saib (1976) and El kirat (1987) purport that velar stops undergo spirantisation along various degrees of weakening. Saib (1976) deploys the following scale to evince the gradient spirantisation of velar stops.

(5)

k → ç → ʃ → y → ø

g → ɟ → ʒ → y → ø

These mappings, Saib (1976) believes, are confirmed to take place in a body of Amazigh lects[4]. Bouhlal (1994), for instance, provides examples from Ihahan, Ida Outanan, Ayt Attab, Zayan and Ayt Ndhir to show that /k/ and /g/ can indeed be mapped to [ç] and [ɟ]. He also holds that the same spirantised segments surface as [ʃ] and [ʒ] in many Northern lects like Ayt Seghrouchen, Asht Bouyelloul, and a couple of other Rifi lects.

(6)

Tashlhiyt	*Ayt Attab*	*ABA*	
akuz	açuz	aʃuz	'weevil'
akabar	açabar	aʃabar	'caravan'
gn	ɟən	ʒən	'sleep'
agllid	aɟəllid	aʒəllid	'king'

(Compiled from Saib (1976))

Furthermore, on the basis of the scale posited in (5), Saib (1976) argues that the choice of which spirant form (ç or ʃ, ɟ or ʒ) an Amazigh lect may have falls to the degree of spirantisation this lect has reached. Saib (1976) also contends that it is not a striking fact that ɟ and ç further

[4] It seems that Saib's (1976) spirantisation scale is too powerful. For example, complete loss of dorsal stops cannot presumably be ascribed to spirantisation. Under my conjecture, this loss is only a matter of typological difference between the northern Amazigh varieties and the southern Amazigh varieties. Furthermore, the items exhibiting such loss are very scarce in the northern lects. Saib (1976), El Kirat (1987) and Bouhlal (1994) keep repeating the same few items where such loss is observed (i.e. /ikmz/ > [imz]).

spirantise into [ʒ] and [ʃ] since this alteration for him is due to the unmarkedness of [-ant] sibilants (cf. Chomsky and Halle (1968)).

Given the scarcity of the data provided by Saib (1976), and El kirat (1987), it can be securely said that the spirantisation of /k/ into [y] is not well attested[5]. Although it holds in some northern lects, its generality is limited if compared with the spirantisation of /g/ into [y]. Consider the data below where the velar /g/ is unfaithfully rendered as a glide [y].

(7) /g/ > [y]

Input	*Output*		
aguʒil	ayuʒil	'orphan'	Ayt Snous
argaz	aryaz	'man'	Ayt Temsaman
agm	ayəm	'to draw water'	Ayt Iznassen
agl	ayəl	'to hang'	Ayt Ndhir
targa	tarya	'river'	Bettioua
tiguga	tiyuya	'plow'	Ayt Weryaghel

Given this overview on the different spirantisation processes that hold in Amazigh lects, it seems likely that we should bring this section to a close by addressing some of the views regarding spirantisation inhibiting and inducing environments. Three accounts will be presented: Biarnay (1917), Saib (1976), and El kirat (1987).

Biarnay (1917) concurs that spirantisation in Rifi lects is motivated by intervocalic position - this is indeed true and confirmed by all subsequent work on spirantisation in Amazigh. He further claims that spirantised segments have assimilated their continuance from adjacent vowels. Biarnay (1917) also observes that a good number of spirantised consonants preserve their continuance when the adjacent vowel or vowels are dropped. He illustrates this by offering examples like /tafutt/ > [θfutt] where the initial vowel of the root /a/ is dropped. To get around the complex assortment of words where spirantisation can in no way be attributed to vowel contiguity, Biarnay (1917) claims that all

[5] We believe that spirantisation of /k/ into [y] is a lexicalized type of spirantisation (i.e. [krz] 'plough' and [tayərza] 'ploughing') because it exists in all Amazigh lects, including non-spirantising ones.

cases of spirantisation that do not ensue from vowel contiguity are but an analogy of those which actually fall out from intervocalic position. We can say that although Biarnay's account achieves some success in contending with the conundrum of spirantisation in Amazigh, it suffers from pernicious limitations with respect to explanatory adequacy.

On the basis of a criticism of Pencheon's (1973) analysis of the inhibiting and inducing environments of spirantisation, Saib (1976) provides another account of spirantisation driven by insights from the difference that holds between singletons and geminates. Pencheon's findings amount to the fact that spirantisation of /k/ into [ʃ] in Ayt Ndhir holds if no such inhibiting environments block it.

K is mapped to ʃ and not ç:

- When followed by u (e.g. takurt > θaʃurθ).

K is mapped to ç and not ʃ:

- In words containing (s, z, ʃ, ʒ) whether contiguous to k or not (e.g. krəz > çrəz 'plow'; aksum > açsum 'meat'; akəz > açəz 'recognise').

- In verbs preceded by the causative prefix –ss (e.g. knəD > ssəçnəD 'to burn'). Saib (1976: 97)

Saib (1976) explains that although the generalizations provided by Pencheon hold true, they cannot generalize over all spirantising Amazigh lects. Saib (1976) provides a body of counterexamples to each of Pencheon's findings. For instance, he observes that spirantisation into [ʃ] is widely attested in Ayt Seghrouchen Amazigh regardless of whether the velar k might be followed by a round vowel /u/ or whether it cohabits with a sibilant within the domain of the word. This is clear in the examples below (from Saib (1976) and El Kirat (1987)).

(8) *Ayt Seghrouchen*

Input	*output*	
takurt	θaʃurθ	'ball'
akuz	aʃuz	'weevil'
kmz	əʃməz	'to scratch'
krz	əʃrəz	'to plough'

To achieve generality, Saib (1976) argues that the velar stops /k/ and /g/ spirantise unrestrictedly in Amazigh but emphatically fail to spirantise when their underlying form is a geminate. To achieve this end, he posits the following rule.

(9) [-cont] → [+cont] / x: where x ≠ geminate

With respect to El Kirat's (1987) account of the inhibiting and inducing environments for spirintisation, El kirat (1987) addresses a couple of restrictions with regard to dental spirantisation. She observes that Ayt Iznassen dental stops which are followed by the sonorant consonants l, m, and n fail to exhibit weakening and surface unscathed. She posits the following rule to accommodate the stubborn resistance of dental stops to spirantise in this environment.

(10) al#ðar → [alDar] 'till the foot'

a. $$\begin{pmatrix} \text{t} \\ \text{d} \\ \text{D} \end{pmatrix} \rightarrow \begin{pmatrix} \theta \\ \eth \\ \boldsymbol{\eth} \end{pmatrix} \sim \; / \; \begin{Bmatrix} \text{l} \\ \text{m} \\ \text{n} \end{Bmatrix} \; \text{—}$$

b. $$\begin{pmatrix} +\text{cor} \\ -\text{cont} \\ -\text{son} \end{pmatrix} \rightarrow [+\text{cont}] \sim \; / \; \begin{array}{c} \begin{pmatrix} +\text{cor} \\ -\text{cont} \\ +\text{son} \end{pmatrix} \\ \begin{Bmatrix} [+\text{nas}] \\ [+\text{lat}\ ] \end{Bmatrix} \end{array} \text{—}$$

~ = not in the environment of.

Interestingly, El Kirat's findings do not extend to many other Amazigh lects. Bouhlal (1994), for example, draws the attention to the absence of such inhibiting environment in Ayt Ndhir.

In closing, it seems that given the various degrees of spirantisation along with the different inhibiting environments in Amazigh, most Amazigh phonologists have not been able to posit unifying rules to the complex assortment of typologies exhibited by spirantisation.

3. Spirantisation in ABA

Though not belonging to Tamazight group, ABA stands in fundamental conflict with many northern Amazigh lects in terms of the type of consonants that undergo spirantisation. Specifically, the eye-catching mismatch observed between ABA and the Northern Amazigh Lects is the lack of spirantised coronal and labial stops in ABA and presumably in all Warayni lects. At the mean time, spirantised coronals and labials pervade nearly all the northern lects along with some Tamazight lects abutting against ABA. The lack of spirantised coronals and labials in Ayt Warayn Amazigh, an Amazigh variety to which ABA belongs, is a mystery to be unraveled. However, if spirantised coronals and labials are unattested in ABA (see data in (3) and (4)), spirantised dorsals are replete. This state of affairs is possibly charged to the uniformity of dorsal spirantisation in all Rifi lects, most Tamazight lects and a handful of Tashlhiyt lects (cf. Bouhlal (1994)). In the previous sections, we have shown that many Amazigh lects like Ayt Ndhir, Zayan, Zemmour, Ayt Attab and others spirantise velar stops into [ç] and [ɟ]. ABA follows a different path. It spirantises velar stops only into [ʃ] (from underlying /k/) and [ʒ] (from underlying /g/). And [ç] and [ɟ] are not at all attested in ABA. Put more strictly, /k/ is always spirantised into [ʃ] unless an inhibiting environment holds[6]. Consider the data below.

(11)

Non-spir.lects	*ABA*	
kl	ʃəl	'to stay'
tinkri	tinəʃri	'standing up'
takurt	taʃurt	'ball'
kal	ʃal	'sand'
akr	aʃər	'to steal'

Should an inhibiting environment arise, another alternative of [ʃ], namely [ç] (a palatalized coronal) (see Elmedlaoui (1992) and Gafos (1996)) is observed. The velar stop /g/, on the other hand, usually surfaces like a [-ant] voiced sibilant as the data below shows.

[6] Inhibiting factors will be handled in more detail in the next section.

(12)

Non-spir.lects	*ABA*	
agl	aʒəl	'to hang'
gar	ʒar	'between'
agm	aʒəm	'to draw water'
tagmrt	taʒmərt	'horse (fem.)'
igr	iʒər	'field'
agut	taʒut	'fog'
ig	iʒ	'he did'

There are very few cases where /g/ emerges like a glide [y]. Most of the glides that arise from the spirantisation of /g/ are substantially conditioned by inhibiting factors that often ensue from OCP effects[7].

Another point that deserves mention is that dorsal spirantisation is unrestricted in ABA. Put more strictly, spirantisation of velars and uvulars always holds in ABA regardless of the environment where the velar stop exists. Be it an onset, a coda, in intervocalic position or in initial position, the velar stop always surfaces spirantised (look at data in (2), (12) and (13)). In this respect it is different from Spanish where spirantisation fails in onset positions.

(13)

Under.F.	*Surf. F.*	
takurt	taʃurt	'ball'
kal	ʃal	'earth, sand'
ikmT	iʃməT	'it burnt'
zik	ziʃ	'early'
akr	aʃər	'to steal'

In the guise of geminates, velar stops stubbornly resist spirantisation. This is presumably due to effort minimization as construed in Kirchner (1998).

[7] We shall address the spirantisation of /g/ into [y] in the next section.

4. The interaction of spirantisation and identity avoidance in ABA

4.1 Spirantisation and underlying sibilants

In roots, spirantised dorsals may coexist with underlying sibilants. However, this coexistence is observed only under strict requirements of identity and distance between the two sibilants. When, for instance, the two sibilants are strictly adjacent or separated by a schwa, they can only cohabit within the root if they exhibit a certain degree of difference in terms of anteriority, voice or both. If the distance that separates the two sibilants is a full mora (i, a, u) or larger (i.e. 2 moras, 2 syllables or when distance is unbounded), the two sibilants are freely tolerated in the root. Consider the data below.

The distance between the two sibilants is one full mora or more.

(14)

a**ʒ**ər**s**if	'land between two rivers'
t-a**ʒ**u**s**-t	'toponym'
i**ʃ**uru**s**n	'ties'
a**ʃ**ru**s**	'a tie'
ʃu**z**	'weevil'

When an underlying velar stop is strictly adjacent or is one schwa away from another sibilant, spirantisation usually holds while observing strict requirements of similarity and identity. In the remainder of this section we are going to present the various ways in which spirantisation applies when the expected output is a Sib Sib cluster. In chapter IV we shall handle the interaction of spirantisation and other processes with Sib ə Sib clusters.

4.2 The interaction of spirantised velars with other sibilants in strictly adjacent clusters.

This subsection is meant to provide a description of the various ways in which spirantised velar stops interact with strictly adjacent sibilants. Different clusters will be described. In particular, we shall deal with ks, sk, gz, zg, gs, sg, kz, zk, ʃk, kʃ and gʃ clusters[8].

[8] I have been unable to find any data exhibiting ʃg, gʒ, ʒg sequences.

4.2.1 ks and sk sequences

This subsection can be set within the very general purpose of characterizing the changes that affect the spirantised velar stops whose surface form abuts against another sibilant and where the two consonants are identical for [-voice] but different for anteriority. The first set to be presented is a cluster where the two elements are identical for [-voice] but different for [ant]. Under this type of sequences, two different scenarios obtain. The first scenario is observed when the spirantised velar stop /k/ obtains in a /ks/ cluster. The second scenario holds when the velar /k/ is in a postposed position with respect to the sibilant /s/ – i.e. in a /sk/ cluster.

When the first scenario obtains, the velar stop /k/ emphatically fails to yield the expected output [ʃ]. The velar stop /k/ spirantises into [ç], thereby foiling the attempt to create a *ʃs cluster. Consider the data below.

(15)

	Input	*Output*	
ks	aksum	açsum	'meat'
	t-aksar-t	taçsart	'slope'
	iksa	içsa	'he grazed cattle'
	sksu	səçsu	'couscous'
	amksa	aməçsa	'shepherd'
	iburksn	iburəçsən	'shoes'

The second scenario is in large measure consistent with the output of the cluster ks in terms of avoiding strident clusters. When a *sʃ cluster – from spirantised /k/ in a sk cluster - is susceptible to arise in the grammar, prompt measures are taken by the lexicon to rule it out. The output of /sk/ always emerges as a geminate [ʃʃ].

(16)	*Input*	*Output*	
sk	t-iskr-t	tiʃʃərt	'garlic'
	isk	iʃʃ	'horn'
	uskay	uʃʃay	'greyhound'
	baskr	baʃʃər	'nail'
	mskddad	məʃʃəddad	'toponym'

4.2.2 gz and zg sequences

gz and zg sequences evince similar phonological phenomena. In both sequences the spirantised velar stop surfaces as a glide [y]. Again we observe an appeal to identity avoidance. Since *zʒ and *ʒz evince identity in terms of the features strident and voice, they are shunned.

(17)

		Input	Output	
a.	**gz**	azgza	azəyza	'green, blue'
		t-agzir-t	tayzirt	'toponym, isle'
		t-agzim-t	tayzimt	'axe'
		t-igzl-t	tiyzəlt	'shortness'

		Input	Output	
b.	**zg**	azgaw	azyaw	'large bag'
		izgar-n	izyarn	'cows'
		t-amzgida	tamzyida	'mosque'

4.2.3 gs and sg sequences

In /sg/ sequences, spirantisation of the velar stop applies deriving sibilant clusters which disagree in terms of voice and anteriority (/sg/ > [sʒ]). In /gs/ clusters, however, spirantisation of the velar stop applies but derives a non-sibilant consonant [ç][9] (/gs/ > [çs]).

(18)

		Input	Output	
a.	**gs**	agsum	açsum	'meat'
		t-agsar-t	taçsart	'slope'
b.	**sg**	asgLLiT	asʒəLLiT	'a tool'
		asgur	asʒur	'stone'
		asgal	asʒal	'hole filled with sand'

[9] According to Saib (1976), the voiced velar stops in /agsum/ and /tagsart/ have undergone devoicing (aksum, taksart) first and then spirantisation (aysum, taysart or açsum, taçsart). We are unsure as to the validity of this proposal.

4.2.4 zk and kz clusters

While the mapping /zk/ > [zʃ] is attested in ABA, the mapping /kz/ > [ʃz] does not hold. This inconsistency is in fundamental conflict with the observation that sibilants disagreeing for voice and anteriority are freely tolerated in ABA, as confirmed by the presence of [sʒ] and [zʃ] sequences. The sequence kz which holds in a variety of Amazigh lects (Tamazight, Tashlhiyt and others) is realized as [qz] in ABA. This alteration cannot plausibly be regarded as an instance of spirantisation. Consider the data below.

(19)

		Input	*Output*	
a.	**zk**[10]	t-izkr-t	tizʃert	'a type of plant'
b.	**kz**	akzin	aqzin	'dog'
		akzuz	aqzuz	'wild pig's offspring'

We know of no reason why such alteration holds in (19b). The same change is also observed in Ayt Iznassen and some Rifi lects.

4.2.5 ʃk, kʃ and gʃ sequences

When the cluster is kʃ or ʃk, spirantisation fails to obtain as the data in (20a, b) shows. Avoiding clusters like [*ʃʃ] - clusters that might result from spirantisation - means that identity of voice and anteriority is shunned. When the cluster is gʃ, spirantisation of the velar stop applies and /g/ is turned into [y] as the data in (20c) evinces. This shows again that identity of [ant] is avoided.

(20)

		Input	*Output*	
a.	**kʃ**	tfakʃəyt	tfakʃəçt	'bleeding toe'
		ikʃf	ikʃəf	'he discovered'
b.	**ʃk**	iʃkm	iʃkəm	'he denounced'
		taʃkalt	taʃkalt	'tool'
		aʃk	aʃk	'to be lost '
c.	**gʃ**	igʃm	iyʃəm	'he got in'

[10] We have been unable to find forms exhibiting /zk/ sequences other than /t-izkr-t/.

From the foregoing, we can draw the following generalizations:

- When the potential output is Sib(+ant,αvoice) Sib(-ant,αvoice), spirantisation applies while observing strident identity avoidance.

- When the potential output is Sib(+ant,αvoice) Sib(-ant,-αvoice), spirantisation applies and yields the expected [-ant] sibilants.

- When the potential output is Sib(-ant) Sib(-ant), spirantisation is precluded if the dorsal stop is /k/ and is induced if the dorsal stop is /g/. When spirantisation applies for /g/, avoiding strident identity is observed.

5. A constraint-based analysis of the interaction of spirantisation with identity avoidance in Sib Sib clusters.

This section is intended to conduct an OT analysis of spirantisation. It is also meant to delve into the different sequences where spirantised dorsal stops cluster with strictly adjacent sibilants.

5.1 OT and spirantisation.

Many works have been devoted to spirantisation under the rubric of OT. To cite a few, we have the landmark works of Kirchner (1998), Bakovic (1995), Burzio (1997), Lavoie (1996) and Romero (1996). Before giving our account more content, it seems likely that we should strive to provide a fresh look at the inventory of ABA. Providing such a look is essentially necessitated as it will pave the way to a proper understanding of how the constraints driving spirantisation interact with other faithfulness constraints. The inventory of stops and fricatives in ABA is set out as follows (see the complete inventory in Chap. I).

(21)

	ABA Stops		**ABA Fricatives**	
	Voiceless	Voiced	voiceless	Voiced
Labial	p	b	f	-
Coronal	t	d	s, S, ʃ	z, Z, ʒ
Velar	k	g	-	-
Uvular	q	-	χ	ɣ

Spirantisation, as indeed noted before, targets only dorsals[11] -both velars and uvulars – to the exclusion of other stops. It has already been observed that the uvular stop q and the uvular fricative χ exhibit a complementary distribution: q is only observed as a geminate[12] while χ only holds as a singleton. Velar stops, on the other hand, foil the attempt to preserve their [-cont] specification. As singletons, velar stops consistently spirantise. Velar stops decline to spirantise only if their spirantisation brings about a cluster of sibilants lying to each other within a distance that activates identity avoidance. Spirantisation in ABA yields a whole range of consonants as laid out below.

(22)

$$\begin{tikzcd} \text{k} \arrow[r] \arrow[dr] & \text{ʃ} \\ \text{g} \arrow[r] \arrow[dr] & \text{ʒ} \\ & \text{y} \\ \text{q} \arrow[r] & \text{ɣ} \end{tikzcd}$$

These derived consonants (ʃ, ç, ʒ and y) are underlyingly different from the underlying consonants ʃ, ʒ and y[13] which are well attested in the inventory of ABA.

(23) **Derived ʃ, ʒ, y, ç**

Input	*Output*	
kal	ʃal	'earth'
ikmz	iʃməz	'he scratched'
aksum	açsum	'meat'
amksa	aməçsa	'shepherd'
igr	iʒər	'field'
agnna	aʒənna	'sky'
anzgum	anəzyum	'eagerness'
azgza	azəyza	'green'

[11] Following Clements (1991), I consider velars and uvulars as dorsal segments.
[12] Saib (1976) and El kirat (1987) cite some exceptions where the dorsal q surfaces as a singleton. These exceptions fall out from historical degemination.
[13] [ç] is only observed as a phonetic reflex of /y/. It does not hold in the underlying sound system of ABA.

(24) **Underlying ʃ, ʒ, y**

Input	*Output*	
taʃwiyt	taʃwiʃt	'calf'
aʃffar	aʃəffar	'thief'
inʒʒm	inəʒʒəm	'he managed'
aɣnʒa	aɣənʒa	'ladle'
yur	yur	'moon'
yad	yad	'already'

While ʃ, ʒ and y may hold in ABA either as underlying segments or as derived segments, all instances of s, z and f are underlying since spirantisation of coronal and labial stops which might produce spirantised segments such as [s], [z] and [f] never holds.

To accommodate the reason why spirantisation affects dorsals to the exclusion of other stops, we shall recruit the constraint Spirantise (Spir) along with the faithfulness constraint Ident-IO Cont. Spir militates against non-spirantised stops. Conversely, Ident-IO Cont foils the attempt to create spirantised forms.

(25) **SPIRANTISE (Spir)** : spirantise every stop.

(26) **Ident-IO Cont** : Input and output specifications of continuant must be identical. (See McCarthy and Prince (1995))

Since dorsals consistently spirantise, if no inhibiting context impinges, Spir must dominate Ident-IO Cont if the right output is to emerge. Consider how the two constraints play out in the tableau below.

(27) a.

/k/	Spir	Ident Cont
a. k	*!	
☞b. ʃ		*

b.

/g/	Spir	Ident Cont
c. g	*!	
☞d. ʒ		*

Because Spir dominates Ident-IO Cont, the spirantised forms of /k/ and /g/, [ʃ] and [ʒ], are evaluated as optimal. The mappings [k] and [g] are sure losers because they fail on the higher ranked constraint Spir.

The ranking established thus far contends successfully with dorsal stops. However, it patently fails if the underlying stops are not dorsal, i.e. labial or coronal stops. Consider the tableaux below.

(28) a.

/t/	Spir	Ident Cont
a. t	*!	
☞b. s		*

b.

/b/	Spir	Ident Cont
c. b	*!	
☞d. f		*

Deriving spirantised forms from underlying coronal and labial stops never obtains as an optimal choice in ABA. Put more strictly, coronal and labial stops conserve their specification of [cont] in the output. To contend with this unexpected twist, we suggest that Ident-IO Cont conflates a family of constraints which can be laid out as follows.

(29) **Ident-IO Dor Cont**: Input and output specifications of continuant must be identical in the dorsal place.

Ident-IO Cor Cont: Input and output specifications of continuant must be identical in the coronal place.

Ident-IO Cor Cont: Input and output specifications of continuant must be identical in the labial place.

Because coronal and labial stops fail to spirantise, Ident-IO Cor Cont and Ident-IO Lab Cont should reign supreme in the hierarchy. Conversely, Ident-IO Dor Cont should be subordinate in position to Spir. Consider how the novel ranking[14] selects the right optimal candidates.

[14] Other Amazigh varieties, like Tarifiyt, Ayt Iznassen, Tamazight and Tashlhiyt, exhibit different rankings of the same constraints (This issue will be handled in Chap.V).

(30)

/t/	Id Lab Cont	Id Cor Cont	Spir	Ident Dor Cont
☞a. t			*	
b. s		*!		
/b/	Id Lab Cont	Id Cor Cont	Spir	Ident Dor Cont
☞c. b			*	
d. f	*!			

(31)

/k/	Id Lab Cont	Id Cor Cont	Spir	Ident Dor Cont
a. k			*!	
☞b. ʃ				*
/g/	Id Lab Cont	Id Cor Cont	Spir	Ident Dor Cont
c. g			*!	
☞d. ʒ				*

As tableau (30) shows, the labial and coronal candidates that satisfy Ident-IO Cor Cont and Ident-IO Lab Cont emerge as winners. This is due to the dominance relationship that holds between Ident-IO Cor Cont / Ident-IO Lab Cont and Spir. Conversely, because Spir dominates Ident-IO Dorsal Cont, the spirantised form of dorsal stops emerges as optimal.

There is an important point that deserves mention. It has to do with the status of dorsal geminates. Dorsal geminates, or any other geminates, never undergo spirantisation. We can translate this requirement in the form of a constraint that preserves the continuant specification of geminates (see Kirchner (1998) for an effort-based approach of why continuant geminates are avoided cross-linguistically). We dub it Ident-IO Geminate Cont.

(32) **Ident-IO Geminate Cont**: Geminates' input and output specifications of continuant must be identical.

Ranking this constraint at the top of the hierarchy is sufficient to rule out any candidate exhibiting spirantisation of a geminate stop.

Having given a handle on how OT should get around the whole range of spirantised and non-spirantised stops, there is still an important issue that deserves mention. The core idea concerns the underlying form of derived ABA sibilants. Can they be regarded as stops or as fricatives underlyingly? Under Richness of the Base, which is originally conceived by Prince and Smolensky (1993), there are no restrictions whatsoever in the underlying form. This means that we can posit any underlying form for any output. However, owing to extralinguistic and learning reasons, we usually resort to Lexicon Optimisation (Prince and Smolensky (1993)). Put in another way, we chose the underlying form that best matches the surface form. Lexicon optimization is only sidestepped if a contrastive alternation obtains between the two contender forms, and the selection of one over the other only holds if the alternation patently decides for one underlying form.

To reify what has been said, we exemplify from spirantised dorsals in ABA. We have already established the fact that [ʃ] and [ʒ] originate from underlying /k/ and /g/. However, by utilizing insights from the Richness of the Base along with Lexicon Optimisation, we can also contend that surface [ʃ] and [ʒ] originate from underlying /ʃ/ and /ʒ/. This move would be preferred by Lexicon Optimisation. This move may look more appealing because it reproduces the underlying form unaltered, thereby not violating any faithfulness constraint. However, the cost of this move is amortized over some undesirable effects. Considering /ʃ/ and /ʒ/ as underlying segments runs counter to the behaviour of kʃ and ʃk clusters which fail to spirantise. The requirement of identity avoidance in such clusters suggests that the phenomenon is one of spirantisation of dorsal stops. Another reason that provides compelling evidence in support of considering stops as underlying is the behaviour of sibilants in the root. We know that roots in Semitic-Hamitic languages exhibit selection restriction constraints. More explicitly, in Amazigh – as in many other Semitic languages – clusters like *(..t…d..), *(..k…g..), *(..s..z..), *(..f…b..), *(..ʃ…ʒ..) and *(..z…ʃ..) do not hold in the root. For these clusters to be accepted in the root, they have to agree in their specifications of voice and anteriority (see Elmedlaoui (1992)). The aforementioned restriction holds also in ABA. However, sibilants sometimes exhibit a different behaviour. More specifically, roots displaying the coexistence of voiced sibilants with voiceless sibilants are replete in ABA. This inconsistency can only be understood if we entertain two types of sibilants: underlying sibilants and spirantisation-driven sibilants. From the foregoing, we deduce that derived sibilants must be dorsal stops underlyingly.

5.2 Licit and illicit outputs of spirantisation

To wind up our discussion about spirantisation, we need to circumscribe the range of spirantisation outputs only to those that are indeed observed in ABA. Crucially, a variety of forms may obtain if spirantisation of /k/ and /g/ holds. The optimal forms are [ʃ] for /k/ and [ʒ] for /g/. /k/ and /g/ can only be mapped to [ç] and [y] respectively if identity avoidance is operative[15]. All the other potential outputs should be rejected in toto. To ensure this rejection, we need to deploy a composite of constraints to rule out the unattested output forms. To illustrate, /k/ and /g/ can spirantise into velar [x] and [ɣ] respectively, simulating in that the uvular stop /q/ that alternates with its same-placed partner [χ]. Crucially, such spirantisation never holds in ABA. To rule out velar [x] and [ɣ], we shall appeal to place markedness as originally conceived by Smolensky (1993) and refined in a variety of ways in Lombardi (1995). Under place markedness, coronal segments are least marked if compared to dorsal or labial segments. This observation Smolensky (1993) schematically lays out in a fixed place markedness hierarchy.

