HARMONIC SERIALISM WITH LEXICAL SELECTION:

EVIDENCE FROM JÈRRIAIS ALLOMORPHY

by

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ABSTRACT

Harmonic Serialism (HS) is a constraint based theory of phonology that has gained interest in the last ten years. As a theory of phonology, HS must be able to account for phonologically conditioned allomorphy. Currently in HS, phonologically conditioned allomorphy is analyzed in one of two ways – either using a single underlying representation in HS or through the realizational framework of Optimal Interleaving (known as Harmonic Serialism with Optimal Interleaving (HS/OI)). Yet, using data from Jersey Norman French (Jèrriais), I show that neither approach can account for certain cases of phonologically conditioned allomorphy. To remedy this deficiency, I propose the inclusion of Lexical Selection (LS) in HS in a framework termed Harmonic Serialism with Lexical Selection (HS/LS). LS provides for the lexical listing of allomorphs and, when needed, the ordering of allomorphs in the input to reflect a grammar's preference to use certain allomorphs regardless of surface markedness.

Using data from Jèrriais, Dyirbal, Moroccan Arabic, Polish, and Catalan I develop a full theory of HS/LS. I explore how GEN is conceived of in HS, how allomorph selection functions within the theory, and how HS/LS can handle certain cases of opacity. I propose a revision of the constraint PRIORITY, which is the LS constraint responsible for ensuring respect of allomorph ordering, from a gradient faithfulness constraint to a categorical markedness constraint. The incorporation of

LS into HS is important in that it allows HS to more fully account for phonologically conditioned allomorphy.

Pouor les pâleurs du Jèrriais

O vous tous! braves Normands des îles de la Manche … sachez-le, votre patois est vénérable; votre patois est sacré; car c'est de votre patois qu'est sortie, comme la fleur de la racine, cette langue française qui demain sera la langue de l'Europe.

François-Victor Hugo
La Normandie inconnue
1857

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CHAPTER 1

INTRODUCTION

Harmonic Serialism (HS; McCarthy 2000; Prince & Smolensky 1993/2004) was first proposed over 20 years ago but set aside in favor of parallel or classic Optimality Theory (classic OT; Prince & Smolensky 1993/2004). But as HS has typological advantages over classic OT, the theory has received increased interest in the literature. The utility of HS has been examined in a variety of areas, including tone and tone shift (Breteler 2015; McCarthy et al. 2012b), syllabification (Elfner 2009, 2016; Elsman 2016; Jesney 2011; Torres-Tamarit 2012), opacity (Hauser et al. 2016; McCarthy 2000, 2002, 2007, 2010a; Torres-Tamarit 2012), positional faithfulness (Jesney 2011; McCarthy 2010b), epenthesis (Elfner 2009, 2016; McCarthy 2010b, 2010c, 2016; Moore-Cantwell 2016), optionality and variation (Kimper 2008, 2011), truncation (Kimper 2009), vowel harmony (Mahanta 2007; McCarthy 2009a), consonant cluster simplification (McCarthy 2008a, 2010c), syncope (McCarthy 2008b, 2010b, 2010c), feature spreading and assimilation (McCarthy 2009a, 2010a), phonological mapping (McCarthy 2009b), coda condition/coda licensing (McCarthy 2010b), pausal phonology (McCarthy 2012), reduplication (McCarthy et al. 2012a), vowel reduction (Staubs 2016), compensatory lengthening (Samko 2011; Torres-Tamarit 2016), positive constraints (Kimper 2016), cross level interactions (McCarthy et al. 2016), and metrical structure (Pruitt 2008, 2010).

Given the increased interest in HS, it is worth exploring how the theory can account for phonologically conditioned allomorphy. Phonologically conditioned allomorphy, discussed in detail in Section 1.1, is a common phenomenon in languages where the surface form of a morpheme varies due to phonetic influence of the surrounding environment. A common example of this is *a/an* variation in English. Currently there are two approaches to phonologically conditioned allomorphy in HS. One is to treat allomorphy as allophony. Unfortunately, this is problematic as it cannot account for all cases of phonologically conditioned allomorphy, as shown in Section 2.5.1. The other is HS with Optimal Interleaving (HS/OI). Optimal Interleaving (OI) was first proposed by Wolf (2008) and is a realizational theory of morphology in phonology couched within Optimality Theory with Candidate Chain (OT-CC; McCarthy 2007). OI was later incorporated into HS (McCarthy 2009a, 2011, 2012). HS/OI uses morpheme realization constraints interwoven with phonological constraints to account for phonologically conditioned allomorphy. The ability of this theory to account for phonologically conditioned allomorphy has been called into question by Bonet (2013) and I show in Section 2.5.2.1 that HS/OI cannot account for certain cases of phonologically conditioned allomorphy. The inability of HS to account for phonologically conditioned allomorphy is troubling as this type of allomorphy is common across languages and a theory of phonology should be able to account for it. This dissertation remedies this issue and proposes an approach to allomorphy that is required in both OT, as shown in Sections 2.2. and 2.4, and HS.

Instead of a realizational view of morphology in HS, I propose a different approach to phonologically conditioned allomorphy, that of multiple underlying representations (Bonet et al. 2015; Hargus 1995; Hargus & Tuttle 1997; Mascaró 1996a, 2004, 2007; Mester 1994; Perlmutter 1998; Tranel 1996a, 1996b).[1] The main premise of this approach is that allomorphs are lexically listed instead of a single morpheme from which allomorphs are derived. All of the analyses listed above share this premise, but there is a divergence among them. Specifically, Bonet et al. (2007) proposes that in addition to lexically listing allomorphs, a grammar can exhibit a preference for certain allomorphs over others regardless of the markedness of the resultant surface form. This approach is termed Lexical Selection (LS; Mascaró 2007). I propose the inclusion of LS within HS to account for phonologically conditioned allomorphy.

This dissertation builds on LS and develops a theory of multiple underlying representations that is compatible with HS and accounts for a greater range of allomorphic processes than does HS or HS/OI. By including LS within HS, deficiencies in HS's handling of phonologically conditioned allomorphy are addressed and corrected. The central empirical basis for my proposal comes from Jersey Norman French (Jèrriais), which demonstrates that HS and HS/OI are inadequate to handle all cases of phonologically conditioned allomorphy and provides the initial argument for including LS in HS. I explore other languages whose phonologically conditioned allomorphy can shed additional light on how LS must function within HS.

The relevant Jèrriais data are presented in Chapter 2 along with a demonstration of how classic OT, using a single underlying representation, cannot account for the

[1] Bonet et al. (2015) is a collection of papers that explore allomorphy within the OT framework. Most of the analyses therein use multiple underlying representations in their OT analyses except Wolf (2015) and Steriade and Yanovich (2015), which use HS/OI and OT with Base-Derivative constraints, respectively.

variation in Jèrriais. This is followed by an explication of LS in Section 2.3. I also show in Section 2.5.1 that in order to account for the allomorphic variation seen in Jèrriais, HS must be modified to include the assumption that allomorphs are lexically listed, the underlying premise of LS. The current theory of morphology in a serial constraint-based framework, HS/OI, uses a single underlying representation in the input and cannot account for Jèrriais allomorphy, which is demonstrated in Section 2.5.2.1. In Chapter 3, I also show that allomorphic variation of various parts of speech in Jèrriais can be accounted for through Harmonic Serialism with Lexical Selection (HS/LS).[2] I then develop a full formal theory of HS/LS, including modifying the primary constraint of LS, PRIORITY; examine certain theoretical issues that arise with the inclusion of LS in HS; and also demonstrate that the data previously accounted for through HS/OI and OI can also be accounted for with HS/LS.

1.1 Phonologically Conditioned Allomorphy

Allomorphy can be triggered by any component of the grammar, including syntax, semantics, morphology, and phonology. For example variation can be triggered by a morphological category. This is seen in the variation in English with plural formation of the word *knife* /naɪf ~ naɪv + z/. This variation is due to the morphological category PLURAL. This is not phonological in nature as when the morpheme is followed by the possessive clitic /s/ (*knife's*), which is phonologically identical to the plural /s/, the stem does not exhibit any variation. Semantically triggered allomorphy can be seen

[2] As there are several different HS and OT approaches discussed herein, I use the following terminology to avoid confusion: parallel OT that uses a single underlying representation is referred to as classic OT, parallel OT with LS is referred to as OT/LS, HS that uses a single underlying representation is referred to simply as HS, and HS with LS is referred to as HS/LS.

in the null plural formation of game animals in English. This is seen in forms such as *the deer*, whose plural exponent is null. Syntactically triggered allomorphy is seen in English *go/went* variation.

While allomorphy can be triggered by any component of the grammar, often it is the phonological component of the grammar that is responsible for the variation. Phonologically conditioned allomorphy can be divided into two distinct types, that of regular or nonsuppletive allomorphy and that of irregular or suppletive allomorphy (Mascaró 2007; Tranel 1993). Regular allomorphy can be a result of a language wide process. This can be seen in English with the negative prefix *in-* [iN-] whose nasal surfaces as [ŋ], [m], or [n] depending on the place of articulation of the following syllable's onset. This is a result of a regular nasal place assimilation process in English. Regular allomorphy is often considered nonsuppletive as the various allomorphs can be derived through a language wide phonological process. In many cases, though, allomorphy is irregular or suppletive. In this case the forms of the allomorphs cannot be attributed to a language wide phonological process. Some suppletive allomorphy is due to syntax, e.g., *go/went*. Many cases are due to phonological conditioning, which is referred to as phonologically conditioned suppletive allomorphy (PCSA). In these cases the phonology triggers the allomorphy but the surface form of the allomorph is not due to a language wide phonological process. For example, in English, the indefinite article exhibits PCSA. When the indefinite article occurs before a consonant, it surfaces as *a* [ə]. When it occurs before a vowel it surfaces as *an* [ən]. It is not the case that [n] epenthesis is used to resolve hiatus language wide. The use of [n] to resolve hiatus is specific to the indefinite article. This is seen in the fact that when the definite article in

English occurs prevocalically it does not surface as **then* *[ðən].

In PCSA, each morpheme resolves phonotactic issues in a morpheme-specific manner. In Jèrriais vowel hiatus can be resolved through the epenthesis of a morpheme specific consonant, as shown in (1), or through deletion of a morpheme specific vowel, as shown in (2).[3]

(1) Vowel Hiatus Resolution through Consonant Epenthesis

a. Plural Indefinite Article – [z] epenthesized

i. **dei** fɑ̃m ‘some women’

ii. **deiz** i:l ‘some islands’

b. Masculine Singular Indefinite Article – [n] epenthesized

i. **ø̃n** ɔ̃m ‘a man’

ii. **ø̃** bœ ‘a bull’

c. Certain Imperfect Verbs – [t] epenthesized

i. il **tɛ** vi ‘he was old’

ii. il **tɛt** ɑ̃ ʒɛri ‘He had been in Jersey’

(2) Vowel Hiatus Resolution through Vowel Deletion

a. Feminine Singular Definite Article – [a] deleted

i. **la** pɑ:rɛ:s ‘the parish’

ii. **l** ɛ:ko:l ‘the school’

b. Object/Subject Pronouns – [ɛ] deleted

i. **ʒɛ** travɑ:l sy la fɛrm ‘I work on the farm’

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[3] Unless otherwise noted, all Jèrriais data are taken from Liddicoat (1994).

ii. ʒ ɛ fɛt œn gɑːʃ 'I made a cake'

c. Masculine Singular Definite Article – [e] deleted

i. kõt **le** prɔgrɛː 'against progress'

ii. vla **l** oːt ʧɑ̃ 'there is the other dog'

The strategy employed, and its associated segments, is not language wide, and it cannot be posited that a specific segment is always epenthesized or deleted.

Accounting for PCSA becomes difficult in that positing derivational rules or a constraint ranking to account for an instance of PCSA will over-generate in cases where allomorphy does not occur at all or occurs but employs a different repair strategy. There have been various approaches to PCSA, including the aforementioned OI and HS/OI. In nonrealizational approaches, some linguists (Bonet et al. 2007; Booij 1996; Bye 2007; Itô & Mester 2004; Kenstowicz 2005; Lapointe 2001; Mascaró 2004, 2007; Perlmutter 1998; Plag 1998, 1999; Steriade 1999; Tranel 1993, 1996a, 1996b, 1998, 1999; Yip 1998) have advocated the lexical listing of allomorphs, with Bye (2007: 70) arguing that "[t]he forms of suppletive allomorphs must be lexically specified by definition." This is the approach advocated for and applied to the cases of PCSA discussed herein. Lexical listing of allomorphs allows for an accounting of the idiosyncratic shapes of allomorphs while allowing constraint interaction to decide when certain forms surface. This is desirable as much of PCSA has been argued to be motivated by the emergence of the unmarked (TETU; McCarthy & Prince 1994) (Drachman et al. 1996; Kager 1996; Lapointe 2001; Mascaró 1996a, 1996b, 2004, 2007; McCarthy & Prince 1994; Perlmutter 1998; Rubach & Booij 2001; Tranel 1996b). Allomorphy often results from a desire to produce a surface form that is unmarked. This can be seen in the *a/an* alternation in English, where the use of *an* prevocalically provides an onset and avoids the vowel hiatus that would result from the use of *a* prevocalically.[4] In cases of TETU allomorphy like this, the lexical listing of allomorphs is enough, as constraint interaction will result in the least marked surface form. But there are cases where allomorphy does not result in TETU. These cases are of special interest as they require additional mechanisms to ensure the correct surface form. Several approaches have been advocated for non-TETU PCSA, such as Lexical Phonology Morphology-OT (LPM-OT; Kiparsky 2000), Indexed Constraint Theory (Alderete 2001; Itô & Mester 1999; McCarthy & Prince 1995; Pater 2000, 2007, 2010; Smith 1997), Cophonology Theory (Anttila 1997, 2002; Inkelas 1998b; Inkelas & Zoll 2005; Orgun 1996, 1998, 1999; Orgun & Inkelas 2002), and Lexical Selection (Bonet et al. 2007). This dissertation champions the use of LS and shows in Section 2.4 how LPM-OT, Indexed Constraint Theory, and Cophonology Theory are unable to adequately account for Jèrriais plural definite article allomorphy.

Jèrriais definite article allomorphy, and other cases of non-TETU PCSA, can be accounted for by lexically listing allomorphs and ordering them to reflect a language's preference to use a default allomorph regardless of surface markedness. The lexical listing and ordering of allomorphs are robust properties of the grammar, as is demonstrated in this dissertation. This is illustrated by the fact that both classic OT and HS require LS in order to account for non-TETU PCSA.

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[4] This is discussed in more detail in the section on LS (Section 2.3).

CHAPTER 2

JÈRRIAIS ALLOMORPHY AND THEORIES OF PHONOLOGY

This chapter provides an overview of the relevant allomorphic variation in Jèrriais and examines how the constraint based theories of phonology – classic OT, OT/LS, and HS – handle or fail to handle the variation of Jèrriais definite articles. The use of classic OT is purely illustrative with the intent of showing that classic OT on its own cannot account for the variation seen in Jèrriais. I first present the allomorphic variation in Jèrriais feminine singular, masculine singular, and plural definite article allomorphy. This is followed by a discussion on why the variation in the masculine singular and plural definite articles is not due to regular phonological processes. I then discuss how a classic OT analysis can only account for the variation in the masculine singular and plural definite articles if it uses economy constraints like *STRUCTURE (Prince & Smolensky 1993/2004; Zoll 1993, 1996). I argue, following Gouskova (2003), that economy constraints should not be used. I conclude that classic OT, as it is currently envisioned, cannot account for the variation seen in Jèrriais and requires additional mechanisms in order to do so. Classic OT is not the only theory unable to account for the variation; as is shown in Section 2.5.1, HS experiences the same problems classic OT does. As HS and classic OT cannot account for the variation without the inclusion of LS, I then present the basic framework of LS as outlined by

Mascaró (2007). This is followed by a successful OT/LS analysis of Jèrriais definite article allomorphy. I then explore alternative approaches within classic OT – specifically that of LPM-OT, Indexed Constraint Theory, and Cophonology Theory. These theories are as unsuccessful as classic OT. Given the need for multiple underlying representations in classic OT, I argue it is also needed in HS if HS is to account for PCSA. I then present the basics of HS and show that traditional HS, including HS/OI, cannot account for the Jèrriais data, thus demonstrating the need for LS in HS.

2.1 Jèrriais Data

Jèrriais is an endangered language spoken on the Island of Jersey off the coast of France in the English channel. Jèrriais has a long written tradition and there are currently ongoing revitalization efforts, but the language has received limited attention from linguists. Much of the work on Jèrriais is sociolinguistic in nature, often regarding the endangerment and revitalization of the language (Johnson 2008; Jones 2000a, 2000b, 2001, 2005a, 2005b, 2009, 2015; Liddicoat 1986, 2008). There has been some descriptive work on the language (Jones 2003, 2007, 2012; Spence 1960, 1993), along with a descriptive synchronic and diachronic grammar of the language, (Liddicoat 1994), a pedagogical grammar (Birt 1985), and several dictionaries (Jersiaise 2005, 2008; LeMaistre & Carré 1966). Analytic work on the language is scarce and is limited to Jones (2010), Liddicoat (1990), and McCarvel (2010, 2016). The two sources of data for the analyses herein come from Liddicoat (1990) and my transcriptions of LeMaistre (1979), which are a series of five cassettes containing recordings of songs, stories, prayers, and associated commentary by a variety of Jèrriais speakers.[5] My transcriptions of these tapes represent the only other transcribed Jèrriais data available, the other being Liddicoat (1994). In addition to my transcription work, I have worked with *L'Office du Jèrriais* to confirm data and to establish contact with Jèrriais speakers. I have also visited the Island of Jersey several times in an effort to begin reconciliation of theoretical analyses to the language and revitalization efforts.

Based on these data, Jèrriais exhibits allomorphic variation in many parts of speech, including verbs, adjectives, prepositions, pronouns, and articles. Like other Norman languages, Jèrriais maintains a gender distinction in the singular definite article – *l(é)/la*. This distinction is lost in the plural definite article, *les (l's)*. Each article exhibits allomorphic variation with the various allomorphs shown in Table 2.1.[6]

The variation exhibited by Jèrriais definite articles is usually attributed to the phonological environment of the following morpheme/word (Liddicoat 1994). The details of this variation are discussed in the sections below.

2.1.1 Feminine Singular Definite Article

The distribution of the feminine singular definite article allomorphs is straightforward with no exceptions found within the available data, which include Liddicoat (1994) and my transcriptions of LeMaistre and Carré (1966).

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[5] In this dissertation, I use data only from Liddicoat (1990) and my transcriptions of LeMaistre (1979). While I have collected some data, none of it appears herein.

[6] The quality of the vowel in the masculine and plural definite articles varies depending on the dialect of the speaker. The masculine singular definite article can appear as [ɛ] or [e]. I have chosen to represent it using [e]. The vowel in the plural definite article can appear as [ɛː], [eː], or [ei]. I have chosen to use [ei]. In addition, the final consonant of the plural definite article can be realized as [z] or [ð] depending on the dialect. I have chosen to represent it using [z].