(33) *Dorsal, *Labial >> *Coronal

The constraints against dorsal and labial segments are high ranked if compared to the constraint against coronal segments. Put in another way, when phonological activity that operates on Place is at stake, coronals are more prone to emerge as defaults than labials or dorsals (see also Paradis and Prunet (1989) on the special behaviour of coronals).

We have thus far established the following ranking for dorsals.

(34) Spir >> Ident-IO Dor Cont

---

[15] For the sake of clarity, we shall sidestep the analysis of the outputs [ç] and [y] at this stage and defer a more comprehensive account of these two outputs until we deal with identity avoidance.

Now we need to ascertain the position of the hierarchy exhibiting place markedness relative to the already established ranking in (34). The hierarchy of place markedness should be placed below faithfulness constraints. If *Dorsal is, for example, placed above faithfulness constraints, dorsal segments will not surface in the lexicon of ABA. Let us see how the constraints play out and how the candidates fare relative to the constraints in the tableau below.

(35)

/k/	Spir	Id Dor Cont	*Dor	*Cor
a. k	*!		*	
☞b. ʃ		*		*
c. x		*	*	

Under this ranking, the output [ʃ] is chosen as optimal. The choice between candidate [ʃ] and [x] is decided by the place markedness hierarchy. While [ʃ] fares well on *Dor, [x] emphatically fails on the same constraint. Notwithstanding its violation of the lower-ranking constraint *Cor, [ʃ] emerges as the winner. Since it is the low-ranking constraints that decide about the nature of the optimal candidate, this instance may well be viewed as a dramatic example of the emergence of the unmarked as conceived in Prince and Smolensky (1993).

Since *Dor and *Cor are ranked below their antagonistic faithfulness constraints, *Dor and *Cor never induce an unfaithful mapping for any input. However, since the two contenders [ʃ] and [x] tie both on Ident-IO Dor Cont and on Spir which both dominate *Dor and *Cor, *Dor and *Cor effects become visibly active, favouring the optimal candidate [ʃ] over its competitor [x]. [ʃ] which is unmarked with respect to *Dor emerges as optimal even if *Dor's presence in the grammar is generally hidden. The account that explains the absence of [x] can, mutatis mutandis, accommodate the absence of [ɣ] as an output form of underlying /g/. Consider the tableau below.

(36)

/g/	Spir	Id Dor Cont	*Dor	*Cor
a. g	*!		*	
☞b. ʒ		*		*
c. ɣ		*!	*	

Having contended with the reason underlying the absence of [x] and [ɣ] from the lexicon of ABA, we try now to get around the absence of [ç] and[ɟ] which can also obtain as output forms of /k/ and /g/ respectively. Recruiting the same constraints in tableau (36) will not enable us to get rid of [ç] and [ɟ]. [ç] and [ɟ] achieve the same degree of success as [ʃ] and [ʒ] as the tableau below evinces for /k/.

(37)

/k/	Spir	Id Dor Cont	*Dor	*Cor
a. k	*!			
☺ b. ʃ		*		*
☺ c. ç[16]		*		*

As the reader may verify, both (37b) and (37c) emerge as potential optimal candidates. Since the lower-ranked constraints *Dor and *Cor patently fail to discriminate between the two contenders, we are unable to select the real optimal output. We need to posit another constraint to break the tie that holds between the two contenders on all constraints. This constraint should militate against the presence of [ç]. We term it *ç.

(38) ***ç** : ç is not allowed.

Since ç is never admitted in ABA, *ç must be placed at the top of the hierarchy as the tableau below portrays.

[16] Following Clements (1989, 1991), I view [ç] and [ɟ] as coronal segments.

(39)

/k/	*ç	Spir	Id Dor Cont	*Dor	*Cor
a. k		*!		*	
☞ b. ʃ			*		*
c. ç	*!		*		*

With *ç placed at the top of the ranking, the tie is broken between [ʃ] and [ç]. And the real output [ʃ] that obtains in ABA inventory emerges again as optimal.

The analysis that has accommodated the absence of ç as a spirantised form of /k/ may well capture the absence of [ɟ] as a spirantised form of /g/. By adding another constraint whose goal is to ban [ɟ] from the output, we shall get the right output for underlying /g/. The constraint is *ɟ.

(40) ***ɟ** : ɟ is not allowed.

(41)

/g/	*ɟ	Spir	Id Dor Cont	*Dor	*Cor
a. g		*!		*	
☞b. ʒ			*		*
c. ɟ	*!		*		*

Candidate [ʒ] is evaluated as optimal owing to the tie break engendered by the presence of the dominating constraint *ɟ. (41c), due to its total aversion to the requirements of *ɟ, awards the palm to (41b) which wins the competition.

Before bringing this section to a close, another point need be further considered here. The point has to do with the way dorsal spirantisation behaves in ABA. It has already been established that dorsal stops in ABA conflate three segments, i.e. k, g and q. The quirk of the matter is that while /k/ and /g/ spirantise by incurring a concomitant change of place from dorsal to coronal, /q/ spirantises and preserves its place features (q > ɣ). To contend with this inconsistency exhibited by place faithfulness in the uvular area, we shall divide the dorsal place into two places, namely velar and uvular in line with Shaw (1991). We shall also assume that Ident-IO Uvular Place dominates Spir which in turn dominates Ident-IO Velar Place. This dominance relationship will successfully contend with the spirantisation of /q/.

5.3 Underlying sibilants: satisfaction or non-satisfaction of the GOCP constraint.

Before contending with underlying sibilants, it is my belief that an overview about locality is essentially necessitated. It is known that some segments within a spreading domain may appear to be non-participants, transparent to the harmony process. A case in point is when vowel harmony skips consonants or when coronal harmony skips vowels and non-coronal consonants. A variety of strategies have been advanced as to how to accommodate such cases of transparency. Under non-linear approaches, locality is viewed as a means of relativising spreading phenomena to what might very generally be viewed as legitimate target : some notion 'anchor', 'projection' or 'feature bearing unit'. Locality is obeyed so long as spreading does not skip such a legitimate target. Notable examples of this line of thinking include Goldsmith (1976), Clements (1976a), Kiparsky (1981) and Anderson and Ewen (1987). The core idea is displayed in (40), where a feature F is linked to two segments A and B, legitimate targets in some respect. Locality is not violated by the skipping of intervening x, since x lacks whatever property it is that grants legitimacy.

(42) A x B

F

Such approaches are frequently coupled with assumptions about underspecifiction: the intervening segment x might be transparent because it is underspecified for either F or whatever node making x a legitimate target (cf. Paradis and Prunet (1989) and Shaw (1991)).

In recent years another view of locality in spreading has been proposed. Under this view, spreading is viewed as strictly local (Nichiosain and Padgett (1993, 1997), McCarthy (1994), Ito, Mester and Padgett (1995), Flemming (1995), Gafos (1996) and Walker (1996)).

Along this line of thinking, all segments in a spreading domain are necessarily participants. Under this view, representations like (40) are considered as gapped configurations because F skips the segment x. In the remainder of this work, I will espouse locality as conceived in Nichiosain and Padgett (1997) as well as in Suzuki (1998) to accommodate the different ABA phonological phenomena exhibited by sibilants, without availing myself of representational linking to represent spreading domains.

Let us turn now to items where two underlying sibilants hold. Two scenarios are observed; either the sibilants are root adjacent as in (41a) or separated by intervening material as in (41b).

(43)

a.	assuy	'holding'
	ass	'day'
	fəssər	'to hang clothes'
	qəzzəħ	'to tear'
	bəzza	'foolish'
	iməZZəy	'it is small'
	tiʃʃəçt	'louse'
	abəʃʃiʃ	'urine'
	əlwəʒʒiq	'kind of bird'
	aməʒʒuT	'bald'
b.	afsas	'tree'
	aməssas	'bland, with no salt'
	amzaz	'hill'
	aRZiZi	'bee'
	iʃuʃ	'he moved around'
	əlfaʒaʒ	'Parkinson'

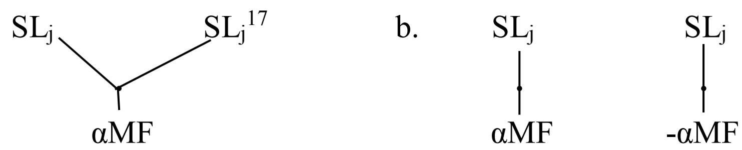
On the basis of the data presented above, we confirm that underlying sibilants are only observed under one of two forms, either as two identical sibilants conjoined into a geminate or as two identical sibilants separated by intervening material.

As two sibilants separated by intervening material, underlying sibilants never stand in conflict with respect to the two features of anteriority and voice. They always surface as identical segments (*(..s...z..), *(..ʃ…ʒ..), *(..z…ʃ..)). This issue has been handled by Elmedlaoui (1992). Elmedlaoui (1992) purports that there is a constraint that discriminates against the coexistence of two obstruents specified differently for voice- sibilants included. By deploying representational insights from Mester (1986, 1989), Elmedlaoui (1992) strenuously argues that the restriction against identical obstruents specified differently for voice or anteriority is driven by OCP effects. Elmedlaoui explains that in his Amazigh variety :

> "Les membres de cette dernière catégorie (t/d, k/g, ou x/ɣ par exemple) ne coexistent jamais dans un radical. Ainsi, quelque soit l'ordre linéaire de ses éléments, aucun des ensembles /(…)t(…)d(…)/, /(…)g(…)k(…)/ ou /(…)x(…)ɣ(…)/ ne peut figurer dans un radical. Par contre, les obstruantes dont le nœud supralaryngal domine un matériel différent, coexistent, librement, soit en adjacence, soit séparament, et quelque soit la nature du matériel qui les sépare éventuellement."
>
> Elmedlaoui (1992: 32)

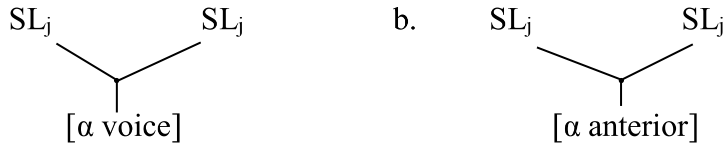
Elmedlaoui (1992) espouses a line of thinking where the OCP drives the fusion of minor features such as [ant], [retroflex] and [voice]. Because representations like (44b) exhibit an outright violation of the OCP, Elmedlaoui (1992) thinks that representations like (44b) should give way to representations like (44a).

(44) a.

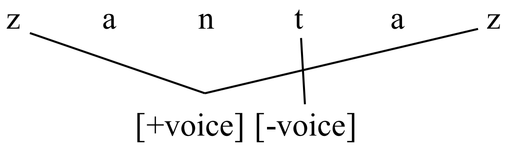


17 SL stands for supralaryngeal, and MF stands for minor features.

For Elmedlaoui (1992) sibilants that are identical within the domain of a root should be contended with in the same fashion. Put in another way, for the OCP to be satisfied features of anteriority and voice must constitute a linked structure if two segments are identical or near-identical[18].

(45) a.


However, this line of thinking runs afoul of candidates like [zantaz] where the fusion of the [+voice] specifications of the two sibilants should in principle be blocked by the intervening [-voice] coronal stop [t]. The fusion of [+voice] in the two sibilants would lead to line crossing (see (46)) which is prohibited by the putative No Line Crossing Constraint (see Goldsmith (1976) and Steriade (1982)).

(46)


Under my conjecture, all instances exhibiting identical segments within the root stem from a correspondence relationship that holds between the two segments. This view I strenuously argue for in Ansar (2004). The core idea is that when two identical segments coexist within the root[19], their identity is reminiscent of a long distance consonant correspondence (or agreement) (see Rose and Walker (2001)). Appealing to such an analysis derives much of its support from crosslinguistic and typological generalizations observed in several languages along with the psycholinguistic studies held by a variety of laymen in the domain. Psycholinguistic studies have shown that the articulation of a given consonant activates other consonants in the word that share a large number of features. The core idea is apparent in speech errors where identical or near-identical segments are more susceptible to trigger slips

[18] Under near-identical, we mean sequences like $(..t…d..)_{Root}$
[19] Such words are replete in the lexicon of ABA.

of the tongue than non-identical segments (see Nooteboom (1967), Fromkin (1971) and Frisch (1996)). Furthermore, Rose and Walker (2001) have shown that near-identical segments are usually shifted to identical ones. Notable examples are observed in the mispronunciation of the phrase *subjects show* as *shubjects show* or the tongue twister *she sells sea shells* which is often produced as *she shells shea shells*. Findings by Frisch et.al. (1997) and MacEachern (1997), though driven by perceptual concepts, are in many respects in conformity with the above idea. From the foregoing, it can be safely contended that the co-occurrence of similar consonants which are different in terms of voice or anteriority presents perception and production difficulties, an idea that has been undertaken in spreading activation models of speech processing (see Dell and Reich (1980), Dell (1984, 1986), Stemberger (1985)).

Under my line of thinking, I argue that an explanation of the above phenomena rests on similarity. Specifically, speakers construct a grammaticalised relation between similar segments just like the relationship observed between constituents larger than the segment, for instance, between words (see Burzio (1999, 2000) on the notion of gradient attraction).

From the foregoing, I suggest that the absence of *(..t…d..), *(..s…z..) and *(..ʃ…z..) in ABA is attributed to the correspondence relation that holds between identicals or near-identicals on the features of voice and anteriority. The line of thinking espoused by Elmedlaoui (1992), as noted before, is fraught with a complex assortment of insuperable problems. Therefore, I purport that the identity of voice and anteriority exhibited by identical obstruents does not ensue from the OCP but should be ascribed to consonant correspondence. Accordingly, I shall, henceforth, view any set of identical segments freely tolerated within the root as an outright violation of the OCP, and not a satisfaction of the OCP as Elmedlaoui believes.

5.4 Sib Sib clusters and identity avoidance in ABA

This section is meant to get around the different ways in which identity avoidance behaves when spirantisation brings about a sibilant that abuts against another strictly adjacent sibilant [20]. When such configuration obtains, different processes of assimilation and dissimilation hold to subserve identity avoidance. Before contending with these processes, we need to posit a major hierarchy of GOCP constraints to accommodate proximity effects. We also need to determine the different GOCP constraints by virtue of which we are going to assess the different similarity requirements exhibited by identity avoidance in Sib Sib clusters.

Since the analysis that we are going to carry out is in large measure propounded by the percepts of the GOCP as conceived in Suzuki (1998) (cf. Chap. II), we contend that a proximity GOCP hierarchy can only be formulated if we posit a major GOCP that encapsulates all the GOCP constraints evincing different degrees of proximity. The major GOCP constraint is set out as follows.

(47) ***Sib … Sib$_{\mathbf{Root}}$**: a sequence of two identical sibilants may not coexist within the root.

This constraint conflates a whole range of GOCP constraints displaying a restriction against sibilants separated by intervening material ranging from zero to ∞.

(48) ***Sib … Sib$_{\mathbf{Root}}$**: *Sib Sib$_{\text{Root}}$ >> *Sib ə Sib$_{\text{Root}}$ >> *Sib $\mu_{[\text{full mora}]}$[21] Sib$_{\text{Root}}$ >> *Sib $\mu\mu$ Sib$_{\text{Root}}$ >> *Sib $\sigma\sigma$ Sib$_{\text{Root}}$ >> *Sib ∞ Sib$_{\text{Root}}$

In this chapter we shall focus only on Sib Sib distance. This means that we are going to utilize the GOCP *Sib Sib$_{\text{Root}}$ to the exclusion of other gradient GOCP constraints.

(49) ***Sib Sib$_{\mathbf{Root}}$**: A sequence of two strictly adjacent sibilants is prohibited.

[20] Henceforth, I shall address only Sib Sib clusters where at least one of the sibilants is derived from spirantisation.

[21] $\mu_{[\text{full mora}]}$ stands for any mora larger than ə.

More often than not, Sib Sib clusters[22] (where one of the sibilants is derived from spirantisation) do not obtain in ABA roots if the two sibilants are identical in terms of voice or anteriority or both. This restriction amounts to the imperative that voice and anteriority must impinge in some way on the function of *Sib Sib_{Root}. In other words, if we posit the constraint *Sib Sib_{Root}, as such, it will discriminates against all strictly adjacent sibilant clusters, which is counter to reality. There are many sibilant clusters like zʃ and sʒ which are freely tolerated in the root due to the difference that holds between the two sibilants in terms of voice and anteriority. Therefore, it seems likely that we should strive to find a way to show that some degrees of similarity between strictly adjacent sibilants are freely tolerated - zʃ and sʒ are, for example, similar only in terms of sibilance but in terms of voice and anteriority they are different – while other degrees of similarity are not tolerated. This means that [voice] and [ant] must somehow contribute in the function of the GOCP constraint *Sib Sib_{Root}. To get closer to the purpose at hand, we need to recruit another markedness constraint to account for the non-existence of say *sʃ, *ʃs, *zʒ and *ʒz clusters. The constraint is *[αvoice]…$[\alpha voice]_{Root}$. This constraint, like *Sib… Sib_{Root}, conflates a body of proximity GOCP constraints as shown in (51).

(50)***[αvoice]…$[\alpha voice]_{Root}$**: A sequence of two identical specifications of voice may not coexist within the root.

(51)***[αvoice]…$[\alpha voice]_{Root}$** : *[αvoice] $[\alpha voice]_{Root}$ >> *[αvoice] ə $[\alpha voice]_{Root}$ >> *[αvoice] $\mu_{[full\ mora]}$ $[\alpha voice]_{Root}$ >> *[αvoice] μμ $[\alpha voice]_{Root}$ >> *[αvoice] σσ *$[\alpha voice]_{Root}$ >> *[αvoice]Sib ∞ $[\alpha voice]_{Root}$.

Among this hierarchy of GOCP proximity constraints, *[αvoice] $[\alpha voice]_{Root}$ is the constraint of interest for us in this chapter. To accommodate identity avoidance in clusters of sibilants which are identical in terms of voice, like *sʃ, *ʃs, *zʒ and *ʒz, for instance, we

[22] Underlying geminate sibilants violate *Sib Sib_{Root}. The identity of the two strictly adjacent sibilants in geminate sibilants is attributed to consonant correspondence (see Ansar (2004)).

need to appeal to the local conjunction of the two GOCP constraints, namely *Sib Sib $_{\text{Root}}$ and *[αvoice] [αvoice] $_{\text{Root}}$.

(52) **(*Sib Sib & *[αvoice] [αvoice])** $_{\textbf{Root}}$:

a. (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$ is violated when the sequence of two segments violate both *Sib Sib $_{\text{Root}}$ and *[αvoice] [αvoice]$_{\text{Root}}$.

b. (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$ >> *Sib Sib $_{\text{Root}}$, *[αvoice] [αvoice]$_{\text{Root}}$

(See Suzuki (1998) for similar locally conjoined GOCP constraints[23])

This constraint is sufficient to militate against sibilants identical in terms of [voice]. To this end, we contend that different sibilant clusters are going to be accommodated via different locally conjoined GOCP constraints which exhibit restrictions against various degrees of similarity of voice and anteriority. In the remainder of this section, we shall address spirantisation in sk and ks contexts in 5.4.1. Then, in 5.4.2 we examine the various ways in which identity avoidance resolves spirantised dorsals in zg and gz sequences. 5.4.3 handles GOCP effects along with spirantisation in zk and kz clusters. Afterwards, sg and gs clusters are addressed. Finally, an account is provided for kʃ and ʃk clusters.

5.4.1 Spirantisation along with assimilation and dissimilation in sk and ks clusters.

On the basis of the data presented in (15) and (16), sk and ks sequences surface as [ʃʃ] and [çs] respectively. This phenomenon, as has been observed by a variety of phonologists like Saib (1976), El Kirat (1987) and Pencheon (1973), pervades a whole range of Northern

[23] The local conjunction of GOCP constraints derives much of its appeal from its ability to account for different degrees of similarity. Put in another way, when identity avoidance requires more identity between two segments, this requirement is expressed in terms of the local conjunction of GOCP constraints. In the remainder of this work, we shall provide an account of how derived sibilants interact with underlying sibilants in clusters different or identical in terms of voice and anteriority and how the local conjunction of GOCP constraints will successfully contend with the different degrees of similarity evinced by these clusters.

Amazigh lects. In many Northern Amazigh lects, when the underlying form is ks or sk, spirantisation applies while observing identity avoidance. In other words, many northern lects evince a propensity to shun derived forms like *[ʃs] or *[sʃ]. The dorsal stop in ks and sk clusters may emerge as ç, y or ɕ depending on the Amazigh variety.

From the foregoing, it emerges that sibilants exhibit restrictions in terms of the features they bear, of most concern here the two features of voice and anteriority. To get around the dissimilation effects observed in ks > ɕs (*ʃs) and sk > ʃʃ (*sʃ), we deploy the GOCP constraint *Sib Sib_{Root} which, as noted before, bars configurations where a sibilant abuts against another sibilant. However, merely positing the GOCP constraint *Sib Sib_{Root}, as already invoked, is insufficient to accommodate the process triggered by the spirantisation of k in sk and ks sequences. The data in (18b) and (19a) exhibit other instances where sibilants are strictly adjacent and where *Sib Sib_{Root} exercises no influence whatsoever on banning adjacent sibilants. To get closer to the purpose at hand, we need to add other features to our constraint to bar the output configurations *sʃ and *ʃs, which are the expected spirantized forms if identity avoidance effects are not operative. To achieve this end, we need to deploy [voice], as already noted. In *sʃ sequences, for instance, not only should the sequence Sib Sib be avoided; the sequences [αvoice][αvoice] should also be avoided. If we collapse all these requirements in a locally conjoined constraint, we are going to get a constraint conflating two GOCP constraints. The locally conjoined constraints is **(*Sib Sib & *[αvoice] [αvoice])** $_{\textbf{Root}}$ as already noted. For expository reasons, we repeat it here.

(53) **(*Sib Sib & *[αvoice] [αvoice])** $_{\textbf{Root}}$:

a. (*Sib Sib & *[αvoice] [αvoice]) $_{\text{Root}}$ is violated when the sequence of two segments violate both *Sib Sib $_{\text{Root}}$ and *[αvoice] [αvoice] $_{\text{Root}}$.

b. (*Sib Sib & *[αvoice] [αvoice]) $_{\text{Root}}$ >> *Sib Sib $_{\text{Root}}$, *[αvoice] [αvoice] $_{\text{Root}}$

It has already been established that Spir dominates Ident-IO Dor Cont. Under this ranking, [tiʃʃərt], the attested output form for underlying /tiskrt/, is assessed as optimal.

(54)

/t-iskr$_{Root}$-t/	Spir	Id Dor Cont
a. tiskərt	*!	
☞b. tiʃʃərt		*

Candidate (54a) is discarded due to its fatal violation of top-ranked Spir, thereby awarding the palm to candidate (54b) which emerges as optimal. Given this ranking, the story is not yet finished. There are other candidates that are more faithful to the underlying form and that pass on Spir, namely [tisyərt] and [tisʃərt]. We discard [tisyərt] at the time being and try to deal with [tisʃərt]. Consider how the established ranking fails to decide the right optimal output.

(55)

/t-iskr$_{Root}$-t/	Spir	Id Dor Cont
a. tiskərt	*!	
☺ b. tiʃʃərt		*
☺ c. tisʃərt		*

To break the tie observed between candidate (55b) and (55c), we need to recruit the already posited locally conjoined constraint (*Sib Sib & *[αvoice] [αvoice])$_{Root}$. By ranking this constraint at the top of the ranking in a single package with Spir, the tie that holds between the (55b) and (55c) is still not broken as the tableau below evinces.

(56)

/t-iskr$_{Root}$-t/	(*Sib Sib & *[αvc] [αvc])$_{Root}$	Spir	Id Dor Cont
💣a. tiskərt		*	
b. tiʃʃərt[24]	*!		*
c. tisʃərt	*!		*

[24] [tiʃʃərt] does not satisfy (*Sib Sib & *[αvc][αvc])$_{Root}$, because the constraint assesses the geminate as a sequence of identical segments. The locally conjoined constraint is a distance-assessing Constraint.

To contend with this insuperable problem, we deem that what drives identity avoidance in the cluster *sʃ is the avoidance of [+ant] [-ant] clusters. In other words, identity in terms of voice and stridency is not always sufficient to trigger GOCP effects. In this case, the avoidance of [+ant][-ant] is also required. This is in central ways consistent with the findings of Suzuki (1998) in Russian Jakan'e (see Chap.II), a process whereby vowels undergo dissimilation although they do not have an identical feature to be avoided. Because the process is an instance of dissimilation, Suzuki (1998) views it as an instance of difference maximization. In line with Suzuki's findings on Jakan'e, I argue that the GOCP constraint required here is $*[+ant][-ant]_{Root}$[25].

(57) **$*[+ant][-ant]_{Root}$**: a sequence of strictly adjacent consonants, where the first is *[+ant] and the second is [-ant], is prohibited.

If we locally conjoin $(*Sib\ Sib\ \&\ *[\alpha voice]\ [\alpha voice])_{Root}$ with $*[+ant][-ant]_{Root}$, the desired effects we intend to achieve will follow.

(58) **$(*Sib\ Sib\ \&\ *[\alpha voice]\ [\alpha voice]\ \&*[+ant][-ant])_{Root}$**:

a. $(*Sib\ Sib\ \&\ *[\alpha voice]\ [\alpha voice]\ \&\ *[+ant][-ant])_{Root}$ is violated when the sequence of two segments violate both $*Sib\ Sib_{Root}$, $*[\alpha voice]\ [\alpha voice]_{Root}$ and $*[+ant][-ant]_{Root}$.

b. $(*Sib\ Sib\ \&\ *[\alpha voice]\ [\alpha voice]\ \&\ *[+ant]\ [-ant])_{Root}$ >> $*Sib\ Sib_{Root}$, $*[\alpha voice]\ [\alpha voice]_{Root}$, $*[+ant]\ [-ant]_{Root}$

If the locally conjoined constraint is ranked along with Spir at the top of the hierarchy, the desired [tiʃʃərt] will be evaluated as optimal as the tableau below shows.

[25] We know of no reason why *sʃ, to the exception of other clusters, activates the constraint *[+ant] [-ant].

(59)

/t-iskr$_{Root}$-t/	(*Sib Sib & *[αvc] [αvc] & *[+ant] [-ant])$_{Root}$	Spir	Ident Dor Cont
a. tiskərt		*!	
☞b. tiʃʃərt			*
c. tisʃərt	*!		*

Under this ranking, (59b) fares well with respect to the two top-ranked constraints. It is thereby evaluated as optimal. The two other contenders emphatically fail since they stand in outright violation of one or another of the two top-ranked constraints.

Now let us turn to [tisyərt]. [tisyərt] is a potential rival to [tiʃʃərt] because it achieves the same degree of success. The tableau below shows how both candidates may emerge as winning candidates if no other constraint is posited to break the tie that holds between the two contenders.

(60)

/t-iskr$_{Root}$-t/	(*Sib Sib & *[αvc] [αvc] & *[+ant] [-ant])$_{Root}$	Spir	Ident Dor Cont
a. tiskərt		*!	
☺ b. tiʃʃərt			*
c. tisʃərt	*!		*
☺ d. tisyərt			*

To break the tie between (60b) and (60d), we need a faithfulness constraint that faithfully renders the specification of input sonority. This constraint we term Ident-IO Son.

(61) **Ident-IO Son**: Input and output specifications of sonority must be identical.

The ranking of Ident-IO Son relative to the other constraints is not yet ascertained. We shall place it at the top of the ranking until more decisive evidence about its position is available.