Table 2.1 Jèrriais Definite Article Allomorphs

<table>
<tr><th></th><th>Singular</th><th>Plural</th></tr>
<tr><td>Masculine</td><td>[le], [l]</td><td rowspan="2">[lei], [lz], [leiz]</td></tr>
<tr><td>Feminine</td><td>[la], [l]</td></tr>
</table>

The feminine singular definite article has two allomorphs, *la* [la] and *l'* [l]. The allomorph [la] occurs before consonants or consonant clusters, as in the examples in (3), and [l] occurs prevocalically, as in (4).

(3) [la] – _C(C)[7]

a. d **la** vil — 'from town'

b. frœmɛ **la** pɔrt — 'close the door'

c. vɒi a **la** pwɛk — 'going fishing'

d. a **la** trinte — 'in Trinity'

e. #**la** gaʃ — 'the cake'

(4) [l] – _V

a. avɛk **l** ɑ̃gjɛtɛr — 'with England'

b. nɛ ʧitiːm ʒɑ̃mei **l** iːl — 'never left the island'

c. ɑ̃ dsuː d **l** armwɛð — 'under the wardrobe'

d. tɛz a **l** eikoul — 'was at school'

e. #**l** iːl — 'the island'

The variation seen in the feminine singular definite article does not present any

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[7] In this dissertation # will be used to signal utterance initial position.

issues for an analysis using a single underlying representation either in classic OT or HS. The deletion of [a] prevocalically can be motivated by NOHIATUS. The resulting syllable is less marked than if [la] had surfaced prevocalically. In Jèrriais there are no polysyllabic words with heterosyllabic adjacent vowels, i.e., *(C)V.V(C). This avoidance of vowel hiatus is not restricted to the feminine singular definite article and can be seen in the allomorphy of the other definite articles and of other parts of speech, such as personal pronouns, indefinite articles, negation particles, prepositions, and adjectives, as illustrated in (1) and (2) above. In (5a) the masculine nominative pronoun, *il/i'*, occurs before a consonant and is realized as [i], while in (5b) it is prevocalic and realized as [il]. The same pattern is seen in (5b) where the preposition *dans*, 'in', occurs as [dɑ̃] before a consonant and in (5c) surfaces as [dɑ̃z] prevocalically.

(5) Vowel Hiatus Resolution

a.	**i** pɑ:lɛ ʒysk a tɑ̃ k tu l mõd s ɑ̃ɲi:s	'He talked until everyone got bored'
b.	**il** ɛ **dɑ̃** lɛ: kjo:	'He is in the fields'
c.	asi **dɑ̃z** œn ʃɛ:ð	'Sitting in a chair'

Vowel hiatus is considered a marked structure and the markedness constraint NOHIATUS is used in many analyses to penalize it (Green 2000; Ngunga 2000; Pulleyblank 2003; Tanner 2007).[8] The avoidance of vowel hiatus within the feminine singular definite article and within other parts of speech can be attributed to the presence of a NOHIATUS constraint, which prohibits heterosyllabic V.V sequences.

In an analysis with a single underlying representation, /la/ is most likely the

[8] I assume that NOHIATUS is a legitimate constraint. See McCarthy and Prince (1993a) for arguments against this constraint.

underlying representation. /l/ is unlikely to be the underlying representation as schwa, not [a], is the epenthetic vowel in Jèrriais.[9]

A ranking of DEP-C, NOHIATUS » MAX-V can be used to analyze the feminine singular definite article. DEP-C prevents epenthesis of a consonant to resolve hiatus in cases where the word begins with a vowel. NOHIATUS penalizes [la] prevocalically and motivates the deletion of [a].

(6) Classic OT Analysis of [avɛk l ɑ̃gjɛtɛr] 'with England'

/avɛk **la** ɑ̃gjɛtɛr/	DEP-C	NOHIATUS	MAX-V
i. avɛk **la** ɑ̃gjɛtɛr		*!	
ii. avɛk **la** ʔɑ̃gjɛtɛr	*!		
☞iii. avɛk **l** ɑ̃gjɛtɛr			*

While the feminine singular definite article lends itself to an analysis based on a single underlying representation, using a similar type of analysis does not work for the other definite articles.

2.1.2 Masculine Singular Definite Article

The masculine singular definite article has two allomorphs, *lé* [le] and *l'* [l]. The distribution of these allomorphs is not as straightforward as previously described in Liddicoat (1994), which is the only printed source of transcribed data. According to Liddicoat (1994) the composition of the onset of the word following the definite article is responsible for the allomorphic variation of the masculine singular definite article. Liddicoat (1994) describes the distribution of [l] as occurring before singleton

[9] See Section 2.2.1 for discussion on epenthetic schwa in Jèrriais.

consonants and vowels and [le] as occurring before consonant clusters, as illustrated in (7) and (8), respectively.

(7) [l] – _V, _C

a. vla **l** o:t ʧɑ̃ ‘there is the other dog’

b. vɛ: **l** gardɛ̃ ‘see the garden’

c. ɛ l sabjõ ‘and the sand’

(8) [le] – _CC

a. kõt **le** prɔgrɛ: ‘against progress’

b. ʒ ɑ̃lvɛ:m **le** vrɛ ‘we took the seaweed’

c. ver **le** kjou 'towards the field'

The majority of the data align with this generalization, yet there are examples that run counter to the patterns described in Liddicoat (1994). In (9) below, [l] surfaces before a complex onset, which is the environment typically associated with [le].

(9) [l] – _CC

a. fɛ **l** brɑ̃kɑʒ ‘done the ‘branchage’’

b. di **l** bwõnɔ̃m ‘said the husband’

c. sy **l** kmɛ̃ ‘on the road’

This is further complicated by variation in certain environments, specifically in the utterance initial position, as in (10), and interconsonantal position, as in (11). Here both allomorphs surface in identical (or near identical) phonological environments.

(10) Variation in Utterance Initial Position

a. **le** sjɛl ‘the sky’ (LeMaistre 1979)

b. **le** tija 'the lime' (LeMaistre 1979)

c. **l** sjɛ̃ 'the man'[10]

d. **l** tɑ̃ 'the weather'

(11) Variation in Interconsonantal Position

a. lɛs **le** mɔn 'leave the world' (LeMaistre 1979)

b. drɛð **le** tɑ̃ 'hardly the time'

c. par **l** tʌn 'by the ton'

d. pɔːs **l** tɑ̃ 'pass the time'

Evidence of this variation was found in recordings made by LeMaistre (1979), of which I have transcribed a portion (one of five cassettes). In my transcriptions of a portion of LeMaistre (1979) (Cassette 2), there were 130 unique tokens of the masculine singular definite article.[11] Including tokens from Liddicoat (1994), the total number of all tokens of the masculine singular definite article in all environments is 211. Out of these tokens, [l] is the most productive allomorph, with [l] occurring 164 times and [le] 47 times. The distribution of the masculine singular definite article allomorphs is summarized in Table 2.2. In positions where variation occurs most, utterance initially and interconsonantally, [l] occurs 42% of the time and [le] 58% in utterance initial position and interconsonantally [l] occurs 39% and [le] 61%. Utterance initially there is only one environment in which [l] surfaces always and this is prevocalically.

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[10] [sjɛ̃] is a demonstrative pronoun that when used with the definite article is translated as 'man' or 'one.MS'.

[11] There were 189 total tokens, but 59 of those were before proper nouns and names. As the definite article is lexicalized as part of the proper noun (mostly surnames), these were not considered as they never show variation.

Table 2.2 Distribution of Masculine Singular Definite Article Allomorphs

	#_CV	#_CC	#_CG	#_V	C_CV	C_CC	C_CG	CC_C	V_V	C_V	V_CV	V_CC	V_CG
[le]	16	4	2	0	9	4	3	1	0	0	5	2	1
[l]	7	2	1	6	10	0	1	0	35	14	76	6	6

The avoidance of vowel hiatus appears to be absolute as in every prevocalic position [le] never surfaces. In the interconsonantal position there are two environments where [le] always occurs and these are CC_C and C_CC.

There is one environment that exhibits a little variation, but not enough to be variation in that the occurrence of the one allomorph is so low it is possible that the use is due to speaker error. This is the postvocalic preconsonantal position – V_C(C, G). In these positions (the last three columns of Table 2.2), of the 96 tokens, [l] occurs 92% of the time while [le] only occurs 8% of the time. Given the low rate of [le] in these positions, I treat its use in this environment as speaker error.

Given the distribution presented above, the following generalizations about the data will be used: [l] surfaces postvocalically and prevocalically, [le] surfaces in groups of three consonants, and there is variation utterance initially before consonants and between two consonants.

(12) Masculine Singular Definite Article Allomorph Environments

a. [l] #_V, V_V, C_V, V_CV, V_CC, V_CG

b. [le] C_CC, CC_C, C_CG

c. variation #_C(C, G), C_CV

This type of allomorphy is suppletive, as shown in Section 2.2.1, and is the type of allomorphic variation that LS is naturally suited to account for, as shown in Section 2.3.3.

2.1.3 Plural Definite Article

There are three allomorphs of the plural definite article, [lei], [leiz], and [lz]. Liddicoat (1994) describes the distribution as [lei] occurring before consonants, shown in (13), and [lz] occurring prevocalically, shown in (14). Liddicoat (1994) does not discuss the distribution of [leiz]. This may be a simple oversight as there are several examples of [leiz] in Liddicoat (1994), in my transcriptions of LeMaistre (1979), and in Jones (2012). This third allomorph appears prevocalically, as does [lz], but its distribution is distinguished from that of [lz] in that it occurs only when the preceding word ends in a consonant, as illustrated in (15), while [lz] only occurs when the preceding word ends in an open syllable, as shown in (14).

(13) [lei] – _C(C)

a.	vɑ̃dr **lei** patat	'sell the potatoes'
b.	dɑ̃ **lei** kjo:	'in the fields'
c.	fi:s **lei** travɒ:	'do the work
d.	#**lei** kawɑ̃	'the owls'

(14) [lz] – V_V

a.	parmi **lz** ɑ̃gjei	'among the English'
b.	pa **lz** almɑ̃	'by the Germans'
c.	#**lz** almɑ̃:z	'the Germans'
d.	ɛ **lz** ɛpiɲ	'and the thorns'

(15) [leiz] – C_V

a. oprei k **leiz** almɑ̃ 'after the Germans'

b. ʃ teim **leiz** ɑ̃gjei 'we were English'

The distribution of each allomorph is phonologically motivated. The distribution of [lei] is limited to before consonants as it is penalized prevocalically by NOHIATUS. The use of [lz] and [leiz] is motivated by ONSET, as they occur prevocalically to provide an onset, with [leiz] being used to avoid overly large consonant clusters. However, as with the masculine singular definite article, single underlying representation analyses fail when trying to account for the variation between all three. This is shown in Section 2.2.1 for the plural definite article and Section 2.2.2 for the masculine singular definite article.

2.2 Classic OT Analyses of Jèrriais Definite Article Allomorphy

In this section I present a classic OT analysis of Jèrriais definite article allomorphy to motivate the use of LS. To lay the groundwork for my argument for the inclusion of LS, I use classic OT to show that an analysis that uses a single underlying representation cannot account for the PCSA present in Jèrriais masculine singular and plural definite articles. After demonstrating the deficiencies of a classic OT analysis, I follow with an OT/LS analysis that successfully accounts for the variation thus demonstrating the need for LS in classic OT, a need that carries over into HS. The inability of HS to account for Jèrriais allomorphy is discussed in Section 2.5.1 and followed by a successful HS/LS analysis in Chapter 3.

In a classic OT analysis, using a single underlying representation requires constraint rankings that contradict attested patterns in Jèrriais and require the use of a theoretically dubious family of constraints, those of the *STRUCTURE family (Prince & Smolensky 1993/2004; Zoll 1993, 1996). Without relying on *STRUCTURE, there is no ranking of constraints that can account for all of the allomorphic variation.

The default approach in classic OT to allomorphy has been to treat allomorphy as a phonological process. Typically allomorphy has been accounted for by positing a single underlying morpheme that then undergoes a phonological process to yield the various allomorphs. This can be seen in McCarthy and Prince's (1993b) analyses of Lardil and Lakota. This approach can account for the feminine singular definite article, as noted above, but encounters issues when dealing with the masculine and plural definite articles. Specifically, the constraint rankings will create conditions where the attested allomorph is harmonically bounded by an unattested allomorph or be incorrect for the language.

2.2.1 Classic OT Analysis of Masculine Singular Definite Article Allomorphy

As noted above, there are two allomorphs of the masculine singular definite article, [l] and [le]. [l] surfaces postvocalically and prevocalically, as shown in (16), and [le] surfaces in groups of three consonants, as shown in (17). There is variation utterance initially before consonants and interconsonantally, as shown in (18).[12]

[12] An OT/LS analysis of the variation is discussed in Section 2.3.3.1 using Partially Ordered Constraints (POC; Anttila 1997, 2007).

(16) [l]

a. vla **l** o:t ʧɑ̃ ‘there is the other dog’

b. fɛ **l** brɑ̃kɑʒ ‘done the ‘branchage’’

c. vɛ: **l** gardɛ̃ ‘see the garden’

(17) [le]

a. kõt **le** prɔgrɛ: ‘against progress’

b. ʒ ɑ̃lvɛ:m **le** vrɛ ‘we took the seaweed’

c. ver **le** kjou 'towards the field'

(18) [l]/[le]

a. #**le** sjɛl ‘the sky’ (LeMaistre 1979)

b. #**l** sjɛ̃ ‘the man’

c. drɛð **le** tɑ̃ ‘hardly the time’

d. pɔ:s **l** tɑ̃ 'pass the time’

The distribution of the masculine singular definite article does not lend itself to an analysis based on a single underlying representation. To account for the variation of [le]/[l], an analysis using a single underlying representation must be one of either epenthesis (in the case of deriving [le] from /l/) or deletion (in the case of deriving [l] from /le/). It seems unlikely that this is a case of epenthesis.

According to Liddicoat (1994), the epenthetic vowel in Jèrriais is schwa (sometimes realized as [ɛ]), examples of which can be seen in (19) below. If the vowel were epenthetic it would be expected that the masculine singular definite article would occasionally be realized as [lə], as is the case with the first person singular/plural nominative pronoun *jé/j*, which is realized as [ʒ], [ʒɛ], or [ʒə]. This can be seen by comparing those in (19) with those in (20).

(19)	a.	dvãk **ʒə** t lɛ dmãd	‘Before I ask it of you’
	b.	**ʒə** n ni: pɑ	‘I do not deny’
	c.	**ʒə** n dvi:z ke l ʒèrjei	‘I speak only Jèrriais’
	d.	**ʒə** n avɛ:m pa d sɛ	‘we did not have any salt’
(20)	a.	**ʒɛ** n sei pa d ʧi	‘I do not know about what to talk’
	b.	ɛ pi **ʒɛ** l mɛti:m dãz ø̃ tĩn	‘and we put in in a tin’
	c.	**ʒɛ** travɑ:l sy la fɛrm	‘I work on the farm’
	d.	i fou k **ʒɛ** l fɛʃõ	‘we must do it’

The masculine singular definite article is realized as [lɛ] in some dialects (notably St. Ouennais). But [lɛ]/[le] is never realized as [lə] (compare (21a) and (21b)), which is possible evidence that the vowel in the masculine singular definite article is not epenthetic.

(21)	a.	ʒ ãlvɛ:m **lɛ** vrɛ	‘we took the seaweed’
	b.	ver **le** kjou	'towards the field'

It is not impossible, but it is unlikely that Jèrriais has more than one epenthetic vowel. Additional support comes from the fact that Sercquiais, a Norman language directly descended from Jèrriais, has epenthetic schwa (Liddicoat 1994).

Given the evidence that this is not a case of epenthesis, then the alternation between [le] and [l] would need to be treated as a case of deletion. It is difficult to motivate deletion of [e]. [l] occurs before vowels, consonants, and consonant clusters, as seen in (16) above. The occurrence of [l] prevocalically can be motivated as a case of hiatus avoidance, as is the case with the feminine singular definite article, but the occurrence of [l] instead of [le] before consonants is difficult to motivate through either markedness or faithfulness constraints. Faithfulness and markedness constraints would favor [le] as it is the faithful candidate to the underlying /le/ and it results in a less marked syllable structure than the use of [l]. In the comparative tableaux of [fɛ **l** brɑ̃kɑʒ] 'done the 'branchage'' below, the markedness constraint NoCoda and the faithfulness constraint Max-V all prefer [le] over the attested [l].

(22) Comparative Tableau Illustrating Harmonic Bounding of [l] by [le]

/fɛ **le** brɑ̃kɑʒ/	*Complex	NoCoda	Max-V
fɛ**l.** brɑ̃.kɑʒ ~ fɛ. **le.**brɑ̃.kɑʒ		L	L

When [l] occurs preconsonantally it must be syllabified into the preceding coda position creating a closed syllable.[13] This can be seen in (23). Attempting to syllabify the [l] in (23b) as part of the onset would also be marked as the sonority of the onset would fall then rise, which would run counter to Jèrriais onsets where sonority is either rising or a plateau. The use of [le] in (23c) would create two open syllables of the unmarked CV shape ([fɛ] and [le]), yet is unattested. Allomorphy in this case does not result in TETU.

(23) Masculine Allomorphy Creating Marked Syllable Structures

a. fɛ**l.**brɑ̃.kɑʒ 'done the 'branchage''

b. fɛ.**l**brɑ̃.kɑʒ

c. *fɛ.**le.**brɑ̃.kɑʒ

[13]According to Liddicoat (1994), Jèrriais lacks syllabic consonants.

Markedness constraints do not favor [l], except for economy constraints like *STRUCTURE (Prince & Smolensky 1993/2004; Zoll 1993, 1996). Economy constraints are a family of markedness constraints that penalize the presence of output structure. As the use of [le] always creates an additional syllable, an economy constraint such as *STRUCTURE$_{\sigma}$, would prefer [l]. But there are theoretical reasons for not using economy constraints. This family of constraints is discussed and rejected as a possible solution in Section 2.2.3 and will not be considered as a viable solution to the problem here. In the end, using /le/ as the underlying representation in an analysis of this allomorphy would be unsatisfactory.

As there is very weak evidence for treating this variation as purely phonological, adopting an LS-based approach is beneficial. It appears that additional constraints are required or possibly a new or modified framework needs to be considered. Regardless, an analysis based on a single underlying representation cannot account for the variation seen in the masculine singular definite article. This same inability is seen in attempting to analyze the plural definite article in Section 2.2.2 below. The use of LS, and its successful accounting of Jèrriais allomorphy, is illustrated in Section 2.3.3.

2.2.2 Classic OT Analysis of Plural Definite Article Allomorphy

The plural definite article has three allomorphs, [lei], [lz], and [leiz]. [lei] occurs preconsonantally while [leiz] and [lz] occur prevocalically. The distinguishing characteristic between the prevocalic allomorphs is that [leiz] occurs after closed syllables and [lz] occurs after open syllables, similar to the pattern seen with the masculine singular definite article.