(62)

/t-iskr$_{Root}$-t/	(*Sib Sib & *[αvc] [αvc] & *[+ant] [-ant])$_{Root}$	Id Son	Spir	Ident Dor Cont
a. tiskərt			*!	
☞ b. tiʃʃərt				*
c. tisʃərt	*!			*
d. tisyərt		*!		*

Under this ranking, candidate (62d) will be omitted from consideration. Its violation of Ident-IO Son leaves it no chance to win. Candidate (62b) still reigns supreme because it is more harmonic than all the other candidates. Another candidate, namely [tisçərt], may also hold as a potential rival of [tiʃʃərt]. To rule it out, we use another markedness constraint whose job is to penalize the spirantisation of /k/ into ç. This constraint we label *ç.

(63) ***ç** : ç is prohibited.

At this stage we place *ç at the top of the hierarchy in a single package with the other top-ranked constraints. The constraint *ç will be demoted in the hierarchy later.

Consider how *ç manages to discard candidate [tisçərt] in the tableau below.

(64)

/t-iskr$_{Root}$-t/	(*Sib Sib & *[αvc] [αvc] & *[+ant] [-ant])$_{Root}$	Id Son	*ç	Spir	Ident Dor Cont
a. tiskərt				*!	
☞ b. tiʃʃərt					*
c. tisʃərt	*!				*

d. tisyərt		*!			*
e. tisçərt			*!		

As the reader may verify, the selection of (64b) over (64e) falls out from (64b)'s satisfaction of *ç. The end result is the exclusion of candidate (64e) which dramatically fails on *ç. This said, we bring the analysis of /sk/ > [ʃʃ] to a close.

Now let us turn to the revelatory twists exhibited by ks sequences. The ks sequence is mapped onto [çs] (see data in (15)). ç is a palatalized coronal fricative consonant that does not obtain in the underlying speech system of ABA (see Gafos (1996) for the characterization of ç). The sound [ç] is only observed as a substitute of ʃ when identity avoidance is in force. Put more strictly, the sequence ks chooses to surface as [çs] to foil the attempt to create the ungrammatical sequence *ʃs. We have already established that the GOCP constraint that is in order in ks sequences is (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$. As has already been noted, this GOCP constraint also bars configurations like *ʃs. With regard to the place of this constraint amid the other constraints that have a say in determining the optimal candidate, we suggest that the locally conjoined constraint (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$ (along with Spir and Ident-IO Son) must reign supreme in the hierarchy. We have seen that Spir avoids creating non-spirantised mappings, and Ident-IO Son militates against the emergence of the glide [y]. It has also been demonstrated that all these constraints must dominate the faithfulness constraint Ident-IO Dor Cont which faithfully renders the non-spirantised form of dorsals.

This said, we are going to generate a set of candidates to be compared with the optimal candidate [çs]. The candidates that will be subjected to evaluation are similar to those provided for sk. They can be laid out as follows: [ys], [ʃs], [ʃʃ] and [ks]. Under the ranking established before, the GOCP constraint (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$ will ensconce itself with the top-ranked constraints since identity avoidance is essentially necessitated in *ʃs sequences. In a tableau format, the ranking for input /aksum/ is set out as follows.

(65)

/aksum/$_{Root}$	Id Son	*ç	Spir	(*Sib Sib &*[αvc][αvc])$_{Root}$	Id Dor Cont
💣 a. aksum			*!		
b. aʃsum				*!	*
c. aysum	*!				*
d. açsum		*!			*
e. aʃʃum				*!	*

The ranking established thus far runs afoul of (65d) [açsum]. It is the unexpected output (65a) that wins. As the reader may verify, all the candidates violate one of the four top-ranked constraints, and since the four constraints Ident-IO Son, *ç, Spir and (*Sib Sib &*[αvoice][αvoice])$_{Root}$ are unranked, the decision is passed to Ident-IO Dor Cont. Ident-IO Dor Cont selects (65a) to the exclusion of the others. To restore the privileged status that (65d) has, we need to demote the constraint *ç. Consider how the display influentially changes after subordinating *ç to a position below the top unranked constraints.

(66)

/aksum/$_{Root}$	Id Son	Spir	(*Sib Sib & *[αvc][αvc])$_{Rt}$	*ç	Id Dor Con
a. aksum		*!			
b. aʃsum			*!		*
c. aysum	*!				*
☞ d. açsum				*	*
e. aʃʃum			*!		*

Because the three top-ranked constraints stand as a single package at the top of the hierarchy, the candidate that best satisfies the three constraints will have more chance to win. Candidate (66c) patently satisfies Spir and (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ at the expense of a fatal violation of Ident-IO Son. Candidate (66b), found wanting on (*Sib Sib & *[αvoice] [αvoice])$_{Root}$, has no chance to redeem itself by satisfying the other top-ranking constraints. Candidate (66a), in turn, exhibits an outright infraction of Spir. (66e) displays a violation mark on (*Sib Sib & *[αvoice] [αvoice])$_{Root}$. Failing to pass on one or another of the three top-ranking constraints, the four candidates (66a), (66b), (6c) and (66e) award the palm to [aç̧sum] which satisfies all the top ranking-constraints. Candidate (66d) is therefore optimal.

Thus far, we have accommodated the reason underlying the absence of the voiceless sequences *(sʃ) and *(ʃs). We have entertained two GOCP constraints that contend with this absence because they militate exactly against the type of identity countenanced in these two clusters. The next subsection is meant to provide an adequate characterization of the absence of *zʒ and *ʒz sequences – the two sequences may well be viewed as voiced counterparts of *sʃ and *ʃs. we shall deploy the same GOCP constraint (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ to accommodate the two sequences. Importantly, the ungrammatical voiced sibilant sequences will be resolved in a different fashion as it will be made clear during the course of developing the next subsection.

5.4.2 Dissimilation and spirantised velar stops in gz and zg sequences.

This subsection seeks to provide a treatment of gz and zg sequences which are respectively mapped as [ɣz] and [zɣ] clusters (look at data (17) - compare [ɣz] and [zɣ] to illicit *(ʒz) and *(zʒ). First, we shall strive to conduct an analysis of gz sequences, and then get around zg sequences.

At the very beginning, we start off by pointing out that the spirantised dorsal in gz sequences cannot be amenable to an analysis under the ranking posited for underlying /aksum/. Consider how the ranking in tableau (66) fails to derive the right optimal output [taɣzirt] for underlying /tagzirt/ even if the dorsal stop /g/ (in gz) is identical to /k/ (in ks) on everything – except voice of course – and both activate the same identity avoidance constraint (*Sib Sib & *[αvoice] [αvoice])$_{Root}$.

(67)

t-agzir$_{Root}$-t	Id Son	Spir	(*Sib Sib & *[αvc][αvc])$_{Root}$	*ç	Id Dor Cont
a. tagzirt		*!			
b. taʒzirt			*!		*
c. tayzirt	*!				*
💣 d. taçzirt				*	*
e. taʒʒirt			*!		*

As the display shows, except for the wrongly chosen-as-optimal output [taçzirt], all the other candidates violate one or another of the three top-ranked constraints. Positing another constraint that should stand in a tangential relationship with respect to [çz] is thereby sorely needed. I suggest that the failure of the mapping of /gz/ onto [çz] stems basically from a propensity to preserve obstruents' specification of voice in ABA roots. Deploying insights from positional faithfulness (Beckman (1997, 1998)) together with insights from Bensoukas (2000, 2001) and Ansar (2003) to the effect that roots and stems exhibit faithfulness more than affixes do in Amazigh, we recruit a constraint that calls for faithfulness of voicing in root obstruents[26]. We dub the constraint Ident Obs Voice.

(68) **Ident Obstruent Voice** : For all segments x and y, where x $\in$ Input, y $\in$ Output and y is an obstruent belonging to the root, if x $\Re$ y, then y is [voice] iff x is [voice].

"Obstruent segments and their input correspondents must agree in voicing in the root" Beckman (1998: 23)

Since Ident Obst Voice is not normally violated in ABA, its position relative to the other constraints is a position of supremacy. It should be placed with the top-ranking constraints. In a tableau format the constraints and the candidates can be laid out as follows.

[26] It is possible not to limit faithfulness of voicing to obstruents and use instead Ident-IO Voice. However, further investigation (chap.IV) will show that there is a difference between obstruents' voice and sonorants' voice.

(69)

/t-agzir$_{Root}$-t/	Id Obs Vc	Id Son	Spir	(*Sib Sib & *[αvc][αvc])$_{Root}$	*ç	Id Dor Cont
💣a. tagzirt			*!			
b. taʒzirt				*!		*
c. tayzirt		*!				*
d. taçzirt	*!				*	*
e. taʒʒirt				*!		*

As the reader may verify, the candidate that emerges as optimal exhibits a striking mismatch with the attested ABA output [tayzirt]. Crucially, if candidate (69a) wins, it is only owing to its satisfaction of the lower-ranked constraints *ç and Ident Dor Cont. With respect to the four dominating but unranked constraints, candidate (69a) achieves the same degree of success, i.e. it violates one of the four top-ranking constraints just like the other contenders. To solve this conundrum, I reckon that the demotion of Ident-IO Son, which discriminates against the to-be-optimal candidate [tayzirt], is indeed required. Put in another way, Ident Obst Voice, Spir and (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ must dominate Ident-IO Son if candidate (69c) is to emerge as optimal. Consider how the expected optimal output obtains under the novel ranking.

(70)

/t-agzir$_{Root}$-t/	Id Obs Vc	Spir	(*Sib Sib & *[αvc][αvc])$_{Root}$	Id Son	*ç	Id Dor Cont
a. tagzirt		*!				
b. taʒzirt			*!			*
☞ c. tayzirt				*		*
d. taçzirt	*!				*	*
e. taʒʒirt			*!			*

Candidate (70c) manages to beat the other candidates by faring well on the three top-ranked constraints. The other candidates, each incurs a violation mark of one or another of these constraints. Violation or satisfaction of the lower-ranked constraints contributes in no way in the selection of the optimal output.

Let us now cast a look at zg sequences which uniformly map to zγ *(zʒ) (look at the data in (17b)). The ranking posited thus far for gz is able to give a handle to zg sequences as formally indicated in the tableau below. The form illustrating the sequence zg is underlying /azgaw/.

(71)

/azgaw$_{Root}$/	Id Obs Vc	Spir	(*Sib Sib & *[αvc][αvc])$_{Root}$	Id Son	*ç	Id Dor Cont
a. azgaw		*!				
b. azʒaw			*!			*
☞c. azγaw				*		*
d. azçaw	*!				*	*
e. aʒʒaw			*!			*

As the reader may notice, candidate (71c) holds as the optimal form since it fares well on the three top-ranked constraints. All the other candidates are more anomalous since each candidate violates one of the three top-ranked constraints. There is an important point that deserves mention with respect to candidate (71e). Although candidate (71e) is ruled out by the locally conjoined GOCP constraint (*Sib Sib & *[αvoice] [αvoice])$_{Root}$, it can also be ruled out on other grounds. The core idea is that (71e) exhibits an instance where [ʒʒ] holds as a geminate. I concur that outputs exhibiting voiced geminates are least favoured in ABA especially if one of the parts of the geminate results from spirantisation. This line of argument is accredited to Kirchner (1998) who argues that voiced geminates are usually disfavoured because they require more effort than their voiceless counterparts[27]. The constraint banning voiced geminates is laid out as follows.

(72) ***Voiced Geminate** : Voiced geminates are prohibited.

(Inspired from Kirchner (1998))

[27] See Kirchner (1998) for a more comprehensive account of effort-based lenition.

Although *Voiced Geminate must be placed in a single package with the three top-ranked constraints so as to be able to militate against (71e), *Voiced Geminate must be dominated by Ident Gem Voice if we want underlying voiced geminates to be rendered faithfully in the output[28]. Consider the output of the underlying voiced geminate in the underlying form /azzl/ compared with the derived form of the voiced geminate in the underlying form /azgaw/ > *[aʒʒaw] in tableaux (73) and (74).

(73)

/azzl$_{Root}$/	Id Gem Vc	*Voiced Gem
☞ a. azzəl		*
b. assəl	*!	

(74)

/azgaw$_{Root}$/	Id Gem Vc	*Voiced Gem	Id Son
a. aʒʒaw		*!	
☞ b. azγaw			*

To bring this section to a close, some observations concerning the GOCP constraints (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ deserve mention. First, the ranking of the locally conjoined constraint (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ evinces that its requirements are met whenever sequences like *ʃs, *zʒ and *ʒz hold. Secondly, we can deduce that the locally conjoined constraint is obeyed since it displays clusters similar enough to trigger identity avoidance.

Thus far, we have established that sibilants' identity of stridency and voice, but not anteriority, is sufficient to activate identity avoidance effects and to place the locally conjoined constraint (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ at the top of the ranking.

In the next subsection, we shall provide a handle on sibilants which are different not only in terms of anteriority but also in terms of voice.

[28] Note that Ident Obs Voice can achieve the same result as Ident Geminate Voice.

5.4.3 Spirantisation in zk and kz sequences.

As has already been shown, there is a variety of ways in which the locally conjoined constraint (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$ can be satisfied. Because it is highly-ranked, the constraint triggers different phonological processes that subserve identity avoidance. We have basically addressed two types of resolution: assimilation as in /tiskrt/ > [tiʃʃərt] and strident dissimilation as in /aksum/ > [aç̧sum], /azgaw/ > [azyaw] and /tagzirt/ > [tayzirt]. It is our goal in this subsection to handle a third case which can be subsumed under the purview of GOCP violation. The first instance to be studied is the spirantised dorsal /k/ in the cluster zk. Striking or not, the velar stop /k/ in zk sequences is entirely oblivious of GOCP effects. The dorsal stop /k/ surfaces as [ʃ] as expected (see data in (19a)), thereby offending the requirements of identity avoidance which are immanent in the GOCP constraint at odds with the sequence [zʃ]. I suggest that the constraint at odds with [zʃ] clusters is the already posited constraint *Sib Sib$_{\text{Root}}$. We have appealed to this constraint to contend with [zʃ] clusters because it does not impose any requirement of voice or anteriority identity on the two sibilants that form the cluster. Crucially, when more identity is required, as in *ʃs, *zʒ and *ʒz (identity of voice), the GOCP constraint must be a locally conjoined constraint to meet the needs of increasing similarity. Note also that locally conjoined constraints dominate non-locally conjoined constraints (Smolensky (1993, 1995)). This observation we have already invoked while defining the locally conjoined constraint (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$. We repeat it here for the sake of clarity.

(75) (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$ >> *Sib Sib $_{\text{Root}}$, *[αvoice] [αvoice]$_{\text{Root}}$

Since zk sequences are freely tolerated in the root as the data in (19a) shows, *Sib Sib$_{\text{Root}}$ must be placed low in the hierarchy. I believe that this constraint must not only be dominated by the locally conjoined constraint (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$ but must also be dominated by all faithfulness constraints. Placing *Sib Sib$_{\text{Root}}$ lower in the hierarchy blunts its effects and renders it non-operative. The ranking posited for former clusters manages to call out the right optimal output [zʃ] for input /zk/ without even resorting to *Sib Sib$_{Root}$ as the following tableau shows.

(76)

/t-zkr$_{Root}$ -t/	Id Obs Vc	(*Sib Sib & *[αvc][αvc])$_{Root}$	Spir	Id Son	*ç	Id Dor Cont
a. tizkərt			*!			
b. tizɣərt				*!		*
☞ c. tizʃərt						*
d. tizçərt					*!	*
e. tiʃʃərt	*!	*				*

However, since one of the prime goals of this chapter is to evince the gradient aspect of identity avoidance[29] by virtue of the dominance relation that holds between the GOCP constraints themselves, we incorporate the GOCP constraint *Sib Sib$_{Root}$ in the hierarchy.

As the reader may verify in tableau (77), the incorporation of *Sib Sib$_{Root}$ foregrounds the gradient aspect of GOCP constraints. Being dominated by the more similarity-requiring GOCP constraints, such as (*Sib Sib & *[αvoice] [αvoice])$_{Root}$, *Sib Sib$_{Root}$ shows that the less the identity between the two sibilants, the less the effect of the GOCP.

(77)

/t-zkr$_{Root}$ -t/	Id Obs Vc	(*Sib Sib & *[αvc][αvc])$_{Rt}$	Spir	Id Son	*ç	Id Dor Cont	*Sib Sib$_{Rt}$
a. tizkərt			*!				
b. tizɣərt				*!		*	
☞ c. tizʃərt						*	*
d. tizçərt					*!	*	
e. tiʃʃərt	*!	*				*	*

[29] The gradient aspect of identity avoidance will be taken up in the next section.

Candidate (77a) fares well on all constraints except Spir, and since Spir is top-ranked, candidate (77a) has no chance to win the competition unless all the other candidates fare worse on Ident Obst Voice, Spir or both constraints. Candidate (77e) fails on the top-ranked constraint Ident Obst Voice and on (*Sib Sib & *[αvoice] [αvoice])$_{Root}$. It, thereby, yields the palm to candidates (77b), (77c) and (77d) which are in fine accord with the requirements of the top–ranked constraints Ident Obst Voice, Spir and (*Sib Sib & *[αvoice] [αvoice])$_{Root}$. Decision is, therefore, passed to the first immediately dominated constraint Ident-IO Son. This constraint disqualifies candidate (77b). Evaluation proceeds between the two last rivals (77c) and (77d). (77d) is, in turn, rejected because it counters *ç which is the immediately dominated constraint below Ident-IO Son. Finally, candidate (77c), whose aversion to lower Ident Dor Cont and *Sib Sib$_{Root}$ cause it no harm, emerges as optimal.

With respect to kz sequences, I have been unable to find any examples displaying this cluster. The two notable examples I came across are /akzin/ > [aqzin] and /akzuz/ > [aqzuz]- the underlying forms of the two words are derived from other Amazigh Varieties like El Kirat's (1987) Amazigh lect. I know of no reason why k is mapped to [q] in these two words. The change cannot plausibly be regarded as an instance of spirantisation nor as an instance of dissimilation[30].

5.4.4 Identity avoidance inactivity in sg and gs sequences

The same ranking established in (77) can readily accommodate the sequence sg. This falls out from the fact that the GOCP constraint *Sib Sib$_{Root}$, which reflects no voice or anteriority identity requirements, is ranked low in the hierarchy. And the fact that it is dominated by all the other constraints brings about the default mapping /g/ > [ʒ]. Consider how this is portrayed in a tableau.

[30] Evidence from other Amazigh varieties, like Tashlhiyt, suggests that k- not q- is underlying in /ikzin/.

(78)

/asgur/Root	Id Obs Vc	Spir	(*Sib Sib & *[αvc][αvc]) Root	Id Son	*ç	Id Dor Cont	*Sib Sib Root
a. asgur		*!					
☞ b. asʒur						*	*
c. asɣur				*!		*	
d. asçur	*!				*	*	
e. aʒʒur	*!		*			*	*

Because of their violation of one or another of the three top-ranked constraints, (78a), and (78d) and (78e) are ruled out. (78b) and (78c) achieve a notable degree of success with respect to Ident Obst Voice and Spir. However, candidate (78c) is sacrificed to candidate (78b). This sacrifice is ascribed to the patent failure of candidate (78c) on Ident-IO Son. The remaining candidate (78b) is, therefore, chosen as optimal because it satisfies the maximum number of the top-ranked constraints including Ident-IO Son and *ç.

As regards the sequence gs, I know of no examples that exhibit this sequence in ABA. Saib (1976) reckons that /aksum/ is derived from historical /agsum/. If this holds true, as some forms would presumably suggest – i.e. [tagsart], for exemple, in Tashlhiyt-, then 'agsum' or 'tagsart' should be contended with in the same fashion in which we have contended with items exhibiting ks clusters. Of course an appeal to such an explanation ought to be propelled by historical drives. If this is an instance of diachronic change, the constraint driving the devoicing of g into k should crucially dominate the constraint calling for spirantisation. Although such an analysis may get around 'agsum' and 'tagsart', I know of no way how this could be translated in a constraint-based analysis without affecting all the other forms having the dorsal stop /k/ as underlying. An anlaysis along this line of thinking will also run afoul of the forms that have /g/ as underlying and that straightforwardly undergo spirantisation into [ʒ] or [ɣ]. Since the historical reasons underlying the devoicing of some voiced dorsal stops are unknown to us, we shall sidestep this insuperable problem by purporting that /aksum/ and /taksart/

are indeed the literal underlying forms for [aҫsum] and [taҫsart] respectively in ABA.

5.4.5 The GOCP and spirantised dorsals in kʃ, ʃk and gʃ sequences.

It is time now to address the final clusters kʃ, ʃk and gʃ. Both kʃ and ʃk are faithfully rendered in the output (see data in (20a, b)). Put in another way, the dorsal stop /k/ in the two clusters is recalcitrant to undergo spirantisation; it survives to the surface form unscathed. Although the already posited GOCP (*Sib Sib & *[αvoice] [αvoice])$_{\text{Root}}$ can successfully discriminate against the cluster *(ʃʃ) resulting from underlying /kʃ/ and /ʃk/, the ranking posited thus far is unable to select the right optimal output derived from underlying /kʃ/ and /ʃk/ sequences. This is evinced in tableau (79).

(79)

/kʃf/$_{\text{Root}}$	Id Obs Vc	(*Sib Sib & *[αvc][αvc])$_{\text{Root}}$	Spir	Id Son	*ҫ	Id Dor Cont
a. əkʃəf			*!			
b. əʃʃəf[31]		*!				*
c. əyʃəf	*![32]			*		*
💣d. əҫʃəf					*	*

As is clear from the ranking in tableau (79), (79a), (79b) and (79c) are ruled out due to the outright violations they incur on one of the three top-ranked constraints. Candidate (79d) wrongly emerges as the winner in its pairwise competition with all the other candidates. To get around this unexpected result, we need to appeal to two influential moves to be able to derive the right output.

[31] The sequence ʃʃ in [iʃʃəm] is ruled out by the GOCP constraint regardless of whether the sequence is a geminate or not. (*Sib Sib & *[αvc][αvc])$_{\text{Root}}$ computes segments in a sequential way – it is a distance-assessing constraint.

[32] Following Piggot (1992) and Avery and Rice (1989), I assume that sonorants and voiced stops are both specified for the feature of [+voice]. Avery and Rice (1989) argues that sonorants have what he terms 'spontaneous voicing', a voicing responsible for the putative postnasal voicing assimilation (nt > nd) in languages like Japanese.

The first move is to demote the position of Spir in the hierarchy. Such demotion is sorely needed if we want to attend to the failure of spirantisation in /kʃ/ and /ʃk/ clusters. Put in another way, (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ can never be satisfied while respecting the requirements of Spir. In /kʃ/ and /ʃk/ clusters, satisfaction of (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ is ensured only at the expense of a violation of Spir. Therefore, (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ ought by right to dominate Spir.

The second move is to posit a constraint whose end result is to militate against the wrongly chosen-as-optimal candidate *[içʃəf]. We concur that this constraint is another locally conjoined constraint dubbed (*[αant] [αant] & *[αvoice] [αvoice])$_{Root}$. The constraint, as will be shown, asserts that sequences identical in terms of [voice] and [anterior] are not allowed in the root.

(80) **(*[αant] [αant] & *[αvoice] [αvoice])$_{Root}$**:

> **a.** (*[αant] [αant] & *[αvoice] [αvoice])$_{Root}$ is violated when the sequence of two segments violate both *[αant] [αant]$_{Root}$ and *[αvoice] [αvoice]$_{Root}$.
>
> **b.** (*[αant] [αant] & *[αvoice] [αvoice])$_{Root}$ >> *[αant] [αant]$_{Root}$, *[αvoice] [αvoice]$_{Root}$.

By demoting Spir in the hierarchy and placing (*[αant] [αant] & *[αvoice] [αvoice])$_{Root}$ with the top-ranked constraints, the faithful mapping of /kʃ/ and /ʃk/ clusters will emerge as optimal as clearly displayed in tableau (81).

(81)

/ikʃm/Root	Id Obs Vc	(*Sib Sib & *[αvc][αvc]) Root	(*[αant][αant] & *[αvc][αvc]) Root	Spir	Id Son
☞a. ikʃəm				*	
b. iʃʃəm		*!			
c. iyʃəm	*![33]				*
d. içʃəm			*!		

This ranking is advantageous since it selects the right optimal output (81a). Crucially, (*[αant][αant] & *[αvoice][αvoice])Root manages to disqualify the potential rival of (81a), namely candidate (81d). All of (81b) and (81c) patently fail on one or more of the three top-ranked constraints, and thus have no chance to win the competition.

The cluster ʃk can be readily accounted for by deploying the same ranking.

(82)

/iʃkm/Root	Id Obs Vc	(*Sib Sib & *[αvc][αvc]) Root	(*[αant][αant] & *[αvc][αvc]) Root	Spir	Id Son
☞ a. iʃkəm				*	
b. iʃʃəm		*!	*		
c. iʃyəm	*!				*
d. iʃçəm			*!		

Candidate (82a) outperforms all the other candidates by faring well on the three unranked constraints lying at the top of the hierarchy. The others display fatal violation of one or another of the three top-ranked constraints. Candidate (82a) is thereby assessed as optimal.

[33] Following Piggot (1992) and Avery and Rice (1989), I assume that sonorants and voiced stops are both specified for the feature of [+voice]. Avery and Rice (1989) argues that sonorants have what he terms 'spontaneous voicing', a voicing responsible for the putative postnasal voicing assimilation (nt > nd) in languages like Japanese.

Another point that deserves mention has to do with sequences like gʃ and ʃg. Close scrutiny of ABA lexicon proves that clusters like these are not attested; the only exception I came across is /igʃm/ > [iγʃəm]. This form, though unique, amounts to a reality that [αant][αant] sibilant clusters, irrespective of whether the two sibilants are different in terms of voice or not, are ruled out. Crucially, an adequate accommodation of [iγʃəm] cannot be effected via the locally conjoined constraint (*Sib Sib & *[αvoice][αvoice])$_{Root}$.. This ensues from the fact that (*Sib Sib & *[αvoice][αvoice])$_{Root}$ is only at odds with sequences of sibilants which are identical in terms of voice. If spirantisation of the dorsal /g/ applies in the context of /gʃ/, the derived illicit output *[ʒʃ] may hold displaying a cluster of sibilants different in terms of voicing. To foreclose any source of clusters like *[ʒʃ], we have to use another locally conjoined constraint to rule out sibilants that are identical in terms of [ant]. This constraint can be set out as follows.

(83) **(*Sib Sib &*[αant] [αant])$_{Root}$**:

a. (*Sib Sib & *[αant] [αant])$_{Root}$ is violated when the sequence of two segments violate both *Sib Sib$_{Root}$ and *[αant] [αant]$_{Root}$..

b. (*Sib Sib & *[αant] [αant])$_{Root}$ >> *Sib Sib $_{Root}$, *[αant] [αant]$_{Root}$

By placing this GOCP constraint at the top of the hierarchy along with (*Sib Sib & *[αvoice][αvoice])$_{Root}$ and Ident Obstruent Voice, we can successfully contend with /igʃm/.

(84)

/igʃm/$_{Root}$	Id Obs Vc	(*Sib Sib & *[αvc][αvc])$_{Root}$	(*Sib Sib & *[αant][αant])$_{Root}$	Spir	Id Son
a. igʃəm				*	
b. iʒʃəm			*!		
☞ c.iγʃəm					*
d. içʃəm	*!				

The ranking established in (84) shows that (84b) fatally violates (*Sib Sib & *[αant][αant])$_{Root}$, an infraction which omits it from consideration. (84d)'s lot is no better than (84b). Violation of Ident Obst Voice deprives candidate (84b) from achieving any success. (84a) and (84c) survive for further assessment. Candidate (84a) is rejected due to a violation of Spir. We are left with (84c) which fares well not only on (*Sib Sib & *[αvoice][αvoice])$_{Root}$ and (*Sib Sib & *[αant][αant])$_{Root}$ but also on Spir. It is thereby evaluated as optimal.

With respect to the clusters ʒg and gʒ, I have been unable to find data illustrating these sequences. However, I assume that they will receive the same treatment as ʃk and kʃ.