(24) [lei] – _C(C)

a. vɑ̃dr **lei** patat 'sell the potatoes'

b. dɑ̃ **lei** kjo: 'in the fields'

(25) [lz] – V_V

a. parmi **lz** ɑ̃gjei 'among the English'

b. pa **lz** almɑ̃ 'by the Germans'

(26) [leiz] – C_V

a. oprei k **leiz** almɑ̃ 'after the Germans'

b. ʃ teim **leiz** ɑ̃gjei 'we were English'

As with the masculine singular definite article, the variation seen in the plural definite article presents issues for an analysis based on a single underlying representation. The three-way variation in the plural definite article is problematic in that analyses favor only one of the two prevocalic forms and an analysis that derives the correct prevocalic form requires a constraint ranking that is incompatible with other facts of the language in order to derive the preconsonantal form. Regardless of the choice of underlying form, an analysis fails unless it includes a theoretically questionable constraint, specifically that of *STRUCTURE$_{\sigma}$. Positing any one of the allomorphs as the underlying representation is problematic.

If /leiz/ is underlying, the ranking needed to derive [lei] and [leiz] results in [leiz] harmonically bounding [lz]. This is due to the fact that [lz] creates a more marked syllable structure than if [leiz] were to surface in the same context. Due to the lack of syllabic consonants, the allomorph [lz] cannot be its own syllable and must be syllabified into the adjacent syllables. Regardless of how the definite article is syllabified, the resulting structure will be more marked than if [leiz] were used. For example, in the phrase [parmi lz ɑ̃gjei] 'among the English', shown in (27), there are three possible syllabifications, all marked in some manner.

(27) Possible Syllabifications of [parmi **lz** ɑ̃gjei] 'among the English'

a. par.mi**l.z**ɑ̃.gjei

b. par.mi**lz.**ɑ̃.gjei

c. par.mi.**lz**ɑ̃.gjei

In (27a), the [l] is syllabified into the coda position of the preceding syllable, creating a closed syllable. In (27b), the entire allomorph is syllabified into the coda position of the preceding syllable creating a complex coda. In (27c) the entire allomorph is syllabified into the onset position of the following syllable, creating a complex onset. All of these configurations are more marked than if the other allomorph [leiz] had surfaced.

The use of [leiz] in this case would result in unmarked syllable structure, as shown in (28). In (28) using [leiz] would allow for syllabifying [z] into the following syllable, providing an onset to an onsetless syllable. The remaining segments could then form their own syllable of the unmarked shape CV. In addition, the preceding syllable would also be an open syllable.

(28) *par.mi.**lei.z**ɑ̃.gjei

From a markedness point of view, [leiz] is a more desirable allomorph than [lz]. Markedness constraints, such as NoCoda, will always prefer [leiz] to [lz]. If /leiz/ is underlying any faithfulness constraints will also prefer [leiz] over [lz]. This results in harmonic bounding of [lz] by [leiz], as demonstrated in the comparative tableau in

(29).[14]

(29) Comparative Tableau Illustrating Harmonic Bounding of [lz] by [leiz]

/parmi **leiz** ãgjei/	NOHIATUS	MAX-V	*COMPLEX	NOCODA
par.mi**l**.**z**ã.gjei ~ par.mi.**lei**.**z**ã.gjei		L		L

This could be resolved by positing /lz/ as underlying. In this case, DEP-V would replace MAX-V and would favor the winner, [lz]. This is shown in the comparative tableau in (30).

(30) Comparative Tableau with /lz/

/parmi **lz** ãgjei/	NOHIATUS	DEP-V	*COMPLEX	NOCODA	MAX-C
par.mi**l**.**z**ã.gjei ~ par.mi.**lei**.**z**ã.gjei		W		L	

While this resolves the issue of deriving [lz] and [leiz], it is problematic for deriving [lei]. Deriving [lei] from /lz/ requires NOCODA to outrank MAX-C, as shown in (31). This is a ranking that is incompatible with language-wide patterns and predicts that the language should lack codas, which is incorrect. Jèrriais allows codas, both simple and complex.[15]

(31) Comparative Tableau Illustrating Ranking Issues for [lei] with /lz/

/dã **lz** kjo:/	NOHIATUS	DEP-V	*COMPLEX	NOCODA	MAX-C
dã.**lei**.kjo: ~ dã.**leiz**.kjo:				W	L

---

[14] *COMPLEX is included as it is important in subsequent tableaux. Including it here shows that it cannot solve the harmonic bounding issues under discussion.

[15] This may be resolved by positing an indexed MAX-C constraint of MAX-C$_{(Determiner)}$ and ranking it above NOCODA. Unfortunately this then predicts that definite articles will never form codas, which is possibly incorrect given that the [l] of the allomorph [lz] is most likely syllabified into the coda as is the masculine singular definite article allomorph [l] in certain environments, e.g., V_C.

As using either /lz/ or /leiz/ as an underlying morpheme is problematic, /lei/ should be examined as a possible underlying form. Unfortunately, using /lei/, or /leiz/ for that matter, results in issues of harmonic bounding. As shown in (32), there is no constraint that favors [lz] over [leiz] resulting in the harmonic bounding of [lz].

(32) Comparative Tableau with /lei/

/parmi **lei** ãgjei/	NOHIATUS	*COMPLEX	MAX-V	NOCODA	DEP-C
par.mi**l**.**z**ã.gjei ~ par.mi.**lei**.**z**ã.gjei			L	L	

Regardless of the underlying representation, an analysis of the plural definite article is problematic; either harmonic bounding occurs or a constraint ranking that is inconsistent with the language is needed. In an attempt to salvage this analysis, another constraint should be considered in order to resolve the issue of harmonic bounding [lz] by [leiz] when /leiz/ is underlying.[16] An important difference between [leiz] and [lz] is that [leiz] contributes an additional syllable, while [lz] must be syllabified into adjacent codas and/or onsets. As instances of vowel syncope such as this result in smaller structures, they are sometimes treated as cases of economy (Hammond 1984; Hartkemeyer 2000; Kiparsky 1998; Kisseberth 1970a, 1970b; McCarthy 1986; Semiloff-Zelasko 1973; Taylor 1994; Tranel 1999). In order to account for these economy effects, a family of constraints known as *STRUCTURE constraints has been proposed (Prince & Smolensky 1993; Zoll 1993, 1996). *STRUCTURE can be specified so as to restrict certain types of structures, such as, in this case, syllables (Zoll 1996). This constraint, defined below in (33), can be used in this analysis to motivate the use of [lz] over [leiz].

[16] /lz/ is not considered as a ranking that is untenable with the facts of the language should not be used.

(33) *STRUCTURE$_\sigma$ – Assess one violation mark for each syllable in the output

Using *STRUCTURE$_\sigma$ along with NOHIATUS (to motivate consonant epenthesis prevocalically), *COMPLEX, DEP-C, and MAX-V, the ranking used in (34) yields the attested candidate.[17] High ranking NOHIATUS prevents [lei] from occurring before vowels, as in candidates (34a.i) and (34b.i). *COMPLEX penalizes [lz] for surfacing under conditions where it would create a complex coda, as in candidates (34a.iii) and (34c.iii). In (34b) *STRUCTURE$_\sigma$ penalizes [leiz] (candidate (34b.ii)) when it occurs intervocalically, a position where [lz] can occur without creating additional syllables.

(34) Tableaux Showing /leiz/ with Inclusion of *STRUCTURE$_\sigma$

a. [leiz]

/oprei k **leiz** almã/	NOHIATUS	*COMPLEX	*STRUC$_\sigma$	MAX-V	NOCODA	MAX-C
i. o.preik.**lei.**al.mã	*!		*****			*
☞ii. o.preik.**lei.z**al.mã			*****			
iii. o.prei**kl.z**al.mã		*!	****	*		

b. [lz]

/parmi **leiz** ãgjei/	NOHIATUS	*COMPLEX	*STRUC$_\sigma$	MAX-V	NOCODA	MAX-C
i. par.mi.**lei.**ã.gjei	*!		*****			*
ii. par.mi.**lei.z**ã.gjei			*****!			
☞iii. par.mi**l.z**ã.gjei			****	*		

[17] Some rankings in the tableaux in this dissertation were achieved using OTSoft 2.3.2 (Hayes et al. 2013). All rankings were confirmed via OTSoft 2.3.2.

c. [lei]

/dã **leiz** kjo:/	NoHiatus	*Complex	*Struc$_\sigma$	Max-V	NoCoda	Max-C
☞i. dã.**lei**.kjo:			***			*
ii. dã.**leiz**.kjo:			***		*!	
iii. dã**lz**.kjo:		*!	**			

While this analysis does work, there are issues associated with using *STRUCTURE$_\sigma$, as economy constraints have been called into question as being theoretically undesirable.

2.2.3 Arguments Against Economy Constraints

Analyses using economy constraints of this nature assume that the ranking of such constraints with regard to other markedness constraints and faithfulness constraints result in varying degrees of syncope. The unfortunate consequence of using *STRUCTURE constraints is that they militate against structure or segments regardless of markedness. It is counter-intuitive to have a constraint that penalizes unmarked content when, in fact, grammars often preserve unmarked structures. *STRUCTURE constraints prefer null outputs over unmarked structures. This can result in a scenario where null is always more harmonic than a given feature or structure. This is one of the primary reasons that Gouskova (2003) argues against economy constraints.[18]

[18] Gouskova (2003) is not the only paper to argue that economy effects derive from constraint interaction and not from economy constraints or external principles of economy. Grimshaw (2003) proposes that the preference for smaller structures over larger ones in syntax is due to constraint interaction and not some special principle of economy.

Gouskova (2003) argues that the presence of economy constraints within CON predicts that unmarked structures, features, or segments can be targets of deletion. For example, *STRUCTURE$_\sigma$ targets all syllables, regardless of their markedness. This is not typologically sound as targets of deletion are typically those things that are marked in some sense, i.e., voiced obstruents, codas, extra-metrical syllables. The fact that *STRUCTURE$_\sigma$ targets syllables that may be unmarked is inconsistent with the fact that markedness is relative.

Gouskova (2003) notes that *STRUCTURE constraints also vary from conventional markedness constraints in general as they are not freely rankable. When they are highly ranked, they result in unattested languages. For example, if *STRUCTURE constraints like *VOWEL or *OBSTRUENT are undominated the resultant language would lack vowels or obstruents, a dire prediction.[19] Thus *STRUCTURE constraints must be artificially restricted from appearing above certain constraints. This is counter to the general assumption in classic OT that constraints are freely rankable. If *STRUCTURE constraints were, somehow, relegated to the lower tiers of the constraint rankings, they would still have odd effects. Gouskova (2003) illustrates these effects by examining iambic syllables in Tepehuan. In iambic languages, both H and LH feet are well formed, though economically different. Economy constraints predict a preference for H over LH feet, which is unattested, as a single heavy syllable will only incur one violation of *STRUCTURE$_\sigma$ while a light plus a heavy iamb will incur two violations. Using *STRUCTURE$_\sigma$ in an analysis leads to unnecessary and unattested reduction, as illustrated in (35). In Tepehuan, the language illustrated here, the attested candidates are candidate

[19] In the analyses above in (34), *STRUCTURE$_\sigma$ outranks MAX-V. This ranking predicts that Jèrriais should have no vowels at all, which is obviously incorrect.

(35a.i) candidate (35b.i), and candidate (35c.iii), all of which have more syllables than the candidates preferred by *STRUCTURE$_\sigma$.

The metrical constraints in (35) do not prefer (H) iambs like [(ták)pa] in candidate (35a.iii) and candidate (35c.i) over (LH) iambs like [(ta.káa)pa] in candidate (35a.i). The only difference between the two is the number of syllables they contain, with *STRUCTURE$_\sigma$ preferring [(ták)pa]. In this case the grammar is deleting syllables purely for the sake of economy and not to create a better metrical structure. This pattern is unattested.

(35) Iambic syllable reduction syncope with *Structureσ (Gouskova 2003: 75)

a. [takáapa]

/takaapa/	SWP	NONFIN	*STRUC$_\sigma$	PARSE-σ	MAX-V
☜i. (ta.káa)pa			***!	*	
ii. (ta.káap)		*!	**		*
💣iii. (ták)pa			**	*	*

b. [táakapa]

/taakapa/	SWP	NONFIN	*STRUC$_\sigma$	PARSE-σ	MAX-V
☜i. (táa)ka.pa			***!	**	
💣ii. (táak)pa			**	*	*

c. [takápa]

/takapa/	SWP	NONFIN	*STRUC$_\sigma$	PARSE-σ	MAX-V
💣i. (ták)pa			**	*	*
ii. (ta.káp)		*!	**		*
☜iii. (ta.ká)pa	*!		***	*	

In addition for issues involving syllable weight, Gouskova (2003) notes that economy constraints do not appear to be well suited for cases of truncation. Children learning English often truncate words that are three syllables or longer and some that are two syllables as illustrated in (36).

(36) Truncation in Child Speech (Pater 1997 as cited in Gouskova 2003)

a. [wǽ:dit] 'rabbit'

b. [té:do] 'potato'

c. [wæ:f] 'giraffe'

d. [ga:beʤ] 'garbage'

In an analysis of this phenomenon using *STRUCTURE$_{\sigma}$, FOOTBIN must outrank *STRUCTURE$_{\sigma}$, which motivates the truncation, in order to prevent extreme shortening as illustrated in (37).

(37) Truncation with Economy Constraints (adapted from Gouskova 2003: 48)

a. wæf

giraffe	FTBIN	*STRUC$_{\sigma}$	MAX
☞i. (wæf)		*	*
ii. gi(wæf)		**!	

b. pómus

hippopotamus	FTBIN	*STRUC$_{\sigma}$	MAX
☞i. (pómus)		**	***
ii. (hippo)(pómus)		***!*	*
iii. (hippo)(póta)mus		***!**	

Unfortunately this predicts that all words should be truncated to CVC or CVV, as shown in (38). Here (38a) is preferred by the economy constraint while the attested form (38b), is penalized.

(38) Incorrect Prediction of Truncation by *STRUCTURE$_\sigma$ (Gouskova 2003: 48)

rabbit	FTBIN	*STRUC$_\sigma$	MAX
💣a. (wæb)		*	*
☜b. (wǽ:dit)		**!	

The shortening of *rabbit* does not occur as there is no metrical markedness constraint that motivates it. Truncation only occurs when the word contains an unfooted syllable, such as that in *giraffe*. As *rabbit* does not meet the criterion for truncation, it remains disyllabic.

Instead, by positing ALL-FT-LEFT and PARSE-σ over MAX, the attested forms are correctly predicted as shown in (39).

(39) Truncation Without Economy Constraints (Gouskova 2003: 48)

a. wǽ:dit

rabbit	ALL-FT-L	PARSE-σ	MAX
i. a. (wæb)			*!*
☞ii. b. (wǽ:dit)			

b. wæf

giraffe	ALL-FT-L	PARSE-σ	MAX
☞i. a. (wæf)			**
ii. b. gi(wæf)	**!	*	

c. pómus

hippopotamus	ALL-FT-L	PARSE-σ	MAX
☞i. (pómus)			******
ii. d. (hippo)(pómus)	**!		**
iii. e. (hippo)(póta)mus	**	*!	

In order to eliminate economy constraints and their detrimental effects, Gouskova (2003) proposes a theory of Lenient Constraint Alignment. Central to this idea is that of harmonic scales and the NOZERO Principle. Harmonic scales are scales on which linguistic entities are arranged in order of markedness. For example, on a harmonic scale for vowel nasality, oral vowels are more harmonic than nasal vowels. This harmony reflects the relative markedness of vowels; nasal vowels are more marked than oral vowels. Markedness constraints derive from these scales, with markedness constraints targeting items that are not the most harmonic. There is no markedness constraint that targets oral vowels, but there is a markedness constraint that targets nasal vowels. Constraints are then lenient in what they target – a constraint will not target the most harmonic item on a harmonic scale. Lenient Constraint Alignment is formalized below in (40).

(40) Lenient Constraint Alignment (Gouskova 2003: 3)

The Constraint Alignment of a harmonic scale $a_n \succ a_{n+1} \succ ... a_{m-1} \succ a_m$ is the constraint hierarchy $*A_m$ »$*A_{m-1}$... »$*A_{n+1}$.

Along with Lenient Constraint Alignment, Gouskova (2003) assumes that there is no harmonic scale where null is more harmonic than something. This is the NOZERO Principle (Gouskova 2003).

(41) NOZERO: no scale containing x implies that ∅ ≻ x (Gouskova 2003: 3)

With Lenient Constraint Alignment and the NOZERO Principle, constraints such as *VOWEL or *OBSTRUENT are absent as they imply that null is better than a vowel or obstruent, respectively. In this system there are only markedness constraints against features that are less harmonic, such as *$\text{VOWEL}_{\text{NASAL}}$, as nasal vowels are less harmonic than oral vowels. Gouskova's proposal precludes constraints such as *VOWEL, which is a welcomed prediction as there are no languages that lack vowels. In addition, her system then has no constraint that must be artificially excluded from the top of a constraint hierarchy. Instead economy effects fall out of the interaction of lenient constraints, making economy constraints and principles superfluous.

With the variation seen here, markedness and faithfulness constraints should be able to derive the alternation between [lz] and [leiz], without appealing to the dubious *$\text{STRUCTURE}_{\sigma}$. Yet, without it, the analysis fails. It appears the plural definite article cannot be accounted for using a single underlying representation and purely phonological constraints.

2.2.4 Summary

The masculine singular and plural definite articles cannot be satisfactorily analyzed using classic OT. The masculine singular definite article requires an analysis positing either epenthesis or deletion. An epenthesis analysis is problematic given the fact that the masculine singular definite article does not contain schwa, the epenthetic vowel of Jèrriais. A deletion analysis is difficult to motivate as deletion creates structures that are more marked in terms of sonority and phonotactics than if the faithful candidate were used. Analyzing the plural definite article using a single underlying representation is also problematic. The rankings attempted for the plural definite article, regardless of the underlying representation, results in harmonic bounding and/or the use of a ranking that is inconsistent with language wide patterns. Both analyses could be repaired by using an economy constraint, but these types of constraints are theoretically undesirable as laid out by Gouskova (2003). Overall, the use of a single underlying representation results in unsatisfying analyses of definite article variation.

The problems encountered here are identical to the ones encountered in HS, as is shown in Section 2.5.1. As harmonic bounding of one allomorph or another occurs, it does not represent a local minimum, to use McCarthy's terminology. Since the allomorph is not the local minimum, it cannot be a global minimum either, and so by HS's Harmonic Improvement requirement, those candidates are still harmonically bounded. Only the use of LS, either within OT, as is demonstrated in Section 2.3.3, or within HS, as is demonstrated in Chapter 3, can lead to a successful account of the allomorphic variation in Jèrriais.

2.3 Lexical Selection (LS)

Using a single underlying representation within classic OT to analyze Jèrriais allomorphy is unsuccessful. Instead, I posit that using multiple underlying representations better accounts for the Jèrriais data given above and for PCSA in general. This is one of the main premises of LS. According to Mascaró (2007) the idiosyncratic behavior of allomorphs can best be handled by positing the listing of allomorphs within the lexicon and allowing constraint interaction to account for the predictable conditions underwhich they surface. The following sections lay out the groundwork for LS, first addressing the relationship between allomorphs and then how the grammar chooses which of the available allomorphs surface in any given context.