5.5 The GOCP and similarity implications

This section provides a glimpse into the broad vista of GOCP constraints interaction and their identity implications. Specifically, I reckon that accommodating identity avoidance in strictly adjacent sibilant clusters cannot be easily achieved if the classic configuration of the OCP is adopted. This ensues from the fact that the classic OCP has no theoretical devices to achieve this end (cf. Suzuki (1998), Pierrehumbert (1993)). The GOCP approach, championed by Suzuki (1998), has been able to contend with the difficulties and inconsistencies exhibited by sibilants while observing identity effects.

We have already established that the GOCP is a constraint that bars sequences of identical or near-identical units. In our analysis, avoiding identity, in its different gradient aspects, is achieved by virtue of basically three GOCP constraints. These constraints exhibit restrictions against strictly adjacent Sibilants that are completely different in terms of voice and anteriority or that are identical in terms of anteriority, voice or both. Among these three GOCP constraints, we have two locally conjoined constraints, i.e. (*Sib Sib & *[αvoice] [αvoice])$_{Root}$ and (*Sib Sib & *[αant] [αant])$_{Root}$, and a non-locally conjoined GOCP constraint, i.e. *Sib Sib$_{Root}$. By appealing to local conjunction, we have been able to contend with a whole range of possibilities in which sibilants specifications of [ant] and [voice] are clustered. Along the course of contending with different sibilant clusters, it has been discovered that when spirantisation yields a cluster of sibilants identical in terms of anteriority, voice or both, the GOCP constraints banning those configurations are top-ranked in the hierarchy and dominate all the other non-locally conjoined GOCP constraints like $*\text{Sib Sib}_{\text{Root}}$, $*[\alpha\text{voice}][\alpha\text{voice}]_{\text{Root}}$ and $*[\alpha\text{ant}][\alpha\text{ant}]_{\text{Root}}$. On the other hand, because strictly adjacent sibilants which are different in terms of voice and anteriority are freely tolerated in the root, the constraint banning such clusters must be demoted in the hierarchy and must be dominated by $(*\text{Sib Sib} \,\&\, *[\alpha\text{ant}]\,[\alpha\text{ant}])_{\text{Root}}$ and $(*\text{Sib Sib} \,\&\, *[\alpha\text{voice}]\,[\alpha\text{voice}])_{\text{Root}}$.

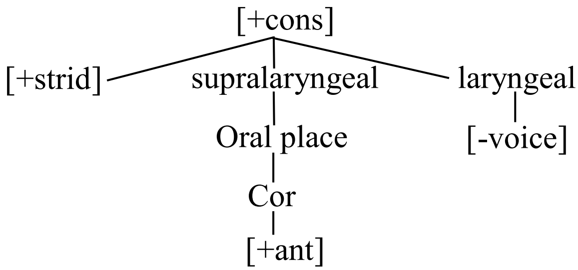
These findings, if translated in the form of a dominance relationship, they will look like:

(85) $(*\text{Sib Sib} \,\&\, *[\alpha\text{ant}]\,[\alpha\text{ant}])_{\text{Root}}$, $(*\text{Sib Sib} \,\&\, *[\alpha\text{voice}]\,[\alpha\text{voice}])_{\text{Root}}$ >> Ident-IO Son >> *ç >> $*\text{Sib Sib}_{\text{Root}}$.

On the basis of the scale in (85), we can safely establish the generalization that the more similar two strictly adjacent sibilants are in terms of voice and anteriority, the higher ranked the constraint that requires identity avoidance between the two sibilants. A finding that substantially concurs with the assumptions made by Suzuki (1998), Pierrehumbert (1993, Frisch (1999) and Rose and walker (2001). Our account of ABA's interaction of spirantisation and the GOCP lends compelling support to the fact that gradient similarity must be incorporated in the concept of the OCP. Among the GOCP constraints that are displayed in (85), the lower-placed constraint $*\text{Sib Sib}_{\text{Root}}$ is emphatically violated in ABA. The other GOCP constraints, owing to their higher position in the hierarchy, are strictly obeyed as noted before. Crucially, the violation of $*\text{Sib Sib}_{\text{Root}}$ in ABA is basically attributed to the fact that it refers to a configuration where the two strictly adjacent sibilants are maximally different in terms of voice and anteriority.

To bring this section to a close, I concur that a tier-based treatment cannot handle the complex twists exhibited by the interaction of identity avoidance and spirantisation in ABA. Representational tier-based approaches, such as those driven by the percepts of Feature Geometry, will be fraught with a whole range of limitations in explaining the ABA phenomenon of identity avoidance and its interaction with spirantisation. If, for example, we deploy Sagey's (1986) Feature Geometry tree, we shall represent sibilants in the following fashion (see the tree in (86)).

(86) *Representation of* [s]



If we use the representation in (86) along with the putative classic OCP as defined below,

(87) **OCP**: At the melodic level, adjacent identical elements are prohibited. McCarthy (1986)

we will be unable to account for the identity avoidance immanent in mappings like /ks/ > [çs], *[ʃs]. This is reminiscent of the fact that the classic OCP computes only one feature at a time (cf. McCarthy (1986)). The case in point evinces that we must entertain three features [strid] (Sib), [ant] and [voice]. However, since the classic OCP countenances one tier at a time, the three tiers [strid], [ant] and [voice] cannot be countenanced at once because they have different positions in the hierarchy as (86) shows.

The classic OCP is fraught with another pernicious limitation. The core idea is that the classic OCP cannot accommodate features that are specified differently. Put in another way, the OCP cannot countenance the two features [+ant] of [ʃ] and [-ant] of [s] in the cluster *sʃ for example. This is due to the fact that the classic OCP computes only identical features. Different specifications for the same feature cannot be considered by the classic OCP.

To wind up, I think that the geometrical representations espoused in FG theory are themselves a limitation since they cannot make a uniform consistent representational relationship between the OCP-activated features that the OCP can see.

6. Conclusion.

In this chapter we have tried to provide a thorough account of the interaction of spirantisation and identity avoidance in strictly adjacent sibilants. We have tried to present facts portraying the application of spirantisation in ABA, with some sporadic comparisons with other Amazigh lects. To flesh out our understanding of spirantisation in ABA, we have conducted an OT analysis of the data exhibiting spirantisation with an eye to paving the ground to a treatment of the interaction of spirantisation and identity avoidance.

To contend with the interaction of spirantisation and identity avoidance in strictly adjacent sibilants, we have recruited a body of GOCP constraints along with the constraint Spir. In particular, we have posited the GOCP constraint $(\text{*Sib Sib \& *}[\alpha\text{voice}][\alpha\text{voice}])_{\text{Root}}$ to get around the output forms of underlying /ks/, /zg/ and /gz/. Our analysis has conflated a whole range of findings. Foremost among these findings is that the GOCP constraint $(\text{*Sib Sib \& *}[\alpha\text{voice}][\alpha\text{voice}])_{\text{Root}}$ is inviolable in ABA, and that it ought by right to be placed on top of the hierarchy.

To handle sequences illustrating difference in terms of voicing and anteriority, i.e. zk and sg, we have resorted to the GOCP constraints $\text{*Sib Sib}_{\text{Root}}$. We have demonstrated that this GOCP constraint should be placed at the bottom of the hierarchy, and that it should be dominated by Ident-IO Son and *ç̧. In this position its force is completely blunted.

The final GOCP constraint we have utilized is $(\text{*Sib Sib \& *}[\alpha\text{ant}]\ [\alpha\text{ant}])_{\text{Root}}$. This constraint is formulated to accommodate the spirantised forms of sequences like kʃ, ʃk and gʃ. Crucially, the constraint has proved to be illuminating in many respects. For one thing, the GOCP constraint discriminating against sequences of identical sibilants proves to have the same supremacy that $(\text{*Sib Sib \& *}[\alpha\text{voice}][\alpha\text{voice}])_{\text{Root}}$ has. For another, its supremacy has provided us with compelling evidence that gradient similarity is at play in ABA.

In concluding this chapter, we have delved into the identity implications portrayed in the dominance relationship that obtains between the GOCP constraints. The ranking of the GOCP constraints has shown that the force of identity is reduced, the more dissimilar the two sibilants are; and, ceteris paribus, the force of identity becomes more notable, the more similar the two sibilants are. We have finished our chapter by criticizing a tier-based approach of the OCP. We have shown that an account that does not espouse similarity in its concept of the OCP is unable to contend with the aforementioned sibilant clusters.

CHAPTER IV

SIB ə SIB CLUSTERS : IDENTITY AND PROXIMITY IMPLICATIONS

Chapter IV

SIB ə SIB CLUSTERS: IDENTITY AND PROXIMITY IMPLICATIONS

1. Introduction

This chapter is construed to be a continuation of the third chapter. The phonological phenomena to be studied are spirantisation and glide assimilation within the root. The point of interest in this chapter is to conduct an analysis of Sib ə Sib sequences that result from spirantisation or glide assimilation. Our goal in this chapter is twofold. First, we try to account for the various ways in which Sib ə Sib clusters are resolved. It will be shown during the course of handling Sib ə Sib clusters that identity avoidance can sometimes be satisfied via spirantisation blockage and other times via dissimilation. Secondly, we argue that without deploying identity and proximity hierarchies of locally conjoined constraints, an adequate characterization of the identity avoidance exhibited by sibilant clusters will not be attained. It is our belief that a treatment that makes no provision for identity and proximity effects cannot supply an adequate characterization of the GOCP effects exhibited in ABA sibilant clusters.

This chapter is organized as follows. In section 2, we provide facts about the interaction of spirantisation and glide assimilation with underlying sibilants in Sib ə Sib clusters. Specifically, we address the way spirantisation holds if the expected output is a derived sibilant that stands a schwa away from an underlying sibilant in 2.1. We start by providing data exhibiting the interaction of spirantisation with Sib(+ant) ə Sib(-ant) clusters in 2.1.1, and then we lay out the data that displays the interaction of spirantisation with Sib(-ant) ə Sib(-ant) clusters in 2.1.2. In 2.2, we present facts about glide assimilation, and then display the interaction of glide assimilation with Sib ə Sib sequences. In section 3, we address the status of glides in Amazigh. Then, we delve into a constraint-based analysis of Sib ə Sib clusters in section 4. In particular, we circumvent the basic phonological phenomena ensuing from the interaction of spirantisation with Sib ə Sib contexts in 4.1. And in 4.2, we carry out an analysis of glide assimilation along with the different phenomena ensuing from the interaction of glide assimilation with Sib ə Sib clusters. In section 5, we evince the range of identity and proximity implications that sibilants exhibit in Sib ə Sib clusters. Section 6 sums up the results.

2. Data description

This section is meant to present the different processes evinced by the interaction of sibilants in Sib ə Sib clusters. Crucially, when a Sib ə Sib cluster is observed in ABA, usually one of the two sibilants of the cluster is derived from a velar stop or a [-back] glide. Derivation falls out from one of two processes: spirantisation or glide assimilation. Spirantisation, as a general phenomenon that pervades the lexicon of ABA, has already been given a handle. So we shall sidestep a presentation of spirantisation facts retaining focus only on spirantisation that is conditioned by Sib ə Sib clusters. Conversely, we shall dwell more on glide assimilation by elucidating the phenomenon as well as by showing how it operates when the susceptible output is a Sib ə Sib cluster.

2.1. Spirantisation and Sib ə Sib clusters

In the third chapter, we have presented a variety of spirantisation-driven processes with an eye to proving that identity avoidance is only observed under strict requirements of identity and proximity. From the standpoint of proximity, we have shown that sibilants separated by a full vowel or larger elements are freely tolerated in ABA.

If we pin down the object of study to clusters where the process of spirantisation yields a segment (a sibilant or a non-sibilant consonant[1]) that stands one schwa away from another sibilant, the nature of the spirantisation-driven segment largely depends on the specifications of

[1] Non-sibilant consonants are usually driven by identity avoidance.

voice and anteriority of the sibilant that is one schwa away from it. Put in another way, when the velar stops k and g are one schwa away from a sibilant, they exhibit a variety of possibilities and choices with respect to spirantisation. Sometimes, they emphatically fail to spirantise. Sometimes, they readily spirantise, and when they spirantise, they might emerge as [-ant] sibilants or as non-strident segments (y and ç). To get a better feel of how the picture holds, let us provide data evincing how spirantisation operates when a Sib ə Sib cluster might emerge.

2.1.1 The interaction of spirantisation with Sib(+ant) ə Sib (-ant) clusters.

When spirantised, the dorsal stops k and g may interact with a [+ant] sibilant. When this display holds, a variety of possibilities is opened up. Specifically, the [+ant] sibilant may precede or follow the derived [-ant] sibilant; it also may agree or disagree with the derived sibilant in terms of voicing. The first scenario to be presented is a situation where derived sibilants are preceded by [+ant] sibilants, and where both sibilants are identical in terms of voicing. Under this sequence, default spirantisation[2] is observed, and /k/ and /g/ are mapped onto [ʃ] and [ʒ] respectively. Consider the data below.

(1)

sək, zəg (identical voice specifications)

		Under.F.	*Surf.F.*	
a.	**sək**	iskra-n	isəʃran	'partridges'
		t-assk-t	tassəʃt	'toponym'
		isk	isəʃ	'cud'
		sk	səʃ	'interjection used to make the cattle move'
b.	**zəg**	ZZg	ZZəʒ[3]	'to milk'

[2] Under default spirantisation, we mean spirantisation that derives sibilant outputs. Spirantisation always derives [-ant] sibilants if identity avoidance effects are not in force.

[3] I have been unable to find other items exhibiting underlying zəg sequences.

When the display that holds exhibits a Sib(+ant, α voice) ə Sib(-ant, -α voice) cluster, spirantisation applies in the same fashion as in (1) yielding [ʃ] and [ʒ] in the output, thereby lending tacit support to the fact that the preceding [+ant] sibilant does not exercise any effects whatsoever to modify the strident feature of the derived sibilant. This observation is portrayed in the data below.

(2) **zək, səg (different voice specifications)**

		Under.F.	*Surf.F.*	
a.	**zək**	t-izzk-t	tizzəʃt	'milk'
b.	**səg**	asgnu	asəʒnu	'cloud'
		iSSgni	iSSəʒni	'big needle'
		asgru	asəʒru	'crop of a bird'
		asgmi	asəʒmi	'rearing, educating'

2.1.2 Spirantisation and Sib(-ant) ə Sib(-ant) clusters.

When the cluster that might emerge after the application of spirantisation is Sib(-ant,αvc) ə Sib(-ant,βvc), two dispositions are observed. Which disposition holds falls to the nature of the dorsal stop that undergoes spirantisation. If the dorsal stop is the voiceless stop k, spirantisation is precluded as the data below shows.

(3) **kəʃ sequences.**

	Under.F.	*Surf.F.*	
kəʃ	akʃʃuT	akəʃʃuT	'twig'
	ikʃʃT	ikəʃʃəT	'he plundered'
	kʃʃ	kəʃʃ	'interjection used to keep the fowls off'

The blockage of spirantisation in (3) presumably applies to foil the attempt to create clusters such as *ʃəʃ. Therefore, unlike the clusters Sib(+ant) ə Sib(-ant) which are freely tolerated in the root, the sequences Sib(-ant) ə Sib(-ant) are avoided. However, the strategies pursued to achieve this avoidance are different. While spirantisation of k emphatically fails if the expected output is a Sib(-ant) ə Sib(-ant) context, spirantisation of dorsal /g/ is attested. Consider the data set out in (4) below.

(4) **gəʒ and gəʃ sequences**[4].

		Under. F.	*Surf. F.*	
a.	**gəʒ**	t-agʒdi-t	tayəʒdit	'wooden pillar'
		agʒdur	ayəʒdur	'lamentations caused by a great misfortune'
b.	**gəʃ**	agʃʃul	ayəʃʃul	'utensil for churning milk'

As the reader may see, spirantisation of /g/ applies while observing the restriction against Sib(-ant) ə Sib(-ant) clusters. The voiced dorsal stop g is mapped onto [y] in place of the expected [ʒ].

2.2 Glide assimilation

Glide assimilation is a process that pervades many Znati lects, most notably Rifi lects. Under glide assimilation, the glide /y/ and /w/ assimilate the voicing specification of the following coronal obstruents t and s within the confines of a root. /y/ surfaces as [ʃ] or [ç] and /w/ surfaces as [ɸ]. When followed by the coronal stop [t], the glide /y/ emerges as [ʃ]. When followed by the coronal sibilant [s], the glide /y/ surfaces as [ç]. Although glide assimilation has been observed by a variety of Amazigh phonologists (cf. Tangi (1991), Chtatou (1982) and Chami (1979)), it has received very little analysis along the history of Amazigh phonology.

ABA is notorious for glide assimilation. The process is systematically and solidly attested in ABA roots. The behaviour of glide assimilation in ABA is in good part consistent with glide assimilation in many Rifi lects. The data below portrays glide assimilation in ABA.

(5)

	Under.F.	*Surf.F.*	
a.	fayt	faʃt	'belonging to the past'
	iyt	iʃt	'one (fem.)'

[4] There are some clusters like kəz, gəz, ʃəg and ʒək which I have been unable to find in the lexicon of ABA.

	t-aɣllay-t	taɣllaʃt		'kettle'
	ayt	aʃt		'those who belong to the tribe of'
	Under.F.	*Surf.F.*		
b.	ifrysn	ifrəçsən	*ifrəʃsən	'toponym'
	iysan	içsan	*iʃsan	'horses'
	ysi	əçsi	*əʃsi	'take !'
c.	blaws	blaɸs		'toponym'
	t-ifaw-t	tifaɸt		'light'
	wt	əɸt		'to hit'

As the reader may verify, the mapping of the glide /y/ onto [ʃ] or [ç] is attributed to the nature of the post-posed consonant. The sibilant ʃ surfaces before the coronal stop [t], and the non-sibilant [ç] emerges before the coronal sibilant [s]. /w/, on the other hand, is mapped uniformly to [ɸ] before both [t] and [s].

Germane to the purpose aimed at in this chapter is the interaction of the palatal glide undergoing assimilation with other sibilants in the root. Put in another way, does glide assimilation yield the expected output [ʃ] if the glide lies within a particular proximity to another sibilant? The answer to this question is partly answered in (5b). Glide assimilation fails to yield the expected output [ʃ] if the distance between the assimilating glide and the other sibilant is Sib Sib or Sib ə Sib. However, failure is not observed thoroughly; it is observed under strict requirements of similarity and proximity between the two sibilants. When the distance between the two sibilants is a full vowel -not a schwa- or larger, no dissimilation of the feature strident holds, i.e. no ç emerges. The default ʃ emerges before the coronal stop t. Consider the data below.

(6)

	Under.F.	*Surf.F.*	
a.	t-azzuy-t	tazzuʃt	'cone'
	siyt	siʃt	'those (fem) who belong to the tribe of'
b.	t-anSRi-yt	tanəSRiʃt	'hall'

	t-anZRi-yt	tanəZRiʃt	'song'
c.	zziwyt	əzziwəʃt	'ground floor'
	zzawyt	əzzawəʃt	'Zawiya'
	t-asbni-yt	tasəbniʃt	'a sort of scarf'
d.	t-azrmummu-yt	tazərmummuʃt	'lizard'

As the reader may notice, the increasing distance between the two sibilants - exhibited in (6a), (6b), (6c) and (6d) - exercises no influence whatsoever on the sibilant resulting from glide assimilation.

2.3. Glide assimilation and Sib ə Sib clusters.

When the distance that holds between the glide undergoing assimilation -usually via assibilation- and any other underlying sibilant is Sib ə Sib, the glide undergoing voice assimilation fails to emerge as the expected sibilant [ʃ] if it agrees with the underlying sibilant in terms of anteriority, i.e. if they are both [-ant]. When the distance that might emerge under glide assimilation is Sib Sib, it is corrected via strident dissimilation as in (5b). Dissimilation holds if the to-be-derived sibilant agrees with the following sibilant in terms of voice, anteriority or both.

2.3.1 The interaction of glide assimilation with Sib(+ant) ə Sib(-ant) clusters

When the sequence is Sib(+ant) ə Sib(-ant), the palatal glide surfaces as [ʃ]. Consider the data below.

(7)

	Under.F.	*Surf.F.*	
a.	zzyt	əzzəʃt	'oil'
	zzytun	əzzəʃtun	'olives'
b.	t-asɦussy-t	tasɦussəʃt	'a whisper'
	t-insy-t	tinsəʃt	'sheep’s leg'

In the items in (7a), the glide is mapped to [ʃ] as expected. This ensues from the fact that the glide undergoing assimilation stands in fundamental conflict with the precedent sibilant with respect to the two features of voice and anteriority. This difference in terms of voice and interiority exercise no influence whatsoever on the output of the glide.

This degree of difference is sufficient to foreclose any source of identity avoidance. Put more strictly, identity in terms of the feature [strident] is not sufficient to trigger dissimilation. (7b) shows that merely being identical for voice is not sufficient to trigger sibilants' dissimilation in Sib ə Sib clusters.

2.3.2 The interaction of glide assimilation with Sib(-ant) ə Sib(-ant) clusters

Only when a potential cluster of sibilants where sibilants are identical for anteriority holds that glide assimilation in a Sib ə Sib context yields the palatalized coronal consonant [ç̧]. Consider the data below.

(8)

	Under.F.	*Surf.F.*		
a.	t-uʒy-t	tuʒəçt	*tuʒəʃt	'healing'
b.	t-ilkiy-t	tiʃʃəçt	*tiʃʃəʃt	'louse'
	t-aʃaʃʃy-t	tʃaʃʃəçt	*tʃaʃʃəʃt	'hat'
	t-afakʃiy-t	tfakʃəçt	*tfakʃəʃt	'bleeding toe'

The forms in (8a) and (8b) provide ample evidence that sibilants identical for anteriority are entirely shunned in ABA; identity or non-identity of voice exercises no influence whatsoever on the output of the glide.

To bring this section to a close, we formulate the following generalizations about the coexistence of sibilants in Sib ə Sib clusters.

- Both spirantisation and glide assimilation yield [-ant] sibilants if the output is Sib(+ant,αvc) ə Sib(-ant,-αvc).
- Both spirantisation and glide assimilation yield [-ant] sibilants if the output is Sib(+ant,αvc) ə Sib(-ant,αvc).
- The spirantisation of dorsal g into [y] is attested if the potential output is Sib(-ant,αvc) ə Sib(-ant,αvc) or Sib(-ant,αvc) ə Sib(-ant,-αvc).

- Glide assimilation yields the non-strident palatalized coronal [ç] if the potential output is Sib(-ant,αvc) ə Sib(-ant,αvc) or Sib(-ant,αvc) ə Sib(-ant,-αvc).
- Spirantisation is blocked if the dorsal stop is k and if the potential output is Sib(-ant,αvc) ə Sib(-ant,αvc).

3. The status of glides in Amazigh

The problem of characterizing the underlying nature of glides has been around for many years in Amazigh phonology. Some authors have considered glides as basic underlying segments; others claim that glides and high vowels are simply phonetic reflexes of the same phonological set and that no distinction exists at the underlying level between the syllabic and the non-syllabic elements. The latter line of thinking is adopted by phonologists like Rischel (1962) and Selkirk (1981). No matter how different the theoretical assumptions adopted by the proponents of this position, they concur that the difference between glides and high vowels is strictly a function of syllable structure. Such a view has engendered an array of consequences. Germane among these consequences is the claim that if the syllabicity of a segment can be determined by the position it occupies in a given syllable then the feature [syllabic] becomes predictable and must therefore be dispensed with.

In Amazigh phonology, many phonologists have viewed the distinction between glides and high vowels to be purely phonetic (cf. Destaing (1920) and Mercier (1937)). This line of argument they defend by claiming that glides and high vowels appear in mutually exclusive environments, as in [iru] 'he cried' vs [ahayru] 'then he cried', where the glide [y] alternates with [i]. These observations and others have propelled phonologists to conclude that glides and high vowels belong to the same underlying set. As Applegate (1971: 101) puts it, "[in Amazigh] two phonemes rather than four are adequate to deal with the four phones." Boukous (1987) and Dell and Elmedlaoui (1985), on their investigation of Tashlhiyt Amazigh, reach the same conclusion by deploying theories of syllable structure.

Counter to the view propounded by the contenders of the line of thinking that eliminates underlying contrast between glides and high vowels, Guerssel (1986), Bynon (1978) and Hyman (1988) have tried to provide supportive evidence in favour of the existence of an underlying lexical contrast between glides and high vowels. Guerssel (1986) contends that in spite of the fact that high vowels and glides are in complementary distribution, a considerable amount of data in Amazigh reveals that in some cases high vowels are allowed only in nucleus position and that they do not alternate with glides. He offers dramatic examples displaying this disparity. He purports that there are some forms where one would expect some suffix vowels to surface as [w] and [y] when appended to vowel-final bases, and where the change does not happen. From the foregoing, Guerssel (1986) comes to the conclusion that the disparity observed between glides and high vowels will receive a natural explanation only if a phonemic distinction between glides and high vowels is established.

Parallel to Guerssel's point of view is Bynon's (1978) standpoint concerning glides and high vowels. Bynon's (1978) account of Ait Hdiddou Amazigh vowels and glides has amounted to the conclusion that an underlying vowel always surfaces unscathed in the surface form, whereas an underlying glide oscillates between a vowel and a glide. In particular, Bynon (1978) embarks on an analysis whose chief mandate is to show that glides and vowels are underlyingly contrastive. To achieve this end, he provides examples that defend his point of view. He explains, for example, that glides contrast with high vowels in final position as in [ini] 'say' vs [iny] 'he rode'. To endorse the viewpoint that glides behave like consonants, Bynon (1978) argues that glides, like other consonants, can form geminates while vowels cannot. Furthermore, a vowel can never occur in any environment next to a vowel while glides can stand in contiguity with any consonant or vowel.

Our viewpoint is consistent with the viewpoint of Guerssel (1986), Bynon (1978) and Bensoukas (2001) on glides and high vowels. In fact, the consonantal nature of glides can be further evinced if we consider spirantisation and glide assimilation. It has already been established that the dorsal stops /g/ and /k/ may spirantise into [y], which lends further patent support to the consonantal nature of glides. Glide assimilation is another compelling evidence. Under glide assimilation, the glides /y/ and /w/ surface as [ʃ] and [ɸ] respectively when followed by the coronal obstruents t and s. If the glides were underlying vowels, no such assimilation would hold.

4. A constraint-based analysis of Sib ə Sib clusters

In the third chapter, we have given a thorough analysis of spirantisation and its interaction with the cluster Sib Sib. In the current expositional context, the GOCP constraints reflecting identity avoidance in Sib Sib clusters will be eschewed to pave the way to another set of GOCP constraints exhibiting a restriction against a larger distance, namely the distance Sib ə Sib. We have already established the fact that identity avoidance is only observed in Sib Sib and Sib ə Sib clusters and emphatically fails in larger distances. In fact, it is this idea that drives us to deploy the proximity hierarchy of GOCP constraints in chapter III, repeated here for the sake of convenience.

(9) *Sib Sib >> *Sib ə Sib >> *Sib $\mu_{[\text{full mora}]}$ Sib >> *Sib μμ Sib >> *Sib σσ Sib >> *Sib ∞ Sib

The remainder of this chapter is meant to unravel the different identity forms under which the GOCP constraints are satisfied. We also intend to check the validity of our findings against the posited proximity hierarchy. Put in another way, we are going to see if identity avoidance effects are reduced when the distance becomes larger, i.e. when we move from distance Sib Sib to distance Sib ə Sib.

Before handling Sib ə Sib clusters, we may well do to repeat the ranking of the already posited constraints. We focus on the constraints which are going to be of utility to our forthcoming analysis.

(10) Ident Obst Voice >> Spir >> Ident-IO Son >> *ç >> Ident Dor Cont

4.1 Spirantisation and Sib ə Sib contexts

This subsection is meant to provide a thorough analysis of the interaction of identity avoidance with spirantisation in Sib ə Sib contexts.

4.1.1 Spirantisation and səʒ/zəʃ clusters

On the basis of the data in (2), we notice that the default spirantisation pattern is observed in all candidates. Put in another way, spirantisation yields a [-ant] sibilant. This suggests that when the display is səʒ or zəʃ, no restriction holds whatsoever to ban this configuration from the output. In OT terms, this means that the constraint calling for identity avoidance in clusters like səʒ or zəʃ is low-ranking. This constraint imposes no principled requirements on the identity of the two sibilants in Sib ə Sib clusters apart of course from their being strident sibilants. Therefore, I reason that the GOCP of interest here should be a non-locally conjoined GOCP constraint labeled *Sib ə Sib_{Root}.