2.3.1 Allomorphs in LS

LS has two main premises. One is the lexical lising of allomorphs, in other words mutliple underlying representations. The second is the ordering of allomorphs in the input when necessary. The lexical listing of allomorphs requires that each allomorph in the input stands in correspondence with its corresponding allomorph in the output. Allomorphic correspondence, as used in LS, is formalized in (42). Corresponding allomorphs are co-indexed in the input and the output.[20]

(42) a. The set of allomorphs of a morpheme M (m_1, m_2, … , m_n) can be represented as a partially ordered set.

b. For M = /m_1, m_2, … , m_n/, GEN (/m_1, m_2, … , m_n/) = GEN (m_1) $\cup$ GEN (m_2) … $\cup$ GEN (m_n). (Given a set of allomorphs, the candidate set is the collection of the individual candidate sets of each allomorph.)

c. Each candidate morph in b. stands in a correspondence relation to one of the underlying allomorphs (i.e., if $cand_1 \in$ GEN (/m_j/), then $cand_1 \Re m_j$).

d. Under input allomorphy, candidate faithfulness violations are computed with respect to the candidate's corresponding underlying allomorph.

(Mascaró 2007: 718)

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[20] Co-indices are not shown in this paper as they interfere with the marking of syllable boundaries, though correspondence is still assumed.

The appeal of lexically listed allomorphs is that constraints regarding faithfulness between each unique allomorph can hold, instead of between an allomorph and an underlying morpheme. In addition the idiosyncratic shape does not have to be accounted for through constraints on the output or through subcategorization frames.[21] This allows for the capturing of the generalization that allomorphy is not allophony. Allophony is predictable, phonologically conditioned, and accounted for through markedness and faithfulness constraints, the ranking of which holds language wide. Allomorphy can differ from allophony in that even though the distribution of each allomorph is phonologically predictable, the phonological shape of the allomorph is often idiosyncratic from the point of view of the larger linguistic system. This is illustrated above in Chapter 1 in the discussion on phonologically conditioned allomorphy.

With the lexical listing of allomorphs there is no need to posit that each allomorph is derived from a common underlying form through productive (or even unproductive) phonological processes. For Jèrriais there is no need to posit an otherwise unmotivated and puzzling deletion or epenthesis to derive the full range of allomorphs. As noted above, treating allomorphy as cases of epenthesis or deletion is problematic as the patterns displayed by allomorphs are not generalizable language-wide.

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[21] Some LS analyses (Bonet 2004, 2007, 2013; Bonet et al. 2007; Bradley & Smith 2011) use subcategorization and the constraint RESPECT, which ensures the lexical idiosyncrasies or subcategorizations are obeyed, assuming that certain words/stems/roots subcategorize for certain allomorphs. I do not assume subcategorization and instead allow allomorph insertion to fall out of constraint interaction.

2.3.2 Deriving Allomorphs in LS

The second premise of LS is the ordering of allomorphs when needed. In some cases of allomorph insertion, the distribution of each allomorph falls out naturally from the interaction of markedness constraints: for any given context, the allomorph that appears is the one that best satisfies the relevant markedness constraints. A classic example of this is the allomorphic variation of the English indefinite article *a/an*. The prevocalic surfacing of *an* can be analyzed as a case of TETU motivated variation (Mascaró 2004). Mascaró (2004) demonstrates that *a* occurs where *an* would violate NOCODA. This analysis is shown in (43) below. Here allomorphy results in the unmarked form surfacing, with *an* avoiding vowel hiatus and creating an onset in (43a) and *a* avoiding a coda that *an* would create in (43b).

(43) OT/LS Analysis of *a/an* Allomorphy in English (Mascaró 2004: 517)

a. *an* [ən]

{ə, ən} *impossible*	ONSET	NOCODA
☞i. ə.n *impossible*	*	
ii. ə.*impossible*	**!	

b. *a* [ə]

{ə, ən} *possible*	ONSET	NOCODA
i. ən. *possible*	*	*!
☞ii. ə.*possible*	*	

In cases of TETU motivated allomorphy, the allomorphs are simply listed in the input, as with *a* and *an*, as constraint interaction alone can dictate which allomorph will surface. This is desirable as the less information that is relegated to the lexicon, the better.

Sometimes, allomorph insertion is not governed on purely phonological criteria. In some cases, the use of a certain allomorph leads to a marked surface structure that could be avoided by the use of the other allomorph. This can be seen in the allomorphy of definite article suffixes in Haitian Creole. Haitian Creole has two definite article allomorphs, *-la* and *-a*, with *-la* surfacing after stems that end in a consonant or glide, as in (44a) through (44c), and *-a* surfacing after stems that end in a vowel, as in (44d), though hiatus is often resolved via glide insertion, as in (44e) and (44f) (Bonet et al. 2007).

(44) Haitian Creole Definite Article Allomorphy (Bonet et al. 2007: 908)

a.	/liv/	'book'	[livla]	'the book'
b.	/ʃat/	'cat'	[ʃatla]	'the cat'
c.	/bagaj/	'thing'	[bagajla]	'the thing'
d.	/papa/	'father'	[papaa]	'the father'
e.	/lapli/	'rain'	[laplija]	'the rain'
f.	/bato/	'boat'	[batowa]	'the boat'

This pattern results in the emergence of marked structure. The use of -*la* violates NoCoda, something the use of -*a* would avoid. The use of -*a* in (44d) violates a number of markedness constraints (e.g. NoHiatus, Onset) that the use of -*la* would avoid. Also, the use of -*a* in the other forms leads to glide epenthesis, thus violating Dep, which could be avoided by using -*la*. This pattern appears to go against the notion of TETU.

In cases where allomorphy does not the result in TETU, as in the Haitian Creole data above, constraint interaction will not always yield the appropriate allomorph in these cases. Faithfulness constraints only apply between each individual allomorph and markedness constraints will yield the candidate that results in the least marked structure, which, in the case of Haitian Creole and Jèrriais, is not the desired result. Mascaró (2007) argues that in cases of non-TETU allomorphy, there is actually competition between unmarked surface structure and a default allomorph. The allomorph that surfaces in these marked configurations is itself a default allomorph and ordering in the lexicon reflects this with the default allomorph being the dominant allomorph.

By ordering one allomorph above the other, patterns like those seen in Haitian Creole and Jèrriais can be accounted for. The pattern in Haitian Creole can be accounted for by ordering the allomorph *-a* over the allomorph *-la,* which in LS is represented as {*-a*> *-la*}. Ordering reflects the preference of the language to use an allomorph regardless of surface markedness. In this case, Haitian Creole prefers to use *-a* except in cases where its use will cause misalignment of the stem and syllable boundary (R-ALIGN-STEM-SYLL) (Bonet et al. 2007).[22] Just as the use of *-a* is penalized by R-ALIGN-STEM-SYLL, another constraint must penalize the use of the lower ordered allomorph in order to favor the use of *-a* in the appropriate configuration.

Mascaró (2007) uses the faithfulness constraint PRIORITY, defined in (45) below, to penalize the use of any allomorph that is not the dominant allomorph.

(45) PRIORITY – respect lexical priority (ordering) of allomorphs.

Given an input containing allomorphs m_1, m_2, … , m_n, and a candidate m_i', where m_i' is in correspondence with m_i, PRIORITY assigns as many violation

[22] See Bonet et al. (2007) for a complete analysis and discussion on the benefits of using ordered allomorphs to understand Haitian Creole definite article allomorphy.

marks as the depth of ordering between m_i and the highest dominating morph(s).

(Mascaró 2007: 726)

Among ordered allomorphs $\{m_1 > m_2 > m_3\}$, candidates containing the dominant allomorph, m_1, will incur no violations of PRIORITY, those containing allomorph m_2 will incur one violation, and those containing allomorph m_3 will incur two violations. Thus PRIORITY can capture the preference of a grammar to utilize the least marked allomorph regardless of surface form markedness.

PRIORITY, while necessary for ensuring respect of lexical priority, is not without issues. Specifically, Wolf (2008) notes that there is no upper limit on the number of ordered allomorphs and that PRIORITY must evaluate candidates gradiently. Gradience is an undesirable characteristic in a constraint (McCarthy 2003, 2004). Mascaró (2007) argues that PRIORITY is a categorical constraint arguing that the locus of the PRIORITY violation is that use of lower ordered allomorphs fails to satisfy the dominance relation entailed in the ordering.[23] But this issue can be avoided entirely by reinterpreting PRIORITY as a markedness constraint and positing that there is only ever a default/nondefault distinction among ordered allomorphs, i.e., $\{m_1 > m_2, m_3\}$. The revised PRIORITY constraint, which is given in (46), is argued for in Chapter 4 and adopted in all of the analyses here forward.

(46) PRIORITY (revised) – Assign one violation mark for use of any allomorph other than the default allomorph

The implementation of allomorph ordering and PRIORITY is demonstrated in the

[23] For his argument see footnote 13 of Mascaró (2007).

following sections in the analyses of Jèrriais masculine singular and plural definite articles.

2.3.3 OT/LS Analysis of Jèrriais Definite Article Allomorphy

In allomorphy the phonological shape of a given allomorph is often idiosyncratic yet the configurations in which it occurs are, in many cases, predictable. The idiosyncratic shape of the allomorph often results in unmarked forms, either in terms of syllable structure or segment features. Cases like this lend themselves to an output based analysis of constraint interaction. Yet, there are many instances of allomorphy where the resultant structure is unnecessarily marked, as seen with Haitian Creole above and Jèrriais.

Jèrriais masculine singular and plural definite articles exhibit allomorphic variation where the use of a given allomorph creates a more marked structure than if an alternative allomorph had been used. This can be seen below in (47). Here, the masculine singular definite article allomorph [l] surfaces even though its use results in a closed syllable, a marked syllable shape, and use of the other allomorph, [le], would create a an open syllable, which is unmarked.