(11) ***Sib ə Sib_{Root}**: A sequence of two sibilants separated by [ə] is prohibited.

*Sib ə Sib_{Root} cannot plausibly be ranked at the top of the hierarchy because clusters which are at odds with the requirement of this GOCP constraint are well attested in ABA as the data in (2) shows. I suggest that this GOCP constraint should be placed below *ç̧ so that it has no effect on the optimal output. Consider the tableau below.

(12)

/asgmi/$_{Root}$	Id Obs Vc	Spir	Id Son	*ç̧	*Sib ə Sib_{Root}
a. asəgmi		*!			
☞b. asəʒmi					*
c. asəɣmi			*!		
d. asəç̧mi	*!			*	

The supremacy of Ident Obst Voice, Spir and Ident-IO Son over *Sib ə Sib_{Root} ensures that candidate (12b) will emerge as optimal. Candidate (12a) is omitted from consideration owing to a fatal violation of Spir. Candidate (12c) is ruled out as it emphatically fails on Ident-IO Son. Although Ident-IO Son does not reign supreme in the hierarchy, it still dominates *Sib ə Sib_{Root}. The final contender is candidate (12d). This candidate stands in fundamental conflict with the requirements of Ident Obst Voice, and since Ident Obst Voice is undominated in ABA, such violation is viewed as fatal. The remaining candidate (12b), faring well on all the high-ranking constraints, is awarded the palm and therefore emerges as optimal.

With the arguments ranked, another point deserves mention. In terms of similarity, the ranking established, thus far, displays that a sequence of Sib ə Sib is tolerated if the two sibilants are maximally different with respect to the specifications of voice and anteriority.

4.1.2 Spirantisation and səʃ/zəʒ clusters.

The forms in (1) exhibit an instance of spirantisation where the dorsal stop /k/ is mapped to a [-ant] sibilant. Once again the candidates evince an infraction of the putative identity avoidance exhibited in sibilant clusters. The mapping /isk/ > [isəʃ], for example, provides a piece of evidence that sibilants different for anteriority but identical for voice have not reached a degree of similarity where identity avoidance is satisfied. This suggests that the locally conjoined constraint (*Sib ə Sib & *[αvoice] ə [αvoice])$_{Root}$, which bans sibilants identical for voice in Sib ə Sib clusters, is no better than *Sib ə Sib $_{Root}$.

(13) **(*Sib ə Sib & *[αvoice] ə [αvoice])$_{Root}$**:

a. (*Sib ə Sib & *[αvoice] ə [αvoice])$_{Root}$ is violated when the sequence of two segments violate both *Sib ə Sib$_{Root}$ and *[αvoice] ə [αvoice]$_{Root}$.

b. (*Sib ə Sib & *[αvoice] ə [αvoice])$_{Root}$>>*Sib ə Sib$_{Root}$, *[αvoice] ə [αvoice]$_{Root}$

Since the requirements of the locally conjoined constraint are not satisfied, the constraint must be ranked low in the hierarchy. However, note that even if the locally conjoined constraint (*Sib ə Sib & *[αvoice] ə [αvoice])$_{Root}$ is ranked at the bottom of the hierarchy, it still dominates *Sib ə Sib $_{Root}$ as (13) asserts. Consider how the locally conjoined constraint (*Sib ə Sib & *[αvoice] ə [αvoice])$_{Root}$ fails to exercise any influence on the selection of the output.

(14)

/t-assk $_{Root}$-t/	Id Obs Vc	Spir	Id Son	*ç	(*Sib ə Sib & *[αvc]ə[αvc])$_{Root}$
a. tassəkt		*!			
☞b. tassəʃt					*
c. tassəyt	*!		*		
d. tassəçt				*!	

Candidates (14a), (14c) and (14d) each violates one of the top-ranking constraints. Candidate (14a) fatally violates Spir. (14c) violates Ident IO Son and (14d) fails on *ç. The only candidate that outperforms (14a), (14c) and (14d) is candidate (14b). (14b) satisfies Spir, Ident-IO Son and *ç. That is why it emerges as optimal despite its infraction of the lower-ranked constraint (*Sib ə Sib & *[αvoice]ə[αvoice])$_{Root}$.

The same ranking contends with the form /izzg/ where spirantisation yields the cluster zəʒ.

(15)

/izzg/$_{Root}$	Id Obs Vc	Spir	Id Son	*ç	(*Sib ə Sib & *[αvc]ə[αvc])$_{Root}$
a. izzəg		*!			
☞b. izzəʒ					*
c. izzəy			*!		
d. izzəç	*!			*	

Owing to its satisfaction of Ident Obst Voice, Spir, Ident-IO Son and *ç, candidate (15b) is evaluated as optimal. The other candidates, each fails on one or another of the aforementioned constraints.

4.1.3 Spirantisation and the avoidance of ʃəʃ, ʒəʒ and ʒəʃ clusters.

For ease of exposition, I shall address *ʒəʒ and *ʒəʃ first, and then move to *ʃəʃ clusters (look at the data in (4)). In these clusters, the dorsal stop /g/ is unfaithfully rendered as [y] due to the presence of a following [-ant] sibilant. Before attending to this change, it is fair to say that the mapping (/g/ > [y]) is consistently observed when identity avoidance is in force. Avoiding the clusters *ʒəʒ and *ʒəʃ ensues from a locally conjoined constraint barring configurations where the two sibilants are identical in terms of [ant].

(16) **(*Sib ə Sib & *[αant] ə [αant])$_{Root}$:**

a. (*Sib ə Sib & *[αant] ə [αant])$_{Root}$ is violated when the sequence of two segments violate both *Sib ə Sib $_{Root}$ and *[αant] ə [αant]$_{Root}$.

b. (*Sib ə Sib & *[αant] ə [αant])$_{Root}$>>*Sib ə Sib $_{Root}$,*[αant] ə [αant]$_{Root.}$

This constraint should ensconce itself at the top of the hierarchy along with Ident Obst Voice. Both should dominate Spir. Actually, Ident Obst Voice's domination of Spir has already been established. The need to establish the ranking (*Sib ə Sib & *[αant] ə [αant])$_{Root}$ >> Spir will be patently clear when we deal with *ʃəʃ. Let us cast a closer look at how underlying /agʒdur/ is mapped by deploying the novel ranking.

(17)

/agʒdur/$_{Root}$	(*Sib ə Sib & *[αant]ə[αant])$_{Root}$	Id Obs Vc	Spir	Id Son	*ç
a. aʒəʒdur	*!				
b. agəʒdur			*!		
☞c. ayəʒdur				*	
d. açəʒdur		*!			*

Under the ranking established in (17), candidates (17a) and (17d) are the first competitors that are sacrificed. Candidate (17a) is rejected in toto owing to its outright violation of (*Sib ə Sib & *[αant] ə [αant])$_{Root}$. Candidate (17d) achieves no better degree of success by virtue of a fatal violation of Ident Obst Voice. Competition proceeds between (17b) and (17c). The fundamental tension that obtains between (17b) and (17c) is resolved in favour of candidate (17c). While candidate (17b) emphatically fails on Spir, candidate (17c) fares well on this constraint. Therefore, Candidate (17c) can be reckoned on to emerge as optimal owing its satisfaction of *Sib(-ant, αvc) ə Sib(-ant, αvc)$_{Root}$, Ident Obst Voice and Spir.

With the above in mind, let us contend with the next cluster *ʒəʃ (see data in (4)). *ʒəʃ also reifies the effect of the GOCP constraint (*Sib ə Sib & *[αant] ə [αant])$_{Root}$. Although *ʒəʃ exhibits a mismatch in sibilants' specifications of voice, identity avoidance is still in force owing to the identity of the feature [ant] in the two sibilants. What is disfavoured in *ʒəʃ is identity of [ant] features. Located at the top of the hierarchy along with Ident Obs Voice, our constraint will disqualify *ʒəʃ sequences that result from underlying gəʃ as the reader may verify in the tableau below.

(18)

/agʃʃul/$_{Root}$	(*Sib ə Sib & *[αant]ə[αant])$_{Root}$	Id Obs Vc	Spir	Id Son	*ç
a. aʒəʃʃul	*!				
b. agəʃʃul			*!		
☞c. ayəʃʃul				*	
d. açəʃʃul		*!			*

Due to an aversion to one or another of the two top-ranked constraints, candidates (18a) and (18d) are ruled out. (18b) outstrips both of (18a) and (18d) by satisfying the two top-ranked constraints while violating Spir, the next lower-ranked constraint. (18c) beats all the candidates since it fares well not only on (*Sib ə Sib & *[αant] ə [αant])$_{Root}$ and Ident Obs Voice but also on Spir.

The final cluster to be accommodated is *ʃəʃ. From the standpoint of OT, the GOCP constraint counter to such clusters is the same locally conjoined constraint (*Sib ə Sib & *[αant] ə [αant])$_{Root}$. Since spirantisation patently fails to obtain when the cluster *ʃəʃ may hold (/kəʃ/ > [kəʃ]), this failure lends patent support to the already admitted ranking *Sib(-ant, αvc) ə Sib(-ant, αvc)$_{Root}$ >> Spir. However, merely deploying the established ranking in (18) fails to yield the right optimal output, for /akʃʃuT/ for instance, as portrayed in the tableau below.

(19)

/akʃʃuT/$_{Root}$	(*Sib ə Sib & *[αant]ə[αant])$_{Root}$	Id Obs Vc	Spir	Id Son	*ç
a. akəʃʃuT			*!		
b. aʃəʃʃuT	*!				
c. ayəʃuT		*!		*	
💣 d. açəʃʃuT					*

Under this ranking, the wrong output (19d) emerges as optimal. Candidate (19d) satisfies all the four top-ranked constraints while the candidates (19a), (19b) and (19c) all fail on one or another of the four top-ranked constraints. Our survey of ABA proves that identical [-ant] sibilants separated by a schwa are never observed in the lexicon. I think that this observation also holds for any [-ant] consonants including the palatalized coronal [ç]. To place our analysis on a firm ground, we deploy another constraint that should be placed at the top of the hierarchy in a single package with (*Sib ə Sib & *[αant] ə [αant])$_{Root}$ and Ident Obst Voice. This constraint is another GOCP constraint termed *[-ant] ə [-ant]. This constraint penalizes any sequence of segments identical in terms of [-ant] and separated by a schwa. To be operative, the GOCP constraint should reign supreme in the hierarchy.

(20) ***[-ant] ə [-ant]**: The sequence of two [-ant] segments separated by a schwa is forbidden.

In a tableau format, the display holds as follows.

(21)

/akʃʃuT/$_{Root}$	(*Sib ə Sib & *[αant]ə[αant])$_{Root}$	*[-ant] ə [-ant]	Id Obs Vc	Spir	Id Son	*ç
☞ a. akəʃʃuT				*		
b. aʃəʃʃuT	*!	*				
c. ayəʃuT			*!		*	
d. açəʃʃuT		*!				*

This ranking is advantageous for a variety of reasons. Foremost among these reasons is that the former wrongly chosen-as-optimal output [açəʃʃuT] is disqualified by the new constraint *[-ant] ə [-ant]. Crucially, (21b) and (21c), found wanting on one or more of the three top-ranked constraints, must give way. The optimal output is the output exhibiting recalcitrance to spirantisation.

4.2 Glide assimilation under OT.

On the basis of the data in (5), the mappings yt > [ʃt], ys > [çs], wt > [ɸt] and ws >[ɸs] are eye-catching. This phenomenon may well be viewed as ensuing from a voice assimilation engendered by the following voiceless obstruents [t] and [s] along with a default emergence of stridence. Before contending with this phenomenon, it is fair to say a couple of words concerning voice faithfulness in ABA roots. Voice faithfulness tends to have the status of the sine qua non in ABA roots. In other words, if no other constraint impinges to disrupt voice specification, voice is always rendered faithfully in the output. To accommodate voice faithfulness, we construct a faithfulness constraint that maintains a relationship of voice matching and identity between the input and the output. We term it Ident-IO Voice.

(22) **Ident-IO Voice** : input and output specifications of voice must be identical.

We need also to posit two other constraints, one banning [+voice] and the other banning [-voice].

(23) ***[+voice]** : [+voice] is prohibited.

(24) ***[-voice]** : [-voice] is prohibited.

The alteration observed in glide assimilation opts for the ranking *[+voice] >> *[-voice] - the [+voice] specification of glides is sacrificed to a [-voice] specification. This ranking also portrays the for-long defended unmarkedness of voice especially in non-prominent positions (see Lombardi (1995, 2001)) for a comprehensive account of issues related to voice).

Because Ident-IO Voice is generally respected in ABA - i.e. consonants do not lose their voice specifications if no other constraint impinges, Ident-IO Voice should by right dominate *[+voice] and *[-voice]. Under this ranking, ABA segments are doomed to faithfully preserve their voice specification in the output. Consider how this is formally indicated in the tableau below.

(25)

/d/	Id Vc	*[+voice]	*[-voice]
☞a. [d]		*	
b. [t]	*!		*

(26)

/t/	Id Vc	*[+voice]	*[-voice]
☞a. [t]			*
b. [d]	*!	*	

Candidate (25b) and candidate (26b), found wanting on Ident-IO Voice, have no chance to redeem themselves by faring well on one or even all the lower-ranked constraints *[+voice] and *[-voice]. Although it securely accommodates a wide range of ABA consonants, the ranking in (25) and (26) makes no provision for voice assimilation in glides. As the reader may notice, the alteration exhibited by the glide undergoing voice assimilation is not amenable to an adequate characterization if no other constraint is posited. The case in point necessitates a constraint whose job is to drive voice assimilation from the following obstruent. Should that constraint prove illuminating, it would attend to all the voice assimilation phenomena that glides undergo. This constraint we shall term Agree. Agree is originally accredited to Lombardi (1995); its end result is to harmonize the voice specifications in consonant clusters[5].

(27) **Agree** : Consonant clusters should agree in voicing.

(see Lombardi (1995), Butska (1998) and Bacovic (1999))

For Agree to be in force, it must have strict veto power over Ident-IO Voice.

[5] Following Guerssel (1986), I consider glides as consonants.

(28)

/ayt/Rt	Agree	Id Vc	*[+voice]	*[-voice]
a. [ayt]	*!		*	*
☞b. [aʃt]		*		*

Agree discriminates against (28a) where the glide stubbornly resists voice assimilation. Candidate (28a) is therefore compelled to give way to the optimal candidate (28b).

With the ranking in (28) in hand, the story is not finished yet. We need to put our hands into accommodating some inconsistencies. The ranking in (28) entails a composite of erroneous predictions with respect to obstruent clusters which are different for voice specification. Let us take, for instance, the form [aʒTiT] where the two obstruents ʒ and T abut against each other. [aʒTiT] is not amenable to an analysis under the ranking in (28) as (29) evinces.

(29)

/agTiT/Root	Agree	Id Vc	*[+voice]	*[-voice]
a. [aʒTiT][6]	*!		*	**
💣b. [aʃTiT]		*		**

The dominance relation in the ranking in (28) and (29) proves to be too powerful. Since Agree is top-ranking in the hierarchy, its violation counts heavier. (29a)'s violation of Agree is, therefore, sufficient to rule out the candidate from the competition. No matter how badly it fares on the lower-ranked constraints, (29b)'s mere satisfaction of the top-ranking Agree is sufficient to wrongly select it as optimal.

To solve this conundrum, we shall divide Ident-IO Voice into two constraints: Ident Obstruent Voice – which we have already presented in chapter III - and Ident Sonorant Voice.

(30) **Ident Obst Voice**: Obstruents' input and output specifications of voice must be identical.

(31) **Ident Son Voice**: Sonorants' input and output specifications of voice must be identical.

[6] /g/ > [ʒ] is driven by spirantisation.

Since obstruents exhibit a dramatic recalcitrance to shift their voice specifications in the output, Ident Obst Voice ought by right to outrank Agree. Ident Son Voice, on the other hand, must be dominated by Agree. A dominance relation that derives much of its plausibility from the voice assimilation undergone by glides. The novel ranking contends successfully with /agTiT/ as the reader may verify.

(32)

/agTiT/$_{Root}$	Id Obs Vc	Agree	Id Son Vc	*[+voice]	*[-voice]
☞a. [aʒTiT]		*		*	**
b. [aʃTiT]	*!				**

(32b)'s satisfaction of Agree, Ident Son Voice and *[+voice] does it no good since it emphatically fails on Ident Obst Voice, the highest-ranked constraint. (32a) emerges as optimal due to its satisfaction of Ident Obst Voice.

Thus far, the posited ranking has given a handle on the voice faithfulness of obstruents. Let us turn to some residual problems exhibited by sequences like lt, mt, nt, rt. If we deploy the ranking posited so far, these clusters should be mapped to their voiceless counterparts l̥t, m̥t, n̥t, r̥t. To foreclose any possibility for the emergence of voiceless sonorants, we need to posit constraints against voiceless sonorant consonants. The constraints banning voiceless l, m, n and r can be set out as follows.

(33) ***l̥** : l̥ is prohibited.

***m̥** : m̥ is prohibited.

***n̥** : n̥ is prohibited.

***r̥** : r̥ is prohibited.

The constraints in (33) must lie at the top of the hierarchy if the desired effects are to follow. Consider the two tableaux in (34) and (35).

(34)

/irta/Root	*r̥	Id Obs Vc	Agree	Id Son Vc	*[+voice]	*[-voice]
☞a. irta			*		*	*
b. ir̥ta	*!			*		*

(35)

/insi/Root	*r̥	Id Obs Vc	Agree	Id Son Vc	*[+voice]	*[-voice]
☞a. insi			*		*	*
b. in̥si	*!			*		*

As the reader may notice, placing *l̥, *m̥, *n̥ and *r̥ on top of the hierarchy forecloses every source of voiceless sonorants. The voice assimilation engendered by Agree is thereby precluded.

Since Agree calls for voice neutralization in consonants clusters, clusters like ty, sy, tw and sw may emerge as tç, sç, tɸ and sɸ or as dy, zy, dw, and zw. We believe that the non-existence of such mappings is ascribed to the recalcitrance of onsets to lose their voice specification. By positing a positional faithfulness constraint (see Lombardi (1995) and Beckman (1997, 1998)) whose end result is to preserve voice specification in onsets and placing it on top of the hierarchy[7], the right outputs will follow. The constraint is called Ident Onset Voice.

(36) **Ident Onset Voice**: input and output specifications of onset voice must be identical. (Beckman (1997, 1998))

In a tableau format the ranking holds as follows.

[7] Following Beckman's (1998) line of thinking, context-specific constraints dominate context-free constraints. This amounts to the fact that Ident Onset Voice must dominate Ident Obst Voice and Ident Son Voice.

(37)

/s-twas/Root	Id Onset Vc	Id Obs Vc	Agree	Id Son Vc	*[+voice]	*[-voice]
☞a. sətwas			*		*	***
b. sətɸas	*!			*		***
c. sədwas		*			*	**

Candidate (37b) is ruled out due to a violation of Ident Onset Voice, the highest ranked constraint. Candidate (37c) and (37a) survive for further consideration. (37c) is omitted from consideration due to its violation of Ident Obst Voice, the first immediately dominated constraint after Ident Onset Voice. (37a) is therefore chosen as optimal owing to its satisfaction of Ident Onset Voice and Ident Obst Voice, and its violation of lower-ranked Agree does it no harm.

Before handling the relationship that holds between glide assimilation and identity avoidance, we conclude this section by pointing out that some daunting problems with respect to the consonants that trigger assimilation still remain. Because sonorant consonants or glides are inherently [+voice][8], Agree will be vacuously satisfied in clusters conjoining a voiced obstruent with a sonorant – recall that voiceless sonorants do not hold in ABA due to the top-ranking constraints *l̥, *m̥, *n̥ and *r̥. In our analysis it is conceded, thus far, that all clusters of voiceless obstruents preceded by glides are doomed to neutralize as [-voice] cluster, with the glides /y/ and /w/ emerging as [ʃ] and [ɸ] respectively. Nonetheless, our survey of ABA has displayed some forms like [iwʃas] where [w] declines to assimilate the [-voice] specification of the following sibilant. To get closer to the purpose at hand, we need to check all the possible clusters where the first member is a glide and the second member is a voiceless obstruent. The underlying voiceless obstruents of ABA can be laid out as follows: f, t, s, ʃ, k, χ. Among this set of obstruents, I have been unable to find data exhibiting glides before

[8] See Piggot (1991) for a line of thinking where voiced obstruents and sonorant consonants are both specified as voiced segments.

the labial ficative f or the dorsal fricative χ. Singleton k is almost never attested in ABA; it is usually spirantised into ʃ or ç[9]. With respect to the cluster -wʃ- observed in [iwʃas], I have no explanation to offer as to why the labiovelar glide declines to assimilate the [-voice] specification of [ʃ].

4.2.1 Glide assimilation and identity avoidance

It has already been noted that distances larger than Sib ə Sib are freely tolerated in ABA roots. Sibilants engendered by glide assimilation are no exception. In [tanəSRiʃt] - derived from underlying /tanSRiyt/-, for instance, glide assimilation obtains regardless of the sibilant s̱ that stands one syllable away from the glide that undergoes assimilation. The GOCP constraint banning this distance is *Sib σ Sib_{Root}.

(38) ***Sib σ Sib_{Root}**: The sequence of two sibilants standing one syllable away from each other is prohibited.

Since this GOCP is thoroughly violated in ABA lexicon, its place must be low in the hierarchy as the tableau below evinces.

(39)

/t-anSRiy$_{Root}$-t/	Agree	Id Son	*ç	*Sib σ Sib $_{Root}$
☞a. tanSRiʃt		*		*
b. tanSRiçt		*	*!	
c. tanSRiyt	*!			

Since (39c) fatally violates the top-ranking constraint Agree, its lot as a sure loser is certain. Evaluation proceeds between (39a) and (39b). Both (39a) and (39b) tie on Agree and Ident-IO Son. Therefore, the decision is passed to *ç which opts for candidate (39a). This situation may well be viewed as an instance of the emergence of the unmarked (see McCarthy (2000)) since it is the low-ranking constraint *ç that decides the nature of the optimal output.

[9] Glides are more attested before coronal segments. This is presumably attributed to the rich consonantal system exhibited by coronals (see Paradis and Prunet (1991) on the special behaviour of coronal segments).

4.2.2 Glide assimilation in the context of Sib(+ant) ə Sib(-ant) clusters

The data in (7) shows that when the context is Sib(+ant) ə Sib(-ant) glide assimilation readily applies yielding the expected sibilant [ʃ]. The assimilation of the glide obtains with total disregard of the presence of the precedent sibilants. This amounts to the conclusion that the constraint requiring identity avoidance in this context exercises no restrictive effects whatsoever on the sequence Sib(+ant, αvc) ə Sib(-ant,αvc). From the standpoint of constraint ranking, this situation may well be viewed to mean that the constraint barring such configuration is to be demoted to a lower position in the hierarchy. The constraint of interest here is the already posited constraint (*Sib ə Sib & *[αvoice] ə [αvoice])$_{Root}$, repeated here for expository reasons.

(40) **(*Sib ə Sib & *[αvoice] ə [αvoice])** $_{\mathbf{Root}}$:

a. (*Sib ə Sib & *[αvoice]ə[αvoice])$_{Root}$ is violated when the sequence of two segments violate both *Sib ə Sib $_{Root}$ and *[αvoice]ə[αvoice]$_{Root}$.

b. (*Sib ə Sib & *[αvoice]ə[αvoice])$_{Root}$ >> *Sib ə Sib $_{Root}$, *[αvoice]ə[αvoice]$_{Root.}$

This move can be schematically indicated in tableau (41). We incorporate the locally conjoined constraint in the tableau although it contributes nothing to the selection of the optimal candidate. We do so for two reasons. For one thing, the position of the GOCP constraint (*Sib ə Sib & *[αvc]ə[αvc])$_{Root}$ shows that the similarity and proximity exhibited by this constraint presents no threat whatsoever to the sequence səʃ in [tinSəʃt], hence the low position of the constraint and its irrelevance in the hierarchy. For another, it is our intention in the next section to discuss identity effects on the basis of the ranking that hold between the GOCP constraints themselves. Positioning every GOCP constraint in its place will facilitate the ranking that holds between the GOCP constraints and aid the reader get a better sense of the gradient aspect of identity in sibilant clusters.

(41)

/t-inSy$_{Root}$-t/	Agree	Id Son	*ç	(*Sib ə Sib & *[αvc]ə[αvc])$_{Root}$
☞a. tinSəʃt		*		*
b. tanSəçt		*	*!	
c. tanSəyt	*!			

Not unlike tableau (39), tableau (41) exhibits an instance of the emergence of the unmarked. Owing to its high-ranked position in the hierarchy, Agree discriminates against candidates (41c) and deprives it from future consideration. The pairwise competition continues between (41a) and (41b). Both are equally harmonic with regard to Agree; both incur a violation mark on Ident-IO Son. The tie is broken only when we reach *ç. *ç favours the candidate that violates (*Sib ə Sib & *[αvc]ə[αvc])$_{Root}$, namely candidate (41a). It is the candidate that emerges optimal.

Let us turn to zəʃ sequences exemplified in the output [əzzəʃt]. The analysis that applies to the cluster Sib(+ant, αvc) ə Sib(-ant,αvc) applies, mutatis mutandis, to the cluster Sib(+ant, αvc) ə Sib(-ant,-αvc). The constraint to be posited in this context is the already formulated constraint *Sib ə Sib$_{Root}$. Since the violation of *Sib ə Sib$_{Root}$ is obvious, its ranking relative to the other constraints, as already invoked, is no better than (*Sib ə Sib & *[αvc]ə[αvc])$_{Root}$ as the tableau below shows.

(42)

/zzyt$_{Root}$/	Agree	Id Son	*ç	*Sib ə Sib$_{Root}$
☞a. əzzəʃt		*		*
b. əzzəçt		*	*!	
c. əzzəyt	*!			

Candidate (42c) is ruled out from the very start of evaluation due to its violation of Agree. *ç breaks the tie between candidate (42a) and candidate (42b) in favour of (42a). (42a) is therefore chosen as optimal.

4.2.3 Glide assimilation in the context of Sib (-ant) ə Sib (-ant) clusters.

If we consider the data in (8), there is one consistent observation that spirantisation and glide assimilation share. The core idea is that both of the phonological phenomena foil the attempt to create [-ant] sibilants when the susceptible cluster Sib (-ant) ə Sib (-ant) might emerge. If spirantisation is precluded in kəʃ and ʃək sequences, glide assibilation is also eschewed just in case it would create ungrammatical clusters like *ʃəʃ or *ʒəʃ. Put in another way, both glide assimilation and spirantisation achieve the same end, i.e. elude the ungrammatical configuration *Sib (-ant) ə Sib (-ant), but do so by following different routes[10]. With the above in mind, we are committed to truth of the assertion that (*Sib ə Sib & *[αant]ə[αant])$_{Root}$ exercises a strong protective effect on ABA roots. Crucially, (*Sib ə Sib & *[αant]ə[αant])$_{Root}$ is a strong inviolable constraint whose force is not weakened by any potential voice disparity that may hold between the two [-ant] sibilants. So long as the sibilants are both [-ant], the constraint is in force irrespective of voice specification. To contend with the candidate /taʃaʃʃyt/ > [tʃaʃʃəçt], we shall appeal to the same ranking posited for the same clusters in the spirantisation section.

(43)

/taʃaʃʃy$_{Root}$-t/	(*Sib ə Sib & *[αant]ə[αant])$_{Root}$	Agree	Id Son	*ç
a. tʃaʃʃəʃt	*!		*	
☞b. tʃaʃʃəçt			*	*
c. tʃaʃʃəyt		*!		

Ranking (*Sib ə Sib & *[αant]ə[αant])$_{Root}$ along with Agree at the top of the hierarchy is a necessity. Candidate (43a) emphatically fails on (*Sib ə Sib & *[αant]ə[αant])$_{Root}$ while observing Agree. Candidate (43c) exhibits the opposite scenario. It fatally violates Agree but patently

[10] There are situations where two phonological phenomena achieve the same end by following different routes. McCarthy (2000) calls such a situation 'homogenity of target and heterogeneity of process'.

satisfies (*Sib ə Sib & *[αant]ə[αant])$_{Root}$ together with the lower-ranked Ident-IO Son and *ç. Candidate (43b) outperforms both (43a) and (43c) by faring well on both (*Sib ə Sib & *[αant]ə[αant])$_{Root}$ and Agree. Despite the violation marks it incurs on the lower-ranked constraints (Ident-IO Son and *ç), (43b) emerges as optimal because of its satisfaction of the two top-ranked constraints.

The analysis that accounts for [tʃaʃʃəçt] can also account for [tuʒəçt]. Interestingly, [tuʒəçt] further evinces that a mismatch on voice is totally eschewed. So long as the sibilants that might emerge are identical in terms of [ant], the configuration is precluded regardless of voice difference between the two sibilants in *ʒəʃ. To accommodate the ungrammaticality of *ʒəʃ, we shall deploy the same locally conjoined constraint (*Sib ə Sib & *[αant]ə[αant])$_{Root}$.

(44)

/t-uʒy$_{Root}$-t/	(*Sib ə Sib & *[αant]ə[αant])$_{Root}$	Agree	Id Son	*ç
a. tuʒəʃt	*!		*	
☞b. tuʒəçt			*	*
c. tuʒəyt		*!		

Just as in tableau (43), the candidate that exhibits identity avoidance while respecting Agree is called optimal by the pointing hand. The other candidates are sure losers.

5. Identity and proximity implications.

This section casts a close look at the two concepts of identity and proximity along with some theoretical and empirical implications of the interaction of the two concepts. First, we address the premise of identity in Sib ə Sib sequences. Then, we give a handle on the notion of proximity by considering the distances Sib Sib (see Chap. III), Sib ə Sib and larger distances. Finally, we consider the theoretical implications of our findings for the literature written on this domain.

In identity terms, our analysis of Sib ə Sib clusters provides compelling evidence that identity of anteriority is more prominent than identity of voice. If we ground our attention on the ranking established thus far, we can devise a similarity hierarchy on the basis of the different GOCP constraints formulated for Sib ə Sib clusters. Consider the derived ranking.

(45) (*Sib ə Sib & *[αant]ə[αant])$_{Root}$ >> Ident Son >> *ç >>(*Sib ə Sib & *[αvoice]ə[αvoice])$_{Root}$ >> *Sib ə Sib$_{Root}$.

On the basis of the hierarchy in (45), where (*Sib ə Sib & *[αant]ə[αant])$_{Root}$ is in force because of its higher position relative to Ident-IO Son and *ç, it can be securely concluded that identity of sibilants' specifications of anteriority is more prominent than their identity in terms of voice. Under the distance displayed by Sib ə Sib clusters, it is sufficient that two sibilants differ in terms of anteriority so that they can coexist freely in the root. When the two sibilants exhibit difference in terms of anteriority and voice specification, they prove to have the same degree of freedom in cohabiting within the root domain. However, when the sibilants' specifications of anteriority are identical, the cooccurrence of the two sibilants is banned no matter how different voice is.

In proximity terms, our investigation of identity avoidance in sibilant clusters vindicates the predictions made by our proximity hierarchy.

(46) *Sib Sib$_{Root}$ >> *Sib ə Sib$_{Root}$ >> *Sib μ[full mora] Sib$_{Root}$ >> *Sib μμ Sib$_{Root}$ >> *Sib σ Sib$_{Root}$ >> *Sib ∞ Sib$_{Root}$

The identity avoidance displayed by Sib Sib clusters happens to be much stronger than the identity avoidance exhibited by Sib ə Sib clusters. While identity avoidance in strictly adjacent sibilants is operative and in force under two conditions, i.e. when it is in the form of Sib(αant) Sib(αant)[11] and Sib(αvc) Sib(αvc)), identity avoidance in Sib ə

[11] We have been unable to find data showing the interaction of two strictly adjacent [-ant] sibilants which are different in terms of [voice]. However, we assume that if such cluster (Sib(-ant,αvc) Sib(-ant,-αvc)) holds, identity avoidance will follow the same path as in *Sib(-ant,αvc) Sib(-ant,αvc). If identity avoidance is operative in larger distances where sibilants are identical in terms of anteriority but different for voice (*Sib(-ant,αvc) Sib(-ant,-αvc)), I see no reason why it should not hold in shorter distances.

Sib clusters is operative only under one condition, i.e. when it is in the form Sib(αant) ə Sib(αant), regardless of voice identity or difference. The other GOCP constraints evincing larger distances, on the other hand, are never in force since they are low-ranked. This means that identity avoidance effects are reduced the larger the distance is.

As regards the theoretical implications of our findings, we believe that our findings on proximity are consistent with the premises of the GOCP as conceived in Suzuki (1998). Our findings concur also with the observation made by Pierrehumbert (1993) that the closer two identical or near-identical segments are, the stronger the effect of the OCP.

In identity terms, Pierrehumbert (1993) computes identity by counting the number of features that segments have in common under a contrastive underspecification model. In her account, major place features and sonority are assigned first. This means that she attributes more importance to these features in computing identity than to minor features such as [voice]. Our findings are in large measure consistent with hers, except that we have heavily relied on local conjunction to achieve this end. Since [-ant] and [+ant] refer somehow to locations within the coronal place, identity of [ant] is given more prominence than [voice] in ABA sibilants.

Frisch (1996) adopts a model of 'structured' specification referring to a hierarchy of natural classes of features under the theory developed in Broe (1993). Identity is computed by dividing the shared natural classes of two segments. According to him, the first features that come into play in assessing identity between two segments are [son], [place] and [cont]. Rose and Walker (2001) and Ansar (2004) produce compelling evidence that [son], [cont] and place features are the most important features in computing identity between segments that exhibit Long Distance Consonant Agreement. In short, all the aforementioned approaches agree that [son], [cont] and place must be given priority in computing identity over minor features like [voice]. Crucially, when we consider the sibilants that undergo GOCP effects in ABA, we find that [son], [cont] and place features are given priority in terms of computing similarity. In other words, sibilants undergo identity avoidance effects because they are already identical in terms of coronal, [son] and [cont] features. We believe that what gives [ant] its privileged status over [voice] in terms of identity effects is that it is a feature that somehow refers to a location within the coronal region. Location or place features are more prominent in terms of identity effects than [voice].

6. Conclusion

In this chapter we have tried to give an adequate characterization of sibilants in Sib ə Sib clusters. A body of GOCP constraints has been formulated to contend with such clusters. We have analyzed the phonological phenomena that arise from the interaction of spirantisation and glide assimilation with identity avoidance in these clusters. Our account has born on clusters of sibilants that are either completely identical or different in terms of voice or anteriority or both. Along the course of developing our analysis, we have entertained one conclusion: identity of anteriority in Sib ə Sib clusters is stubbornly resisted. Conversely, identity of voice is freely tolerated. While sibilants identical in terms of [voice] but different in terms of [ant] are freely tolerated in the root, sibilants identical in terms of anteriority are never accepted in the root regardless if the two sibilants are identical for voice or not.

The analysis we have conducted has brought about an important range of consequences with regard to proximity and identity effects. For one thing, our analysis has proven that identity and proximity effects must be incorporated in the theoretical concept of the GOCP if desirable results are to follow. For another, our analysis has shown that identity avoidance is reduced the larger the distance between two sibilants. Specifically, when the distance is Sib Sib, identity avoidance effects are observed when the two sibilants share just [voice] or just [ant] or share both. When the distance is Sib ə Sib, identity avoidance obtains only if the sibilants are identical in terms of [ant] regardless of voice. When distance is larger than Sib ə Sib, sibilants do not evince any identity avoidance effects.

CHAPTER V

EXTENSIONS

Chapter V

EXTENSIONS

1. Introduction

This chapter is meant to provide a glimpse on the complex assortments exhibited by spirantisation in a range of Amazigh lects. As indeed it has been noted before (cf. chap.III), spirantisation in Amazigh evinces a spectrum of difficulties that basically ensue from diachronic reasons. It is not the goal of this chapter to address all the details of spirantisation disparities as they hold in all Amazigh lects. We are rather interested in accommodating the basic spirantisation differences that hold between the three main Amazigh varieties that exist in Morocco, namely Tamazight, Tashlhiyt and the Northern Amazigh Lects. To achieve this end, we are going to conduct a treatment of four Amazigh lects. From Tamazight, we shall address Ayt Atta lect. Within the Tashlhiyt range, we shall handle Ayt Baâmrane and Iboudraren lects. In the Northern Amazigh Lects, our analysis will bear on Ayt Iznassen Amazigh. The driving force behind this comparative approach is to show that different Amazigh lects avail themselves of the same universal violable constraints, and that the phonological mismatches between these lects fall out from different constraint rankings.

The chapter is organised as follows. The first section is meant to provide a comparative treatment of four Amazigh lects. First, spirantisation is investigated in the non-spirantising lect Ayt Baâmrane. Then, we proceed to the partially spirantised lects, namely Ayt Atta and Iboudraren. Finally, a phonological sketch of spirantisation is offered to the nearly fully-spirantising lect Ayt Iznassen. The second section takes stock of the findings and fleshes out the typological implications of comparing Amazigh lects. In the end, a conclusion sums up the results.

2. Spirantisation in Amazigh: a comparative approach.

This section looks at the variety of ways in which spirantisation holds in some Amazigh lects. Crucially, our analysis is going to focus on four Amazigh lects which belong to the putative trilateral Amazigh divisions recognized in Morocco, namely Tamazight, Tashlhiyt, and the Northern Amazigh Lects[1] (see El Kirat (1987), Saib (1976) among others). Along the course of developing this section, we conduct an OT treatment of the four aforementioned Amazigh lects with an eye to proving that the reason underlying the mismatches that hold between the different Amazigh lects is ascribed to the different rankings of the formerly posited constraints. We shall first try to give a handle on Tashlhiyt variety. Under Tashlhiyt Variety, we try to get around two Amazigh lects, Ayt Baâmrane (see Bouhlal (1994)) and Iboudraren (cf. Boukous (1982 [87])).

2.1. Spirantisation in Ayt Baâmrane.

Ayt Baâmrane is a Tashlhiyt Amazigh lect spoken in the southern areas of Souss. In broad terms, we can say that it is characterized by lack of spirantisation (cf. Basset (1952)). Under lack of spirantisation, we mean that Ayt Baamrane's underlying obstruent stops are faithfully rendered in the output as the data below shows.

(1) (data from Bouhlal (1994))

	Input	*Output*	*Gloss*
Coronals	kti	kti	'to remember'
	tatbirt	tatbirt	'pigeon (fem.)'
	tafukt	tafukt	'sun'
	asrdun	asrdun	'mule (masc.)'
	idukan	idukan	'sandals'
Labials	bnu	bnu	'to build'
	tabrida	tabrida	'road'
	ibxin	ibxin	'he is black'
	tarbatt	tarbatt	'girl'
Velars	krz	krz	'to plough'
	akr	akr	'to steal'
	aʃakuk	aʃakuk	'curled hair'
	gnu	gnu	'to sew'

However, uvulars fail to resist such temptation and readily fricativise when they happen to surface as singletons. This is not an oddity

[1] I have chosen to use the Northern Amazigh lects in place of using Tarifiyt lects because the Northern Amazigh lects conflate a whole range of varieties among which Tarifiyt is only one variety.

of Ayt Baâmrane. Rather, the phenomenon pervades the whole range of non-spirantising Tashlhiyt Amazigh lects as well as Touareg (cf. Saib (1974, 1976))[2]. Consider the data below.

(2)

	Z.F.	I.F.[3]	Gloss
Uvulars	ɣr	qqra	'to read'
	nɣ	nqqa	'to kill'
	ɣz	qqaz	'to dig'
	ɣRS	qqRuS	'to slaughter'
	ɣRi	qqRay	'to abort'
	ɣns	qqnus	'to put on haik'
	Rɣ	Rqqa	'to be hot'

To account for Ayt Baâmrane Amazigh, we need to deploy a set of constraints. All of which have already been presented while developing our analysis of spirantisation in ABA (Chap III). We need the family of constraints that bifurcate from Ident-IO Cont, namely Ident-IO Lab Cont, Ident-IO Cor Cont and Ident-IO Dor Cont (cf. Chap.III). Resorting to this number of faithfulness constraints derives much of its appeal from the fact that spirantisation is in large measure conditioned by Place – i.e. Lab, Cor or Dor. We have already established that Spir dominates Ident-IO Dor Cont in ABA. The same scenario does not hold in Ayt Baâmrane Amazigh. While both velar and uvular stops undergo spirantisation in ABA, only uvular stops fricativise in Ayt Baâmrane Amazigh. With this observation as background, we believe that the dorsal place should bifurcate into two minor places, Velar and Uvular, as notably argued in Shaw (1991). This division compels us to divide the faithfulness constraint Ident-IO Dor Cont into two other more specific faithfulness constraints, namely Ident-IO Uvular Cont and Ident-IO Velar Cont.

(3) a. **Ident-IO Velar Cont**:

Velar segments' input and output specifications of [cont] must be identical.

[2] Spirantisation of /q/ obtains in Tashlhiyt as well as in all the other Amazigh varieties.
[3] Z.F stands for Zero form and I.F. stands for Intensive form.

b. **Ident-IO Uvular Cont**:

Uvular segments' input and output specifications of [cont] must be identical.

Since coronal, labial and velar stops fail to spirantise in Ayt Baâmrane Amazigh (see (1)), Ident-IO Cor Cont, Ident-IO Lab Cont and Ident-IO Velar Cont must dominate the constraint Spir. Translating the dominance relation in a tableau format will help us accommodate coronal, labial and velar stops.

(4) *Coronal stops*

/ftu/	Id Cor Cont	Id Lab Cont	Id Vel Cont	Spir
☞a. ftu				*
b. fθu	*!			

(5)

/afud/	Id Cor Cont	Id Lab Cont	Id Vel Cont	Spir
☞a. afud				*
b. afuð	*!			

As the reader may verify, ranking Ident-IO Cor Cont above Spir forecloses any possibility for the spirantised candidate to emerge as optimal. Candidate (4a) and (5a) emerge as optimal because they satisfy the top-ranked constraint Ident-IO Cor Cont.

(6)

/bri/	Id Lab Cont	Spir
☞a. bri		*
b. βri	*!	

The same scenario holds for labials. Candidate (6b) is sacrificed to (6a). This is ascribed to (6a)'s satisfaction of top-ranked Ident-IO Lab Cont.

With respect to velar stops, the two tableaux below exhibit what happens when Ident-IO Vel Cont dominates Spir.

(7)

/akal/	Id Vel Cont	Spir
☞a. akal		*
b. açal	*!	

(8)

/gnu/	Id Vel Cont	Spir
☞a. gnu		*
b. ɟnu	*!	

Velars are no different. In (7) and (8), it is the input that is rendered unscathed to the output form that is optimal. This ensues from the strict veto power that Ident-IO Vel Cont has over Spir. Candidate (a) wins its pairwise competition with (b) as displayed in tableaux (7) and (8) because of its satisfaction of the top-ranking constraint Ident-IO Vel Cont.

The only consonant which foils the attempt to preserve faithfulness is the uvular stop q; it is uniformly mapped to ɣ. This means that it patently obeys Spir at the expense of a violation of Ident-IO Uvu Cont. Such observation yields compelling evidence to the effect that Spir must outrank Ident-IO Uvu Cont. This dominance relationship elects the right optimal output as the tableau below shows.

(9)

/qli/	Spir	Id Uvu Cont
a. qli	*!	
☞b. ɣli		*

Candidate (9b) emerges as the winner in its pairwise competition with candidate (9a). While violating lower-ranked Ident-IO Uvu Cont, (9b) observes the requirements of the top-ranked constraint Spir. That is why it is evaluated as optimal.

Another subtlety that deserves mention is the status of non-continuant geminates in Ayt Baâmrane Amazigh. Not unlike the non-continuant geminates of all Amazigh lects, Ayt Baâmrane non-continuant geminates never lose their [-cont] specification. This recalcitrance to spirantise is discussed by Kirchner (1998). Kirchner (1998) argues that geminate stops decline to spirantise because continuant geminates require more effort than non-continuant geminates[4]. Kirchner (1998) explains that there is a typological propensity for geminates to resist spirantisation.

This said, the constraint that preserves the continuancy of geminates will be top-ranked, thereby discriminating against any disruption of the feature [cont] in geminate outputs.

(10) **Ident Gem Cont**: Geminates input and output specifications of continuant must be identical.

(11)

/iqqar/	Id Gem Cont	Spir	Id Uvu Cont
☞a. iqqar		*	
b. iɣɣar	*!		*

Failure to derive output (11b) stems from the fact that Ident-IO Gem Cont reigns supreme in the hierarchy. (11a)'s faithful rendering of continuant captures the reason underlying its success in the competition. In closing, the final ranking for Ayt Baamrane Amazigh is set out as follows.

(12) Ident Gem Cont, Ident Lab Cont, Ident Vel Cont, Ident Cor Cont >> Spir >> Ident Uvu Cont[5]

Under this ranking, the attempt of obstruent stops to generate fricatives is foiled. The only exception is exhibited by the uvular stop /q/ which readily undergoes spirantisation.

---

[4] kirchner (1998) espouses an effort-based approach to accommodate spirantisation phenomena crosslinguistically. Effort-based approaches wed the substance of functional phonetic explanation with the formalism of OT constraint interaction in order to achieve more deeply explanatory accounts of phonological phenomena: the goal appears, to varying degrees in such works as Steriade (1993, 1995, 1996), Kaun (1994), Flemming (1995), (1997), Jun (1995), Silverman (1995), Myers (1997), Beckman (1997), Boersma (1997a, b, c, d) , Hayes (1997), Kirchner (1997), MacEachern (1997).

[5] Henceforth, I shall assume that Ident Gem Cont, which preserves the continuancy specification of Geminates, and Ident Son Cont, which preserves the continuancy of sonorants, as well as Max C and Dep C to be top-ranked and to dominate Spir in all the Amazigh lects to come. Our comparative study has shown that these constraints are inviolable in Amazigh.

2.2. Spirantisation in Ayt Atta Amazigh (AAA).

Ayt Atta is an Amazigh lect spoken in the South of the Middle Atlas. It belongs to Tamazight variety. It is characterized by the spirantisation of dorsals to the exclusion of other places (cf. Saib (1976) and El Kirat (1987)). Although AAA is consistent with ABA in terms of spirantising the same dorsal stops, the output of spirantisation is not identical in the two lects. While ABA maps /k/ onto [ʃ] or [ҫ] and /g/ onto [ʒ] or [y], AAA maps /k/ onto [ç] and /g/ onto [ɟ]. Consider the data below.

(13) (data compiled from Saib (1976) and El Kirat (1987))

	Input	*Output*	*Gloss*
Coronals	tadunt	tadunt	'fat (n.)'
	tatbirt	tatbirt	'pigeon (fem.)'
	tafukt	tafukt	'sun'
	asrdun	asərdun	'mule (masc.)'
	bdu	əbdu	'to start'
Labials	bDu	əbDu	'to divide'
	abrid	abrid	'road'
	baba	baba	'dad'
	tarbatt	tarbatt	'girl'
	akabar	açabar	'caravan'
Velars	akuz	açuz	'weevil'
	akal	açal	'earth'
	krz	əçrəz	'to plough'
	amksa	aməçsa	'shepherd'
	gn	ɟən	'to sleep'
	tagmart	taɟmart	'mare'
	agru	aɟru	'frog'

	Z.F.	*I.F.*	*Gloss*
Uvulars	Rəɣ	Rəqqa	'to be hot'
	nəɣ	nəqqa	'to kill'
	ɣəz	əqqaz	'to dig'
	taɣuni	iqqən	'to put on shoes'

Since only dorsals, in the guise of velar or uvular stops, are observed to undergo spirantisation, Ident –IO Cor Cont and Ident-IO Lab Cont should dominate Spir. This move ensures that coronal and labial stops will decline to spirantise as set out in the tableaux below.

(14) *Coronal stops (t/d)*

/t-adun-t/	Id Cor Cont	Id Lab Cont	Spir
☞a. tadunt			***
b. θaðunθ	*!**		

Because Ident-IO Cor Cont reigns supreme in the hierarchy, its supremacy rules out candidate (14b). We are left with candidate (14a) which abides by the requirements of Ident-IO Cor Cont, and thereby emerges as optimal.

(15) *The labial stop b*

/akabar/	Id Cor Cont	Id Lab Cont	Spir
☞a. açabar			*
b. açafar		*!	

(15a) emerges as optimal since it satisfies the top-ranked constraint Ident-IO Lab Cont. The same top-ranked constraint is emphatically violated by (15b) - a violation ensuing from (15b)'s change of b's specification of continuant.

Let us turn now to the dorsal consonants of Ayt Atta which act in conformity with the requirements of Spir. In constraint ranking terms, this conformity amounts to an imperative that Spir must dominate Ident-IO Dor Cont. Consider how this is portrayed in a tableau for candidate /nq/.

(16) *The uvular stop q.*

/nq/	Spir	Id Dor Cont
a. nəq	*!	
☞ b. nəɣ		*

The way constraints play out selects the right optimal output. The mapping in (16a) is rejected because of a fatal violation of spirantisation. Therefore, the palm is awarded to candidate (16b) which, notwithstanding its violation of Ident-IO Dor Cont, satisfies the top-ranked constraint Spir. (16b) is, therefore, chosen as optimal.

Let us turn now to the dorsal stops /k/ and /g/. I reckon that circumscribing the output of dorsal spirantisation to only [ç] (from underlying /k/) and [ɟ] (from underlying /g/) is reminiscent of a set of other constraints. This set of constraints should militate against outputs like [ʃ], [ɕ] and [y] - derived from underlying /k/- , and [ʒ] and [y] - derived from underlying /g/. The constraints are Ident-IO Sonorant, *ɕ and Ident-IO Strident. Of these three constraints Ident-IO Sonorant and *ɕ have already been defined. Ident-IO Strident is meant to penalize every alteration of stridency from input to output.

(17) **Ident-IO Str**: Input and output specifications of strident must be identical.

The end result of this constraint is to ensure the mapping of dorsal stops to non-strident fricatives. Ranking this constraint above Ident-IO Dorsal Cont is sufficient to rule out strident fricatives as shown in the tableau below.

(18)

/akuz/	Id Str	Spir	Id Dor Cont
a. akuz		*!	
b. aʃuz	*!		*
☞c. açuz			*

As the reader may notice, candidate (18b)'s lot is decided at the very first constraint. Its fatal violation of the top-ranked Ident-IO Str rules it out. The competition continues between (18a) and (18c). Although (18a) satisfies Ident-IO Str via a faithful rendering of the dorsal stop, it violates the first immediately dominated constraint Spir. (18c) fares better on both Ident-IO Str and Spir; it is thereby chosen as optimal.

Three other contenders may obtain for the optimal candidate [çəl]. They are [yəl], [ɕəl] and [xəl]. The constraint that is at odds with [yl] is Ident-IO Son, and the constraint that is tangential to [ɕəl] is *ɕ while the constraint that stands in fundamental conflict with [xəl] - x is a velar fricative – is *x.

(19) ***x** : No x.

The three candidates may well be rendered anomalous by placing the three constraints Ident-IO Son, *ç and *x above Spir.

(20)

/akal/	Id Son	*ç	*x	Id Str	Spir	Id Dor Cont
a. akal					*!	
b. aʃal				*!		*
☞c. açal						*
d. aɕal		*!				*
e. ayal	*!					*
f. axal			*!			*

Because Ident-IO Son, *ç and *x are placed higher in the ranking, they readily disqualify the candidates (20e), (20d) and (20f). The candidates cannot redeem themselves by faring well on Spir or any other lower constraint. Candidate (20c) satisfies the four top-ranked constraints maximally well; it also bests candidate (20a) and (20b) on Spir and Ident-IO Str respectively. It is therefore elected as optimal.

Notice that the same ranking posited for /k/ may also contend with /g/. However, we need to posit another constraint and place it at the top of the hierarchy. The constraint is *ɤ.

(21) ***ɤ** : No ɤ. (ɤ is a velar fricative)

In a tableau format, the display holds as follows.

(22)

/agru/	Id Son	*ç	*ɤ	Id Str	Spir	Id Dor Cont
a. agru					*!	
b. aʒru				*!		*
☞c. aɟru						*
d. aɕru		*!				*
e. ayru	*!					*
f. aɤru			*!			*

Owing to its satisfaction of all the top-ranked constraints, (22c) emerges as optimal.

Consider the final ranking for AAA.

(23) Ident Lab Cont, Ident Cor Cont, Ident Son, *ç, *ɣ, *x, Ident Str >> Spir >> Ident Dor Cont.

2.3. Spirantisation in Iboudraren Amazigh

Propelled by the percepts of generative phonology (cf. Chomsky and Halle (1968)) and the syllable-based phonology (cf. Kahn (1976) and Hooper (1976)), Boukous (1982) has conducted an analysis of spirantisation in Iboudraren Variety, a Tashlhiyt Amazigh variety spoken near Tiznit. Foremost among the findings of Boukous (1982) is that Iboudraren Amazigh spirantises coronals to the exclusion of other stops. Specifically, t and d are unfaithfully rendered as [s] and [z]. This alteration is usually construed as assibilation by many phonologists (Chomsky and Halle (1968) among others).

The data below exhibits the failure of spirantisation in velar and labial places and its application for coronal stops.

(24)

	Input	*Output*	*Gloss*
Coronals	tiwizi	siwizi	'collective work'
	dari	zari	'I have'
	atay	asay	'tea'
	idil	izil	'green'
	tasut	sasus	'generation'
	afud	afuz	'knee'
Labials	aqqrab	aqqrab	'bag'
	lktab	lktab	'book'
	baba	baba	'dad'
	akabar	akabar	'caravan'
Velars	akal	akal	'weevil'
	akz	akz	'to recognize'
	amksa	amksa	'shepherd'
	aguʒil	aguʒil	'orphan'
	agrtil	agrtil	'mare'

	Z.F.	*I.F.*	*Gloss*
Uvulars	ɣr	qqra	' to read'
	nɣ	nqqa	'to kill'
	ɣz	qqaz	'to dig'
	ɣRS	qqRuS	'to slaughter'

The failure of spirantisation in velar and labial stops may well be viewed as falling out from ranking Ident-IO Lab Cont and Ident-IO Vel Cont above Spir. Consider the following tableaux.

(25)

/baba/	Id Lab Cont	Spir
☞a. baba		**
b. βaβa	*!*	

(26)

/akal/	Id Vel Cont	Spir
☞a. akal		*
b. açal	*!	

As schematically shown in (25) and (26), the candidates that satisfy the top-ranked constraints Ident-IO Lab Cont and Ident-IO Vel Cont emerge as optimal. The faithful rendering of velar and labial specifications of [cont] is favoured.

With respect to the uvular stop /q/, it is spirantised in the same fashion as all the other uvular stops of other Amazigh lects. This amounts to an imperative that Ident-IO Uvular Cont must be placed below Spir in Iboudraren Amazigh as well as in all other Amazigh lects.

(27)

/nq/	Spir	Id Uvu Cont
a. nq	*!	
☞b. nɣ		*

The spirantised uvular stop in (27b) surfaces as optimal since it patently satisfies Spir at the expense of a violation of Ident-IO Uvu Cont. I believe that this ranking is pan-Amazigh.

Let us turn now to the twists exhibited by coronals. Coronal stops in Iboudraren uniformly exhibit spirantisation (t > s, *θ and d > z, *ð). This means that Spir should have strict veto power over Ident-IO Cor Cont. Another requirement should be satisfied. We need to circumscribe the output forms of the underlying coronal stops /t/ and /d/ to only [s] and [z] respectively. Put more strictly, we need to posit other constraints whose end result is to ban θ and ð to surface as outputs of underlying /t/ and /d/. These constraints can be laid out as follows.

(28) ***θ** : No θ.

(29) ***ð** : No ð.

By intercalating Spir between *θ and *ð, on the one hand, and Ident-IO Cor Cont on the other, the emergence of the optimal outputs will follow. The tableaux below portray how the posited ranking selects the right output.

(30)

/atay/	*θ	Spir	Id Cor Cont
a. atay		*!	
☞ b. asay			*
c. aθay	*!		*

(31)

/idil/	*ð	Spir	Id Cor Cont
a. idil		*!	
☞b. izil			*
c. iðil	*!		*

As the reader may notice, (30c) and (31c) have no chance to win since they stand in outright violation of the top-ranked constraints *θ and *ð. (30a) and (31a) achieve a modest degree of success by faring well on *θ and *ð. However, they violate Spir, the first immediately dominated constraint. The optimal candidates in both tableaux are (30b) and (31b) owing to their satisfaction of Spir as well as *θ (for underlying /t/) and *ð (for underlying /d/).

The spirantisation of coronal stops is, nonetheless, fraught with a complex assortment of inconsistencies. The dental stops t and d decline to spirantise if they are followed by n, l and r as the data below shows.

(32)

Input	*Output*	*Gloss*
msadnin	msadnin	'sharp'
itran	itran	'stars'
idrus	idrus	'rare'
tatla	satla	'late reaping'
tidlalin	sidlalin	'strands of hair'

(Data from Boukous (1982: 401))

We have two dispositions as to how this conundrum is to be circumvented. The first is to view the coronal stops in the sequences in (32) as not specified for continuant and that they get their continuant value from the following onset. This line of thinking is beset with insuperable problems. If the coronal stops in (32) decline to spirantise before the sonorant consonants n, r and l, they readily spirantise if they are followed by obstruent stops as the data below evinces.

(33)

Input	*Output*	*Gloss*
atbir	asbir	'pigeon'
tadgalt	sazgalt	'widow'
tga	sga	'she is'
tkri	skri	'It is reduced.'
idqqi	izqqi	'pottery'

Boukous (1982: 405)

If continuant is triggered by onsets, all onset stops, be they sonorant or obstruent, will trigger assimilation of [cont]. This line of argument, therefore, suffers from pernicious limitations and should be rejected. The alternative line of thinking is to view the sequences (dl, tl, dn, tn) as partial geminates in line with the findings of Kirchner (1998). Kirchner (1998) proposes a line of thinking that can be illuminatingly pursued. The aforementioned clusters and more influentially their reverse forms (ld, lt, nd, nt) are viewed by Kirchner as partial geminates because they resist spirantisation crosslinguistically. Spirantisation of homorganic stops in such sequences will increase effort. In Kirchner's theory, increasing effort is always disfavored. This means that we have to posit a constraint that disfavours the spirantisation of the coronal obstruent stops in such clusters. This constraint we shall term *Half-Spirantised Partial Geminate (*HSPG).

(34) ***Half-Spirantised Partial Geminate (*HSPG)**:

No half-spirantised partial geminate.

The constraint should be placed before Spir to preclude spirantisation. This can be outlined in the tableau below.

(35)

/tatla/	*HSPG	Spir	Id Cor Cont
☞a. satla		*	
b. sasla	*!		**

The ranking established in tableau (35) prizes the blockage of spirantisation. Put more strictly, violation of *HSPG counts heavier than violation of lower-ranked Spir. The fundamental tension that holds between (35a) and (35b) is resolved by *HSPG which favours (35a) and rejects (35b).

Another revelatory twist deserves mention. Spirantisation is also precluded if the coronal stops t and d are followed or preceded by a sibilant as depicted in the data below.

(36)

Input	*Output*	*Gloss*
tidsi	sidsi	'toponym'
adʒar	adʒar	'neighbour'
tsala	tsala	'she is busy doing…'
tzayd	tzayd	'she added'
agdz	agdz	'toponym'
imsd	imsd	'It is sharp.'
sti	sti	'to choose'
zdi	zdi	'to join'
astay	astay	'choice'

Boukous (1982: 403)

This recalcitrance, again, brings identity avoidance to the fore. Iboudraren Amazigh foils the attempt to create clusters of sibilants, different or not, for the specification of voicing and anteriority. Deriving such clusters runs afoul of Morpheme structure constraints[6] as Boukous (1982) argues. To contend with this blockage, we recruit the already formulated GOCP constraint *Sib Sib which militates against clusters of sibilants in strictly adjacent contexts.

(37) ***Sib Sib**: the sequence of two strictly adjacent sibilants is prohibited.

The location of the GOCP constraint *Sib Sib[7] relative to Spir is one of supremacy. *Sib Sib must dominate Spir if the blockage of spirantisation is to follow.

(38)

/agdz/	*Sib Sib	Spir	Id Cor Cont
☞a. agdz		*	
b. agzz	*!		*

In its pairwise competition with (38a), (38b) is defeated owing to the fatal violation it incurs on top-ranked *Sib Sib. (38a), despite its violation of Spir, fares well on *Sib Sib, and is thereby chosen as optimal.

The final ranking of constraints for Iboudraren Amazigh is set out as follows.

(39) Ident Lab Cont, Ident Vel Cont, *θ, *ð, *Sib Sib >> Spir >> Ident Uvu Cont, Ident Cor Cont.

2.4. Spirantisation in Ayt Iznassen (AZ).

El Kirat (1987) is first accredited for having offered a thorough analysis of spirantisation in AZ Amazigh. Ayt Iznassen is an Amazigh lect spoken in the eastern side of the Rif mountains. It is a nearly fully-spirantising lect. El Kirat's (1987) analysis of AZ is in good part driven by the premises of Generative Phonology (cf. Vennemann (1972) and Kiparsky (1982)).

---

[6] Morpheme Structure Constraints circumscribe what features are possible at the segmental and sequential levels.

[7] Recall that Ident Gem Cont is high-ranked. It must dominate *Sib Sib if underlying sibilant geminates are to be rendered faithfully in the output.

AZ Amazigh exhibits nearly an across-the-board type of spirantisation. Put in another way, singleton obstruent stops are never immune to spirantisation. The only stop that declines to spirantise is the recalcitrant labial /b/ which declines to spirantise and always surfaces unscathed. Consider how this is displayed in the data below.

(40)

	Input	*Output*	*Gloss*
Labials	baba	baba	'dad'
	abrkan	abərçan	'black'
	tabslt	θabsəlt	'one onion'
	arba	arba	'boy'
	tabrat	θabraθ	'letter'
Coronals	tiTT	θiTT	'eye'
	takurt	θaçurθ	'ball'
	tχdm	θəχðəm	'she worked'
	taydit	θayðiθ	'she-dog'
	tadunt	θaðunt	'fat (n.)'
Velars	amkan	amçan	'place'
	kurdu	çurdu	'tick'
	kuz	çuz	'weevil'
	amkli	aməçli	'lunch'
	agm	aɟəm	'to draw water'
	agl	aɟəl	'to hang'
	gar	ʒar	'between'

	Z.F.	*I.F.*	*Gloss*
Uvulars	izəɣran	azəqqur	'roof wood'
	nɣ	nəqq	'to kill'
	əRɣ	Rəqq	'to dig'
	θmuɣli	əqqəl	'to look'

If we translate the alterations exhibited by the data in (40) in a constraint ranking format, Ident-IO Lab Cont has to dominate Spir if we want to foreclose any potential source of labial fricatives. Of course, the other constraints, Ident-IO Cor Cont and Ident-IO Dor Cont, must lie below Spir.

Consider how the posited ranking discriminates against the labial fricatives [β] and [f].

(41)

/baba/	Id Lab Cont	Spir
☞a. baba		**
b. βaβa	*!*	
c. fafa	*!*	

The requirement of faithfulness that Ident-IO Lab Cont calls for is met in (41a) and emphatically failed in (41b) and (41c). The force of Spir is blunted due to the supremacy of Ident-IO Lab Cont. This supremacy entails the optimality of (41a).

Let us now move to coronals. As the data in (40) evinces, coronal stops are uniformly spirantised. This ensues from ranking Ident-IO Cor Cont below Spir. Ident-IO Cor Str must be placed above Spir to disqualify sib outputs like [s] and [z].

(42)

/immut/	Id Cor Str	Spir	Id Cor Cont
a. immut		*	
☞ b. immuθ			*
c. immus	*!		*

The optimal candidate is candidate (42b). (42b)'s success is charged to its satisfaction of the top-ranked Ident-IO Str as well as Spir.

However, spirantisation of coronal stops does not apply in an across-the-board fashion. There are situations where spirantisation is precluded. Specifically, when the coronal stops are preceded by a sonorant stop, no spirantisation obtains (*lθ[8], *lð, *nθ, *nð, *mθ, *mð) (see El Kirat (1987)). The data below illustrates the failure of spirantisation in the aforementioned clusters.

[8] I view the lateral coronal /l/ as a [-cont] stop.

(43) Data from El Kirat (1987: 215)

Input	*Output*	*Gloss*
tamdint	θamdint	'city'
tammmt	θamməmt	'honey'
tasawnt	θsawnt	'uphill slope'
taqzint	θaqzint	'baby dog'
taqbilt	θaqbilt	'tribe'
ultma	ultma	'my sister'
taɣyult	θaɣyult	'she-donkey'

To get around the above clusters where the dental stop t and d are recalcitrant to spirantisation, we shall resort to *HSPG (cf. (34)). Along Kirchner's (1998) line of thinking, I view these clusters as partial geminates that resist the temptation of spirantisation. Replete are the languages where homorganic clusters (nasal+obstruent stop) or (lat+obstruent stop) foil the attempt to create half-spirantised clusters. So the failure of spirantisation in such clusters is not an oddity of AZ but it pervades a whole range of languages like Spanish (Harris (1969)), Proto-Banto (Greenberg (1950)) and Malayalam (Mohanan (1986)).

As regards *[mθ] and *[mð], I have no clear-cut explanation for the failure of spirantisation in this cluster. The core idea that is not amenable to an explanation is that the nasal stop and the coronal stop are not homorganic. For a cluster [nasal + obstruent stop] to be a partial geminate, the two parts of the cluster have to be homorganic (see Kirchner (1998)), which I reason is not the case here. However, on anything other than homorganicity, the cluster [mt], for instance, evinces undeniable affinity with the sequence [nt]. With all these observations as background, I concur that [mt] and [md] sequences should be, somehow, viewed as partial geminates.

By placing *HSPG above Spir, the output that stands in conformity with *HSPG will emerge as optimal as the tableau below portrays.

(44)

/ultma/	*HSPG	Spir	Id Cor Cont
☞a. ultma		*	
b. ulθma	*!		*

Despite its violation of Spir, (44a) is assessed as optimal owing to its satisfaction of *HSPG. (44b) fatally violates *HSPG; therefore, its strive to achieve optimality is entirely thwarted.

With respect to dorsals, the data in (40) evinces that dorsals are consistently spirantised. Nonetheless, there is an insuperable problem that befalls the spirantisation of dorsals. The point is that the dorsal stops /k/ and /g/ are mapped onto a whole range of outputs - /k/ may be mapped to ç, ʃ or y and /g/ may be mapped to ɟ, ʒ or y- with no clear conditioning factors as El Kirat (1987) argues. El Kirat (1987) explains that the unpredictability of the output mappings of dorsal stops is in good part reminiscent of the fact that spirantisation is an on-going productive phenomenon in AZ. Put in another way, AZ is still a variety in transition with respect to dorsal spirantisation. For El Kirat (1987) and Saib (1976), spirantisation of velar stops follows this gradient scale.

(45) /k/ > ç > ʃ > y > ø

/g/ > ɟ > ʒ > y > ø

However, I think that El kirat's generalizations about her variety are presumably fraught with some limitations. The lack of conditioning factors in AZ, as purported by El Kirat (1987), does not seem to be a sound conclusion. Despite the fact that El Kirat's (1987) work does not bear on identity avoidance, I have been able to find some identity avoidance effects which may well be viewed as conditioning factors. The data below, which I am not sure if extensive or not, exhibits the fact that ks clusters are mapped to [ys] (*[ʃs], *[çs]) and sk clusters are mapped to [ʃʃ] (*[sʃ], *[sy], *[sç]).

(46)

Input	*Output*	*Gloss*
aksum	aysum	'meat'
taksart	θaysarθ	'slope'
uska	uʃʃay	'hound'
isk	iʃʃ	'horn'
tiskrt	θiʃʃərθ	'garlic'

(Compiled from El Kirat (1987))

However, since I am not sure if there are exceptions to the changes exhibited by ks and sk in (46), I shall sidestep a thorough treatment of these clusters and leave the issue in abeyance. I will just assume that there is a lot of probability that the already posited GOCP constraint *Sib Sib & *[αvc][αvc]$_{Root}$ dominates Spir just as in ABA.

Suffice it to say now that the ranking Spir >> Ident-IO Dor Cont is enough to ensure the spirantisation of singletons /k/, /g/ and /q/.

(47)

/aqimi/	Spir	Id Dor Cont
a. aqimi	*!	
☞b. aɣimi		*

*ç, *x and *ɤ must be placed at the top of the hierarchy to rule out the velar fricatives [x] and [ɤ] and the palatalized coronal [ç] which never hold as output forms for input /k/ and /g/ in AZ. We shall sidestep the issue of which output emerges as optimal among the range of licit segments, namely ʃ, ʒ, ç, ɟ and y, because El Kirat (1987) has not constructed any consistent conditioning factors for dorsal spirantisation.

(48)

/kal/	*ç	*x	Spir	Id Dor Cont
a. kal			*!	
b. xal		*!		*
c. çal	*!			*
☞d. ʃal				*

Under the ranking established in (48), (48d) outperforms all the other candidates by faring well on the two top-ranked constraints *ç and *x, as well as on Spir. This is why it is chosen as optimal. (48a) fails on Spir and (48b) and (48c) fail on *x and *ç respectively.

The final ranking for AZ is outlined as follows:

(49) Ident Lab Cont, Ident Cor Str, *HSPG, *ç, *x, *ɤ >> Spir >> Ident Dor Cont

3. Factorial Typology and re-ranking constraints.

It has become common knowledge that generative theory assumes that the grammars of individual languages are all variations on a single theme, that of Universal Grammar. In OT terms, Universal Grammar is viewed as a set of universal violable constraints whose orderings substantially differ from one language to another (see Tesar and Smolensky (1993), Gnanadesikan (1995) and Goad (1997) for extensive discussion of this issue). Our understanding of spirantisation typology as exhibited in the four Amazigh lects is, therefore, reminiscent of different orderings of the same constraints. This observation figures prominently in a comparative approach of the rankings posited for the various Amazigh lects we have accommodated. In the remainder of this section, I shall compare the rankings of the already studied Amazigh lects only in terms of Spir and Ident-IO Place Cont. The other constraints are eschewed because they only account for the remnant cases where Spir is precluded or address the inventory restrictions observed in every lect.

(50)

Ayt Baâmrane	:	*Ident Lab Cont, Ident Cor Cont, Ident Vel Cont >> **Spir** >> Ident Uvu Cont*
Ayt Atta	:	*Ident Lab Cont, Ident Cor Cont >> **Spir** >>Ident Vel Cont, Ident Uvu Cont*[9]
ABA	:	*Ident Lab Cont, Ident Cor Cont >> **Spir** >> Ident Vel Cont, Ident Uvu Cont*
Iboudraren	:	*Ident Lab Cont, Ident Vel Cont >> **Spir** >> Ident Cor Cont, Ident Uvu Cont*
AZ	*:*	*Ident Lab Cont >> **Spir** >> Ident Cor Cont, Ident Vel Cont, Ident Uvu Cont*

Some Rifi lects like Tumsamane spirantise all stops (see El Kirat (1987)), which means that Spir must dominate all Ident-IO Place Cont constraints (see 51).

[9] Although Ident Vel Cont and Ident Uvu Cont can be encapsulated in one constraint, namely Ident Dor Cont, we have chosen to use the two constraints for the sake of clarity.

(51) Tumsamane : ***Spir*** *>> Ident Lab Cont, Ident Cor Cont, Ident Vel Cont, Ident Uvu Cont*

As the reader may notice, the degree of spirantisation in every lect is attributed to the position of Spir relative to the other constraints. When Spir is ranked low in the hierarchy as in Ayt Baâmrane we get a non-spirantising lect – except for uvulars of course. When Spir is at the top of the hierarchy, the lect is fully spirantising as in Tumsamane.

4. Conclusion

In this chapter we have offered a comparative account of spirantisation in four Amazigh lects. We have tried to find the position of Spir relative to the other constraints. Foremost among our findings is that the degree of spirantisation in each lect falls out from the place of Spir relative to continuant faithfulness constraints. Specifically, Spir is more in force when it is promoted in the hierarchy, less so when it is demoted. When Spir is top-ranked, spirantisation applies across-the-board as in Tumsamane. When Spir is demoted in the hierarchy, spirantisation emphatically fails on labial, coronal and velar stops as in Ayt Baâmrane.

Along the course of analyzing the four Amazigh lects, we have come across the interaction of identity avoidance with spirantisation. Notable examples have been offered from Ayt Baâmrane and Ayt Iznassen lects. We have shown that despite the valiant efforts invested by El Kirat (1987) to offer a thorough account of spirantisation in AZ, there are still many limitations. It is my belief that a better account of spirantisation requires an extensive study of a huge amount of significant data collected from as many Amazigh lects as possible. Only then can we understand the real conditioning factors that inhibit or induce spirantisation.

CONCLUSION

CONCLUSION

The study of spirantisation along with identity avoidance has been the focus of this work. In particular, we have tried to characterise sibilant clusters and the way they are conditioned by GOCP constraints.

To review, in the first chapter we have laid out some basic information about the geographical and linguistic context of ABA. We have presented a couple of theoretical assumptions. We have also addressed the basic premises of OT, i.e. the fundamentals and principles of OT and how OT works. We have also provided a brief retrospective on some of OT's subtheories like Correspondence Theory, the Local Conjunction of Constraints and Constraint Encapsulation.

The second chapter has aimed at providing a glimpse into the broad vista displayed by the GOCP theory as construed in Suzuki (1998). Specifically, the basic tenets of the GOCP theory have been dealt with, encompassing issues related to domain, locality, similarity and proximity. The mismatches observed between the classic OCP and the GOCP have been recorded, along with a presentation of the central empirical and theoretical ways in which the GOCP outstrips the classic OCP.

In the third chapter, we have invested much interest into gaining a proper understanding of how identity avoidance and spirantisation condition sibilants in Sib Sib clusters. We have shown that the GOCP constraints are either satisfied or violated depending on the identity exhibited by the two sibilants. The final ranking established for the GOCP constraints displays gradient similarity effects. Put in another way, the GOCP constraint calling for the avoidance of increasingly similar sibilants is promoted in the hierarchy. The GOCP constraints exhibiting a restriction against less identical sibilants are prone to be demoted in the hierarchy.

The fourth chapter is conceived as a continuation of the third chapter. The focus of interest is to accommodate the scenarios under which the cluster Sib ə Sib satisfies identity avoidance and the scenarios under which the same cluster emphatically fails to satisfy identity avoidance. Under the final ranking we have established from our study of

Sib ə Sib clusters, we have observed that identity avoidance effects are more readily respected if the two sibilants agree in terms of anteriority and not necessarily in terms of voice. By wedding insights from chapter III with findings from chapter IV, we amount to the imperative that identity and proximity effects should be accounted for if an adequate characterisation of identity avoidance in sibilants is to follow. The end result of the chapter has been that the force of identity avoidance is weakened, the larger the distance between the sibilants. While identity of voice, anteriority or both is sufficient to trigger GOCP effects in Sib Sib clusters, only identity of both anterior and voice, or sometimes just anterior, can trigger GOCP effects in Sib ə Sib clusters.

The fifth chapter is intended to yield a factorial typology of spirantisation in four Amazigh lects. The four Amazigh lects that have been chosen epitomize the three main Amazigh varieties observed in Morocco, namely Tamazight, Tashlhiyt and the Northern Amazigh lects. It has been demonstrated that re-ordering the same constraints deployed to account for spirantisation in ABA yields the rankings of the four Amazigh lects , namely Ayt Baamrane, Iboudraren, Ayt Atta and and Ayt Yeznassen. It has also been demonstrated that the position of Spir amid other place faithfulness constraints is responsible for which stops are susceptible to undergo spirantisation.

The findings of the present dissertation conflate novel insights that fill a gap on the literature on Amazigh phonology. First, the study of the behaviour of sibilants, underlying or derived, has received little attention in Amazigh phonology. Specifically, sibilants received no more than passing interest in Saib (1976), El Kirat (1987) and Boukous (1982). This obliviousness is ascribed in large measure to the former Amazigh phonologists' concentration on spirantisation alone. Secondly, the study of identity avoidance effects on sibilants may well be viewed as an innovation in this work. Such an issue has not been analysed thoroughly before. Insightful findings have been reached. More specifically, by incorporating some theoretical techniques to accommodate identity and proximity effects, the GOCP theory has reified the way in which identity and distance condition the nature of segments engendered by spirantisation and glide assimilation. Furthermore, the investigation of spirantisation in Amazigh within the purview of a constraint-based approach has shed light on how re-ranking the same constraints yields the grammars of other Amazigh lects.

Nonetheless, a more comprehensive account of spirantisation and identity avoidance calls for more comparative cross-linguistic work if a better account is to follow.

REFERENCES

REFERENCES

Adam, A. (1968). *Casablanca*. Paris : éd. du C. N. R. S. Vol. II.

Alderete, J. (1996a). A Formal Theory of Dissimilation. Hand-out of the talk presented at Rum J. Clam II, University of Massachusetts.

Alderete, J. (1996b). Dissimilation as Local Conjunction. In K. Kusumoto (ed.), *Proceedings of the North East Linguistics Society 27*, pp. 17-13, GLSA, Amherst, MA.

Alderete, J. (1997). Dissimilation as Local Conjunction. pp. 01-15, [ROA, 175].

Alderete, J. (2003). Phonological Processes: Dissimilation. In Frawley, W. (ed.) *International Encyclopedia of Linguistics*, 2nd Edition, pp. 323-324. Oxford: Oxford University Press.

Alderete, J. and S. A. Frisch. (2007). Dissimilation in Grammar and the Lexicon. In de Lacy; P. (ed.) *The Cambridge Handbook of Phonology*, pp. 379-398. Cambridge: Cambridge University Press.

Alderete, J. et.al. (1996). Reduplication and Segmental Markedness. Ms. University of Massachusetts, Amherst, [ROA, 134].

Anderson, J. and C. Ewen. (1987). *Principles of Dependency Phonology*. Cambridge: Cambridge University Press.

Ansar, K. (2007). A Comparative Study of Spirantisation in Amazigh. *Languages and Linguistics* 20: pp. 29-52.

Ansar, K. (2012). Spirantisation and Identity Avoidance in Asht Bouyelloul Amazigh. *Langues et Littératures* 22: pp. 25-61.

Ansar. K. (2003). Identity Avoidance in Berber Words. Ms. Med. V University, Faculty of Letters, Rabat.

Ansar. K. (2004). Long Consonant Agreement in Berber. Ms. Med. V University, Faculty of Letters, Rabat.

Applegate, J. R. (1971). *The Berber Languages*, in C.T. Hodge (ed.), *Afro-asiatic: a Survey*. The Hague (Mouton).

Archangeli, D. (1984). *Underspecification in Yawelmani Phonology and Morphology*. Ph. D. Thesis, MIT, Cambridge, Massachusetts.

Archangeli, D. and D. Pulleyblank. (1994a). *Grounded Phonology*. MIT Press, Cambridge, Mass.

Archangeli, D. and D. Pulleyblank.(1987). Maximal and Minimal Rules: Effects of Tier Scansion. *Proceedings of NELS* 17, pp. 16-35.

Avery, P. and K. Rice. (1989). Segmental Structure and Coronal Underspecification. *Phonology* 6, pp. 179-200.

Bacovic, E. (2005a). Partial Identity Avoidance as Cooperative Interaction. Ms. UCSD. [Rutgers Optimality Archive 698].

Bader, Y. (1985). Schwa in Berber: A Non-Linear Analysis. *Lingua*, Vol. 67, N°2-3, pp. 225 – 249, Amsterdam.

Bakovic, E. (1995). Strong Onsets and Spanish Fortition. *MITWPL, Proceedings of SCIL 6*. Vol. 23, Rutgers University, [ROA, 96].

Bakovic, E. (1996). Foot Harmony and Quantitative Adjustment. Ms. Rutgers University, [ROA, 168].

Basset, A. (1952). *La langue berbère*. First published for the International African Institute. Reprinted in 1969 by Dawsons of Pall Mall, London.

Basset, A. (1959). *La langue berbère, morphologie. Le verbe – étude de thèmes*. Paris: Librairie Ernest Leroux.

Beckman, J. (1997). *Positional Faithfulness*. Doctoral Dissertation, UMass- Amherst.

Benhallam, A. (1980). *Syllable Structure and Rule Types in Arabic*. Ph.D. Dissertation, university of Florida.

Bensoukas, K. (1999). Labial Alternations in Tashlhiyt Revisited: A Constraint-based Analysis. Ms. Med. V University, Faculty of Letters, Rabat

Bensoukas, K. (2000). Markedness, Faithfulness and Consonant Place in Tashlhiyt Roots and Affixes. Ms. Med. V University, Faculty of Letters, Rabat

Bensoukas, K. (2001). *Stem Forms in the Non-templatic Morphology of Berber*. Doctorat D'Etat Thesis. Faculty of Letters, Rabat.

Bensoukas, K. (2010b). Degemination as Identity Avoidance: Tashlhit Intensive Verb Forms. Ms. Mohammed V-Agdal University, Faculty of Letters and Human Sciences, Rabat. (Revision of 2002 manuscript).

Bensoukas, K. (2012b). Morphological Haplology in Amazigh. *Asinag* 7: pp. 151-171.

Bensoukas, K. (2014). *Featural Dissimilation in Tashlhit – Avoiding the Repetition of [Labial] and [Round]*. Publications of the Faculty of Letters and Human Sciences – Rabat. Theses and Memoirs N° 72.

Benua, L. (1997). *Transderivational Identity: Phonological Relations between Words.* Doctoral Dissertation, UMass-Amherst.

Benua, L.(1995). Identity Effects in Morphological Truncation. In *Papers in Optimality Theory.* J. Beckman, S. Urbanczyk & L. Walsh (eds.), pp.77-136, UMass-Amherst GLSA.

Biarnay, S. (1917). *Dialectes berbères du Rif*. Paris: Leroux.

Boersma, P. (1997a). Elements of Functional Phonology. Ms., Instituut Voor Fonetische Wetenschappen, [ROA, 193].

Boersma, P. (1997b). Sound Change in Functional Phonology. University of Amsterdam, the Netherlands, [ROA, 237].

Boersma, P. (1997c). Inventories in Functional Phonology. University of Amsterdam, the Netherlands, [ROA, 232].

Boersma, P. (1997d). How we Learn Variation, Optimality, and Probability. University of Amsterdam, the Netherlands, [ROA, 221].

Bouhlal, A. (1994). *Spirantisation in Tashlhiyt Berber: Diachrony and Synchrony*. D.E.S Thesis, Faculty of Letters, Rabat.

Boukous, A. (1979). Le profil sociolinguistique du Maroc. *Bulletin économique et social du Maroc*. N°.140, pp. (5 – 32).

Boukous, A. (1982). L'assibilation dans le dialecte tashlhiyt. *Recherche linguistiques et sémiotiques*. Faculty of Letters, Rabat.

Boukous, A. (1987). *Phonotactiques et domaine prosodique en berbère (Parler tachlhiyt d'Agadir, Maroc)*. Thèse d'état, Université Paris VIII, Vincennes à Saint Denis.

Boukous, A. (1994). *Variation phonique et compétence globale. Le cas du parler d'Agadir*. Publications de la Faculté des Lettres et Sciences Humaines, Rabat.

Burzio, L. (1995). The Rise of Optimality Theory. *Glot International* 1 (6), pp. 3-7.

Burzio, L. (1997). Italian Participial Morphology and Correspondence Theory. In *Proceedings of the First Mediterranean Conference of Morphology*. (eds.) Greet Booij, Angela Ralli and Sergio Scalise, pp. 42-53: University of Patras.

Burzio, L. (1999). Surface-to-Surface Morphology: When your Representations turn into Constraints. Ms. of a paper presented at the 1999, Maryland, Mayfast, University of Maryland, College Park, [ROA, 341].

Burzio, L. (2000). Segmental Contrast Meets Output-to-Output Faithfulness. *The Linguistic Review* 17, pp. 367 – 384.

Bynon, J. (1978). The Internal Reconstruction of Berber Vowels and Semi Vowels. In *Atti del secondo congresso di linguistica camito-semitica*, pp. 293-298. Universita di Firenze.

Chaker, S. (1977). Problèmes de phonologie berbère (kabyle). Travaux de l'Institut de phonétique d'Aix.

Chami, M. (1979). *Un parler amazigh du Rif marocain. Approche phonologique et morphologique*. 3rd Cycle Thesis, Paris: Université Descartes.

Chomsky, N. and Halle, M. (1968). *The Sound Pattern of English*. Harper and Row, New York.

Chtatou, M. (1982). *Aspects of the Phonology of a Berber Dialect of the Rif.* Ph.D. Dissertation, University of London.

Clements, G. N. (1976a). *Vowel Harmony in Non-Linear Generative Phonology: An Autosegmental Model*. Reproduced by IULC, Bloomington, Indiana.

Clements, G. N. (1985). The Geometry of Phonological Features. *Phonology Yearbook 2*, pp. 225-252.

Clements, G. N. (1991). Place of Articulation in Consonants and Vowels: A Unified Theory. In *Working Papers of the Cornell Phonetics Laboratory*. Vol. 5, pp. 77-123.

Crowhurst, M. and M. Hewitt (1995). Prosodic Overlay and Headless Feet in Yidin. *Phonology* 12, pp. 39-84.

Davis, P. (1970). A Classification of the Dissimilative Jakan'e Dialects of Russian. *Orbis* 19, pp. 360-376.

Dell, F. and M. Elmedlaoui (1985). Syllabic Consonants and Syllabification in Imdlawn Tashlhiyt Berber. *Journal of African Languages and Linguistics* 7, pp. 105-130.

Dell, F. and M. Elmedlaoui (1988). Syllabic Consonants in Berber: Some New Evidence. *Journal of African Languages and Linguistics 10*, 1-17.

Dell, F. and M. Elmedlaoui (1989). Clitic Ordering, Morphology and Phonology in the verbal Complex of Imdlawn Tashlhiyt Berber. *Langues orientales anciennes: Philologie et linguistique.* N°2, pp. 165-194. Peeters, Louvain, Paris.

Dell, G. (1984). Representation of Serial Order in Speech: Evidence from the Repeated Phoneme Effect in Speech Errors. *Journal of Experimental Psychology: Learning, Memory and Cognition* 10, pp. 222-233.

Dell, G. (1986). A Spreading Activation Theory of Retrieval in Sentence Production, *Psychological Review* 93, pp. 283-321.

Dell, G.and P. Reich. (1986). Toward a Unified Model of Slips of the Tongue. In Victoria A. Fromkin, ed., *Errors in Linguistic Performance*, pp. 273-86, San Diego, Academic Express.

Destaing,E. (1907) *Etude sur le dialecte berbère de Beni Snous*. Paris, leroux.

Destaing,E. (1920). *Etude sur le dialecte berbère des Ait Seghrouchen. (Moyen Atlas marocain)*. Paris, Leroux.

El Kirat, A. (1987). *Spirantisation in the Beni Iznassen Dialect: Diachrony and Synchrony*. D.E.S. Thesis, Med V University, Rabat.

Elmedlaoui, M. (1985). *Le Parler berbère chleuh d'Imdlawn: Segments et syllabation*. D.E.S. Université de Paris VIII, Saint Denis, Paris.

Elmedlaoui, M. (1992 [1995]). *Aspects des représentations phonologiques dans certaines langues chamito-sémitiques*. Thèse de Doctorat d'état. Université Med. V. Rabat. [*Publications de la Faculté des Lettres et des Sciences Humaines,* Rabat, série: Thèse et Mémoires, No.23]

Elmedlaoui, M. (1993). Geminates and Spirantisation in Hebrew, Berber, and Tigrinya: A Fortis-Lenis Module Analysis, *Linguistica Communicatio* V.1, pp. 121-176.

Evans, N. (1995). Current Issues in the Phonology of Australian Languages. In J. Goldsmith, ed. *The Handbook of Phonological Theory*, pp. 723-761. Basil Blackwell, Cambridge, Mass.

Flemming, E. (1995). *Auditory Features in Phonology*. Doctoral Dissertation, MIT.

Flemming, E. (1997). Phonetic Optimisation, Compromise in Speech Production. *University of Maryland Working Papers in Linguistics 5*: Selected phonology papers from H-OT-9.

Foley, W. (1991). *The Yimas Language of New Guinea*. Stanford University Press, *Review* 6, pp. 99-130.

Frisch et.al. (1997). Similarity and Phonotactics in Arabic. Unpublished Ms. Northwestern University, Evanston, IL, [ROA, 223].

Frisch, S. (1996). *Similarity and Frequency in Phonology*. Doctoral Dissertation, Northwestern University, Evanston, IL.

Frisch, S. (1999). *Similarity and Frequency in Phonology*. Ms. Northwestern University.

Frisch, S. A. (2004). Language Processing and Segmental OCP effects. In Hayes, B., Kirchner R., and D. Steriade (eds.). *Phonetically Based Phonology*, pp. 346-371. Cambridge: Cambridge University Press.

Frisch, S. A. and B. A. Zawaydeh. (2001). The Psychological Reality of OCP-Place in Arabic. *Language* 77: pp. 91-106.

Fromkin, V. (1971). The Non-anomalous nature of Anomalous Utterances. *Language* 47, pp. 27-52.

Fukazawa, H. (1999). *Theoretical Implications of OCP effects on Features in Optimality Theory*. Doctoral Dissertation, University of Maryland, College Park, MD.

Gafos, A. (1996). *The Articulatory Basis of Locality in Phonology*. Doctoral Dissertation, Johns Hopkins University, Baltimore, MD.

Gnanadesikan, A. E. (1995). Markedness and Faithfulness Constraints in Child Phonology. Ms. University of Massachusetts, Amherst, [ROA, 67].

Goad, H. (1997). Consonantal Harmony in Child Language: An Optimality Theoretic Approach. In *Focus on Phonological Acquisition*, ed. S.J. Hannahs and Martha Young Scholten, pp. 113-142. Amsterdam: Benjamins.

Goldsmith, J. (1976). *Autosegmental Phonology*. Doctoral Dissertation, MIT. [Published by Garland Press, New York, 1979]

Greenberg, J. (1950). The patterning of Root Morphemes in Semitic. *Word* 6, pp. 162-181.

Guerssel, M. (1976). *Issues in Berber Phonology*. M.A. Dissertation, Washington University.

Guerssel, M. (1978). A Condition on Assimilation Rules. *Linguistic Analysis* 4, pp. 225-254.

Guerssel, M. (1985). The Role of Sonority in Berber Syllabification. *Awal,* Vol. l, pp. 81-110. Maison des Sciences de l'Homme, Paris.

Guerssel, M. (1986). Glides in Berber and Syllabicity. *Linguistic Inquiry*, Vol. 17, Winter 1986, pp. 1-12. MIT.

Halle, M. (1995). Feature Geometry and Feature Spreading. *Linguistic Inquiry,* Vol. 26, pp. 1-46.

Harris, J.W. (1969). *Spanish Phonology*. Cambridge: MIT Press.

Hayes, B. (1987). A Revised Parametric Metrical Theory. *Proceedings of the North Eastern Linguistic Society,* Vol. *17*, pp. 274-289.

Hayes, B. (1995). *Metrical Stress Theory: Principles and Case Studies*. University of Chicago Press, Chicago.

Hayes, B. (1997). Phonetically-driven Phonology: The Role of Optimality Theory and Inductive Grounding. Ms. UCLA, [ROA, 158].

Hooper, J. (1976). *An Introduction to Natural Generative Phonology*. New York, Academic Press.

Hurch, B. (2006). Dissimilation. In Brown, K. (ed.). *Encyclopedia of Languages and Linguistics*, (2nd edn.), Vol. 3, pp. 719-722. Amsterdam: Elsevier.

Hyman, L. (1988). Underspecification and Vowel Transfer in Esimbi. *Phonology*, Vol. 5, pp. 255-73.

Idil, O. (1982). *L'Evolution des structures sociales et spatiales dans le Moyen Atlas du Nord-Est. (Maroc).* Doctorat de Troisième Cycle. Université de Toulouse, Le Mirail, Institut de Géographie, Daniel Faucher.

Ishihara, M. (1991). *A Lexical Prosodic Phonology of Japanese Verbs*. Doctoral Dissertation, University of Arizona.

Ito, Junko. A. Mester and J. Padgett (1995). Licensing and Underspecification in Optimality Theory. *Linguistic Inquiry.* Vol. 26, N° 4, pp. 571-613.

Jun, J. (1995). *Perceptual and Articulatory Factors in Assimilation: An Optimality Theoretic Approach.* Doctoral Dissertation. UCLA.

Kager, R. (1994). Ternary Rhythm in Alignment Theory. Ms. Utrecht University, [ROA, 35].

Kager, R. (1999). *Optimality Theory*. Cambridge: Cambridge University Press.

Kahn, D. (1976). *Syllable-Based Generalizations in English Phonology*. Doctoral Dissertation, MIT.

Kaun, A.(1994). *The Typology of Rounding Harmony*. Doctoral Dissertation, UCLA.

Kawahara, S. and S. Sano. (2014). Identity Avoidance and Rendaku. Proceedings of Phonology 2013. http: //ling.auf.net./ lingbuzz /001947/current.pdf?_s=rSnoRzt9b_ujoxo

Keer, E. W. (1999). *Geminates, the OCP and the Nature of CON*. Ph. D. Dissertation, The State University of New Jersey.

Kenstowiz, M. and C. Kisseberth. (1979). Generative Phonology: Description and Theory. *Language*, Vol. 57, No. 2 (Jun., 1981), pp. 460-463.

Kiparsky, P. (1982). Lexical Morphology and Phonology. In the Linguistic Society of Korea. (ed.). *Linguistics in the Morning Calm*. Seoul: Hanshim.

Kirchner, R. (1995). *Going the Distance: Synchronic Chain Shifts in Optimality Theory*. Ms., UCLA, [ROA-66].

Kirchner, R. (1997). Contrastiveness and Faithfulness. *Phonology* 14:1, pp. 83-111.

Kirchner, R. (1998). *An Effort-Based Approach to Consonant Lenition*. Ph.D. Dissertation, UMASS, Amherst.

Kossmann, M. (1999). *Essai sur la phonologie du proto-berbère*. Köln, Rüdiger Köppe Verlag.

Kuznetsov, P.S. (1973). *Russkia Dialektologia*. Prosveshchenie, Moscow.

La Charité, D. and C. Paradis (1993). The Emergence of Constraints in Generative Phonology and a Comparison of Three Current Constraint-Based Models. *Canadian Journal Of Linguistics* 38 (2), pp. 127-153.

La Montagne, G. and K. Rice. (1995). A Correspondence Account of Coalescence. In J. N. Beckman, L. Walsh Dickey, and S. Urbanczyk. (eds.) *Papers in Optimalty Theory*. University of Massachusetts Occasional Papers in Linguistics 18. Amherst : GLSA. pp. 211-223.

Lafkioui, M. (2006). La spirantisation dynamique de la vélaire occlusive simple /k/ dans les variétés berbères du Rif. *Studi Magrebini*, pp. 219 - 228.

Lafkioui, M. (2007). *Atlas linguistiques des variétés berbère du Rif. Berber Studies*. Vol. 16. Köln : Köppe.

Laoust, E. (1927). Le Dialecte berbère du Rif. *Hespéris* VII, pp. 173-208.

Laoust, E. (1929). *Cours de berbère marocain, Dialecte du Maroc central*. Edition II. Paris: Geuthner.

Lavoie, L. (1996). Consonant Strength: Results of a Data Base Development Project, *Working Papers of the Cornell Phonetics Laboratory* 11, pp. 269-316.

Leben, W. (1973). *Suprasegmental Phonology*. Doctoral Dissertation, MIT, Cambridge, Mass.

Lee, B. (1991). *Prosodic Structures in Tokelma Phonology and Morphology*. Doctoral Dissertation, University of Texas, Austin.

Lombardi, L. (1995). Laryngeal Neutralisation and Syllable Well-Formedness. *Natural Language and Linguistic Theory,* Vol. 13, pp. 39-74.

Lombardi, L. (2001). Positional Faithfulness and Voicing Assimilation in Optimality Theory. *Natural Language and Linguistic Theory* Vol. 17, pp. 267 – 302.

Louali-Raynal, N. (1999a). La spirantisation en berbère. In Lamberti, M. & L. Tonelli. (eds) : 271-298.

Lubowicz, A. (1998). Derived Environment Effects in OT. *West Coast Conference on Formal Linguistics,* Vol. 17, pp. 451- 464.

MacEachern, M. (1997). *Laryngeal Co-occurrence Restrictions*. Doctoral Dissertation, UCLA, Los Angeles.

McCarthy, J. (1986). OCP Effects: Gemination and Antigemination. *Linguistic Inquiry*, Vol. 17, pp. 207-263.

McCarthy, J. (1988). Feature Geometry and Dependency: A Review. *Phonetica*, Vol. 43, pp. 84 -108.

McCarthy, J. (1993a). *Prosodic Morphology I: Constraint Interaction and Satisfaction.* Ms., University of Massachusetts, Amherst, and Rutgers University, Ruccs-TR-3.

McCarthy, J. (1994a). *The Emergence of the Unmarked: Optimality in Prosodic Morphology*. Ms. University of Massachusetts, Amherst and Rutgers University, [ROA-13].

McCarthy, J. (1994b). On Coronal "Transparency". Handout of talk presented at the Annual Trilateral Phonology Weekend, University of California, Santa Cruz, California.

McCarthy, J. (1997). Faithfulness and Prosodic Circumscription. Ms. University of Massachusetts, Amherst, [ROA, 201].

McCarthy, J. (1999). Faithfulness and Identity in Prosodic Morphology. In Kager, R., Van Der Hulst, H. and W. Zonneveld. (eds.). *The Prosody Morphology Interface*, pp. 218-309. Cambridge: Cambridge University Press.

McCarthy, J. (2000). *The Fundamentals of Optimality Theory*. University of Massachusetts.

McCarthy, J. A. Prince. (1995). Faithfulness and Reduplicative Identity. *University of Massachusetts Occasional Papers in Linguistics,* Vol. 18: Papers in Optimality Theory. [ROA, 60].

McCarthy, J. and A. Prince. (1993a). Generalized Alignment. Ms., University of Massachusetts, Amherst, and Rutgers University, [ROA, 7].

McCarthy, J. and A. Prince. (2000). Faithfulness and Identity in Prosodic Morphology. [ROA- 216].

McCarthy, J. and A. Prince. (2001). *Prosodic Morphology: Constraint Interaction and Satisfaction*. University of Massachusetts, Amherst. [ROA-482]

McCarthy, J. and A. Taub. (1992). Review of Paradis and Prunet 1991. *Phonology*, Vol. 9, pp. 363-370.

McConvell, P. (1988). Nasal Cluster Dissimilation and Constraints on Phonological Variables in Gurindgi and Related Languages. *Aboriginal Linguistics*, Vol. 1, pp. 135-165.

McCregor, W. (1990). *A Functional Grammar of Gooniyandi*. J. Benjamins, Amsterdam.

Mercier, H. (1937). *Vocabulaires et textes berbères dans le dialecte berbère des Ait Izdeg.* Rabat: Céré.

Mester, R. A. (1986). *Studies in Tier Structure*. UMASS, Amherst, Ph.D. Dissertation.

Mester, R. A. (1989). Dependent Tier Ordering and the OCP. In H. Van Der Hulst & N. Smith, (eds.), *Features, Segmental Structure and Harmony Processes*. Dordrecht: Foris, pp. 127-144.

Mester, R. A. and J. Ito. (1996a). Rendaku I: Constraint Conjunction and the OCP. Paper presented at Kobe Phonology Forum, Kobe, Japan, [ROA, 144].

Mester, R. A. and J. Ito. (1996b). Structural Economy and OCP Interactions in Local Domains. Handout of a paper presented at Western Conference on Linguistics 1996. University of California, Santa Cruz.

Mester, R. A. and J. Ito. (1997). Sympathy Theory and German Truncations. *University of Maryland Working Papers in Linguistics,* Vol. 5, pp. 117-138, also in [ROA, 211].

Mohanan, K. P. (1986). *The Theory of Lexical Phonology*. Dordrecht: Reidel.

Mohanan, K. P. (1993). Fields of Attraction in Phonology. In J. Goldsmith, ed., *The Last Phonological Rule: Reflections on Constraints and Derivations*, pp. 61-116. University of Chicago. Press, Chicago.

Myers, S. (1997). Canadian Raising and the Representation of Gradient Timing Relations. *SLS*, 27/1, pp. 169 – 184.

Nelson, L. H. (1996). *Latin-English Dictionary*. University of Kansas.

Ni chiosain, M. and J. Padgett. (1993). Inherent V-Place: Report No. LRC-93-09, Linguistics Research Center, University of California, Santa Cruz.

Ni chiosain, M. and J. Padgett. (1997). Markedness, Segment Realisation and Locality in Spreading. Ms. [Published in 2001] in *Constraints and Representations: Segmental Phonology in Optimality Theory*. Linda Lombardi (ed.), pp.118 – 156.

Nooteboom, S. G. (1967). Some Regularities in Phonemic Speech Errors. *IPO Annual Progress* Report II, pp. 65-70.

Odden, D. (1987). Adjacency Parameters in Phonology. *Language* 70, pp. 289-330.

Odden, D. (1987). Dissimilation as Deletion in Chukchi. Proceedings from the Third Eastern States Conference on Linguistics, ed. By Miller and J. Power; pp. 235-246. Columbus, OH: The Ohio State University.

Ohno, S. (1998). Synchronically Unified Ranking and Distribution of Voice in Japanese. In K. Suzuki and Elzinga, (eds), *Proceedings of Southwest Optimality Workshop I: Features in Optimality Theory*, pp. 126-144, Coyote Working Papers, University of Arizona, Tucson.

Padgett, J. (1991). *Stricture in Feature Geometry*. Doctoral Dissertation, University of Massachusetts, Amherst. [Published by CSLI, Stanford, 1995].

Padgett, J. (1992). OCP Subsidiary Features. *Proceedings of the North East Linguistic Society*, Vol. 22, pp. 335-346, GSLA, Amherst, MA.

Paradis, C. and J. F. Prunet. (1989). On Coronal Transparency. *Phonology*. 6.2, pp. 317-348.

Paradis, C. and J. F. Prunet. (1991). Introduction: Asymmetry and Visibility in Consonant Articulation. In C. Paradis and J.F. Prunet (eds.) *The Special Status of Coronals: Internal and External Evidence.* Phonetics and Phonology 2. pp. 1-27.

Pencheon, T.G. (1973). *Tamazight of the Ayt Ndhir*. Los Angeles: Undena Publication.

Pierrehumbert, J. (1993). Dissimilarity in the Arabic Verbal Roots. *Proceedings of the North East Linguistics Society*, Vol. 23, pp. 367-381, GLSA, Amherst, MA.

Piggot, G.L. (1992). Variability in Feature Dependency: The Case of Nasality. NLLT, Vol. 10, pp. 310-43.

Prince, A. (1990). Quantitative Consequences of Rhythmic Organization. Paper presented at CLS, Vol. 26-II, pp. 355-398, The Para-session on the Syllable on Phonetics and Phonology, Chicago.

Prince, A. and P. Smolensky. (1993). Vowel Harmony and Optimality Theory. In Proceedings of the Workshop on Phonology, pp. 1-18. Universidade de Coimbra: Associaçao Portuguesa de Linguistica.

Prince, A. and P. Smolensky. (1993a). *Optimality Theory: Constraint Interaction in Generative Grammar*. Rutgers University and University of Colorado at Boulder, [ROA, 537].

Pulleyblank, D. (1994). Neutral Vowels in Optimality Theory: A Comparison of Yoruba and Wolof. Ms. University of British Columbia.

Pulleyblank, D. (1986). *Tone in Lexical Phonology*. D. Reidel Publishing Company, Dordrecht.

Renisio, A. (1932). *Etudes sur les dialectes berbères des Beni Iznassen, du Rif et des Senhaja des Srair*. Paris: Editions Ernest Leroux.

Rischel, J. (1962). Stress, Juncture, and Syllabification in Phonemic Description. In *Preprints of Papers for the Ninth International Congress of Linguistics*, August, pp. 27-31, Cambridge, Massachusetts.

Romero, J. (1996). *Gestural Organisation in Spanish: an Experimental Study of Spirantisation and Aspiration*. Doctoral Dissertation, University of Connecticut.

Rose, S. and R. Walker. (2001 [2004]). A Typology of Consonant Agreement as Correspondence. *Language* 80 (3), pp. 475-531.

Rosenthall, S. (1994). *Vowel/Glide Alternation in a Theory of Constraint Interaction*. Ph. D. Dissertation, University of Massachusetts.

Ross, J. R. (1972). Double-ing. *Linguistic Enquiry*, Vol. 3; pp. 61-86.

Sagey, E. (1986). *The Representation of Features and Relations in Non-Linear Phonology*. Ph.D. dissertation, MIT.

Saib, J. (1974). Gemination and Spirantisation in Berber . Diachrony and Synchrony. *Studies in African Linguistics*. Vol.5, N°.1. pp. 1 – 26.

Saib, J. (1976). *A Phonological Study of Tamazight Berber: Dialect of the Ait Ndhir.* Doctoral Dissertation, Los Angeles: University of California.

Selkirk, E. (1981). *The Syntax of Words*. *LI Monograph*, series 7. Cambridge, Mass: MIT Press.

Selkirk, E. (1988). Dependency, Place and the Notion Tier. Unpublished Ms. University of Massachusetts, Amherst, MA.

Selkirk, E. (1991). Major Place in the Vowel Space: Vowel Height Features. Unpublished Ms. UMASS, Amherst.

Selkirk, E. (1993). [Labial] Relations. Unpublished Paper, University of Massachusetts.

Shaw, P. (1991). Consonant Harmony Systems / the Special Status of Coronal Harmony. In C; Paradis and J. F. Prunet (eds.) *Phonetics and Phonology 2. The Special Status of Coronals: Internal and External Evidence*. pp. 5-157.

Silverman, D. (1995). *Phrasing and Recoverability*. Doctoral Dissertation, UCLA.

Smolensky, P. (1993). On the Internal Structure of the Constraint Component Con of UG. Handout of talk at UCLA, [ROA-86].

Smolensky, P. (1995). Harmony, Markedness, and Phonological Activity. Handout from ROW-1. [Revised, ROA-87, 1995].

Stanley, R. (1967). Redundancy Rules in Phonology. *Language*, Vol. 43, pp. 313-436.

Stemberger, J. (1982). The Nature of Segments in the Lexicon: Evidence from Speech Errors. *Lingua*, Vol. 56, pp. 235-59.

Stemberger, J. (1985). An Interactive Activation Model of Language Production. In Andrews W. Ellis, ed. *Progress in the Psychology of Language*, Vol. 1, London: Lawrence Erlbaum Associates, pp. 143 - 186.

Steriade, D. (1982). *Greek Prosodies and the Nature of Syllabification*. Doctoral Dissertation, MIT. Cambridge.

Steriade, D. (1987). Redundant Values. In A. Bosch, B. Need and E. Scihler, (eds.). CLS 23 Part Two: *Para-session on Autosegmental and Metrical Phonology*. Pp. 339-362.

Steriade, D. (1993). Positional Neutralisation. Handout from presentation at NELS 24, University of Massachusetts, Amherst.

Steriade, D. (1995). Neutralisation and the Expression of Contrast. Unpublished Ms., UCLA.

Steriade, D. (1996). Paradigm Uniformity and the Phonetics-Phonology Boundary. Ms., Prepared for *Papers in Laboratory Phonology* 5, edited by M. Broe & J. Pierrehumbert, Cambridge University Press.

Suzuki, K. (1995a). Consequences of Iambic Stress System in Southern Paiute. Unpublished paper presented at LSA Annual Meeting, Arizona.

Suzuki, K. (1995b). Vowel Raising in Woleaian: Adjacency and Linear Precedence in OT. Unpublished paper, University of Arizona.

Suzuki, K. (1997). NN: Rendaku and Licensing Paradox. In Ho-min Sohn & J. Haig (eds), *Japanese/ Korean Linguistics*, Vol. 6, pp. 215-228, CSLI Publications, Stanford, California.

Suzuki, K. (1998). *A Typological Investigation of Dissimilation*. Doctoral Dissertation, University of Arizona.

Tangi, O. (1991). *Aspects de la phonologie d'un parler berbère du Maroc; Ath Sidhar (Rif).* Thèse de Doctorat (Nouveau Régime), Université de Paris 8.

Tesar and Smolensky (1993). *The Learnability of Optimality Theory: An Algorithm and Some Basic Complexity Results*. Technical Report CU-CS-678-93, Computer Science Department, University of Colorado, Boulder.

Uhlenbeck, E. M. (1949). De Structuur van het Javaanese Morpheem. Nix & Co, Bandoeng.

Venneman, T. (1972). Rule Inversion. *Lingua*, Vol. 15, pp. 109-149.

Walker, R. (1996). A third Parameter in Unbounded Stress. In *Proceedings of the North East Linguistic Society*, Vol. 26, ed. Kiyumi Kusumoto, Amherst, MA: GLSA.

Walker, R. (1997). Faith and Markedness in Esimbi Feature Transfer. *Phonology at Santa Cruz*, Vol. 5, pp. 103-115.

Walker, R. (2001). Consonantal Correspondence. *Proceedings of Workshop on the Lexicon on Phonetics and Phonology. Papers in Experimental and Theoretical Linguistics*, Vol. 6, University of Alberta, pp. 73-84.

Walter, M. A. (2007). *Repetition Avoidance in Human Languages*. Ph. D. Dissertation, MIT.

Wordick, F. (1982). *The Yanjibarndi Language*. (Pacific Linguistics Series C, 71.), Australian National University, Canberra.

Yip, M. (1989). Feature Geometry and Co-occurrence restrictions. *Phonology,* Vol. 6. pp. 349-374.

Yip, M. (1995a). *Identity Avoidance in Phonology and Morphology*. Ms. University of California, Irvine, [ROA-82].

Yip, M. (1995b). Repetition and its Avoidance: The case of Javanese. (Appeared in K. Suzuki and D. Elzinga, (eds.). *Proceedings of Southwest Optimality Workshop I: Features in Optimality Theory*. Coyote Working Papers, University of Arisona, Tucson, [ROA-83].

Yip, M.(1988a). The Obligatory Contour Principle and Phonological Rules: A Loss of Identity. *Linguistic Inquiry*, Vol. 19, pp. 65-100.

This book bears heavily on sibilants in Amazigh, of most concern here sibilants of Asht Bouyelloul Amazigh (ABA). Two phonological phenomena that derive sibilants have been extensively studied. The first is spirantisation; the second is glide assimilation. The interaction of derived sibilants with underlying sibilants proves to yield a complex assortment of phonological alterations driven in large measure by identity avoidance.
A large part of this work is devoted to the interaction of identity avoidance with spirantisation and glide assimilation. To get around these three phonological phenomena, we have appealed to the GOCP theory as construed in Suzuki (1998). The central thrust of the GOCP theory is that identity and proximity effects should be incorporated in the new concept of the OCP. This goal Suzuki (1998) achieves by appealing to two strategies. The first strategy, termed 'Local Conjunction of Constraints' (Smolensky (1993 : 95)), is deployed to get around identity effects. The second strategy, a gradient proximity hierarchy of GOCP constraints, is resorted to accommodate proximity effects.

40 DH