(47)	a.	fɛ**l.**brɑ̃.kɑʒ	*fɛ.**le.**brɑ̃.kɑʒ	'done the 'branchage''
	b.	tu**l**.ma.tẽ	* tu.**le**.ma.tẽ	'all morning'
	c.	fei**l**.pɛ̃	*fei.**le**.pɛ̃	'make the bread'

In addition to cases where marked structures arise, the idiosyncratic shapes of the allomorphs cannot be explained by general, language-wide, phonological processes, as noted above.

I propose that LS can best account for the allomorphic variation exhibited by Jèrriais definite articles. LS has been used to analyze allomorphic variation in a variety of languages (Bonet 2004, 2007; Bonet et al. 2007; Bradley 2007; Bradley & Smith 2011; Kikuchi; Mascaró 1996a, 2004, 2007) and is suitable for analysis of the variation of Jèrriais definite articles.

2.3.3.1 OT/LS Analysis of Masculine Singular Definite Article Allomorphy

As noted above, there are two allomorphs for the masculine singular definite article, [le] and [l]. The distribution of these two allomorphs is predictable, with [le] occurring in sequences of three or more consonants (C_CC) and [l] occurring pre- and postvocalically. There is variation word initially before consonants and interconsonantally.

While the distribution of the allomorphs is predictable, the use of the allomorph [l] can create syllables that are more marked than if [le] was used, as was seen in (23). The allomorph [l] surfaces in most contexts, except where its use results in a series of four consonants. As [l] can occur before consonants and consonant clusters, the use of [l] must create either complex onsets that violate sonority sequencing or a coda. The use of [le], on the other hand, would create unmarked syllables in the same contexts, specifically open syllables with simplex onsets. The fact that allomorphic variation does not result in TETU can be explained by positing that [l] is the default allomorph for the masculine singular definite article. To reflect this, [l] is ordered over [le], {l>le}. As illustrated in the tableau in (48), faithfulness to PRIORITY is more important than abiding by markedness constraints, such as *NOCODA. Here the use of [le] results in a violation of the higher ranked PRIORITY constraint and [l] surfaces despite its more gratuitous violations of NOCODA.

(48) Tableau Showing [l] > [le]

/fɛ {l>le} brɑ̃kɑʒ/	PRIORITY	NOCODA
☞a. fɛl.brɑ̃.kɑʒ		**
b. fɛ.le.brɑ̃.kɑʒ	*!	*

PRIORITY cannot be the highest ranked constraint in Jèrriais or there would be no allomorphic variation.[24] Instead a constraint must outrank PRIORITY that favors the use of [le] in the appropriate configuration, specifically when the definite article surfaces amongst three or more consonants. The key difference in the use of [l] over [le] is that [l] surfaces in positions where it can be syllabified into adjacent syllables, either as a coda, in the case of V_C, or as an onset where it is prevocalic. In cases where the masculine singular definite article surfaces in the configuration of C_CC or CC_C it surfaces as [le]. This can be attributed to *COMPLEX, which penalizes the creation of an additional consonant cluster in (49b). Unfortunately *COMPLEX is only effective if [l] is syllabified into the coda in this case. If [l] is syllabified into the following onset, as in (49c), then *COMPLEX is only violated once, the same number of violations as incurred by the attested form in (49a). Appealing to SONORITYSEQUENCING is possible, as it would penalize either syllabification due to the unallowable sonority profile of [ml] and [lvr].

[24] PRIORITY does not have to be artificially restricted from appearing at the top of a hypothetical constraint ranking. In languages where no allomorph ordering is present it can be assumed that PRIORITY is high ranking, but never has an effect and would be indistinguishable from a language with no LS-governed allomorphy at all.

(49) a. ʒ ɑ̃l.vɛ:m.**le**.vrɛ ‘We took the seaweed’

b. * ʒɑ̃l.vɛ:m**l**.vrɛ

c. *ʒɑ̃l.vɛ:m.**l**vrɛ

If SONORITYSEQUENCING, and for that matter *COMPLEX, are used, then they must not be highly ranked as in Jèrriais complex onsets and codas are allowed, including those that violate SONORITYSEQUENCING, such as [lv] in (50a) and [pt] in (50b).

(50) a. mei l soulɛ s **lv**ɪ ‘but when the sun rose ...’

b. ø̃n **pt**it fɛ**rm** ‘a small farm’

c. **fr**œmɛ la pɔ**rt** s i vu: **pj**ɛ: ‘close the door please’

Also, Jèrriais allows for clusters of three consonants so it is also not the size of the created cluster in (49b) that is problematic.[25]

(51) a. l tɑ̃ ju**k ʒ s**ɔ̃m ‘nowadays (lit. the time where we are)’

b. j a dei pjɛ̀**r l l**ɔ̃ dei ry: ‘there are stones along the roads’

c. **ʒ kw**ɔ:tr li ‘I ran after him’

d. so:f ʃɛ̃ **k ʃ t**ɛ dɑ̃ lei butik ‘… except what was in the shops’

In order to prevent these clusters, and those present in the onsets of the data being analyzed, from being simplified, SONORITYSEQUENCING and *COMPLEX must be outranked by DEP and MAX. This is illustrated in the tableau in (52). Here candidate

[25] Onsets with three consonants are found in Jèrriais, but are limited to a consonant followed by a liquid and glide. Codas with three consonants are limited to rCr (Liddicoat 1994: 136, 138). While no rCR clusters are found in phrases in the Jèrriais data in Liddicoat (1994), there are examples in the Sercquiais data contained therein. Sercquiais, a language descended from Jèrriais, exhibits similar phonotactic patterns as Jèrriais.

(52d) employs epenthesis and candidate (52e) employs deletion of the coda [m] in order to resolve the SONORITYSEQUENCING violations entailed by using [l]. This results in violations of DEP and MAX respectively. Instead using [le], as in candidate (52c), is the preferred option.

(52) OT/LS Analysis of [ʒ ɑ̃lvɛ:m le vrɛ] 'we took the seaweed'

/ʒ ɑ̃lvɛ :m {l>le} vrɛ/	DEP	MAX	SONSEQ	*COMPLEX	PRIORITY	NOCODA
a. ʒɑ̃l.vɛ:m**l**.vrɛ			*!	**		**
b. ʒɑ̃l.vɛ:m.**l**vrɛ			*!	*		**
☞c. ʒɑ̃l.vɛ:m.**le**.vrɛ				*	*	**
d. ʒɑ̃l.vɛ:m.**l**ə.vrɛ	*!			*		**
e. ʒɑ̃l.vɛ:**l**.vrɛ		*!		*		**

Thus far the OT/LS analysis has been able to account for the regular distribution of the masculine singular definite article allomorphs. In order to account for the variation seen in the utterance initial position (53) and in the interconsonantal position (54), the analysis must make use of an additional framework to handle the variation.

(53) Variation in Utterance Initial Position

a.	**le** sjɛl	'the sky'	(LeMaistre 1979)
b.	**le** tija	'the lime'	(LeMaistre 1979)
c.	**l** sjɛ̃	'the man'	
d.	**l** tɑ̃	'the weather'	

(54) Variation in Interconsonantal Position

a.	lɛs **le** mɔn	'leave the world'	(LeMaistre 1979)
b.	drɛð **le** tɑ̃	'hardly the time'	
c.	par **l** tʌn	'by the ton'	

d. pɔːs l tɑ̃ 'pass the time'

The issue of how to handle variation and optionality is not new to OT.[26] There are several approaches to handling variation in OT. These include Stochastic OT (Boersma 1997, 1998), Partially Ordered Constraints (POC; proposed by Kiparsky (1993b) and developed by Anttila (1997, 2007) as a theory of partially ordered grammars), Floating Constraints (Nagy & Reynolds 1997; Reynolds 1994), and Markedness Suppression (Kaplan 2011b; Pescaru 2015). Of these, POC will be used to account for the Jèrriais variation. This is due to the fact that POC has been adapted to HS as Serial Variation (SV; Kimper 2008, 2011) and is used in the HS/LS analysis presented in the next chapter.

The main premise of POC is that instead of viewing a grammar as a total order on the constraints, the grammar is instead conceived of as "a partial order in a set of constraints" (Anttila 2007: 9). For a set of constraints in a language, some constraints have several possible rankings (constraints A, B, and C for illustration in (55)). Each of these rankings produces a multiple orders, which depending on how the partial order is resolved in an evaluation, produce different results. Variation at the surface is due to EVAL resolving the partial ranking into a total ranking, which it may do so differently on different evaluations.

(55)	a.	A»B»C	b.	A»C»B	c.	B»A»C
	d.	B»C»A	e.	C»B»A	f.	C»A»B

Now if some candidate (candidate 1) violates Constraints A and B and another

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[26] See Coetzee and Pater (2014) for a discussion on variation and optionality in phonological theory.

candidate (candidate 2) violates only Constraint C, then that candidate will win in two out of three tableaux as there are four out of six possible rankings in (55) that favor candidate 2 over candidate 1. Anttila (1997, 2007) argues that this percentage should be reflected in the actual variation seen in the data, but this is not always the case as is seen with interconsonantal variation below.

For the masculine singular definite article data, I propose a partial ordering of the constraints SONORITYSEQUENCING, *COMPLEX, and PRIORITY. PRIORITY favors the use of [l], while the other two constraints favor [le] in certain environments, specifically that of #_C and C_C. The possible rankings are shown in Table 2.3 along with the allomorph chosen by the ranking. In four out of the six rankings, [le] surfaces. This aligns with the rate seen in the data for the utterance initial position. In the environment of #_C, [le] occurs 69% of the time and [l] occurs 31%. Yet, interconsonantally, the ratio does not align as closely. In the environment of C_C [le] occurs 47% of the time while [l] occurs 53% of the time. This difference could be due to the disparity in the total number of tokens for each environment – there are 32 total tokens for the utterance

Table 2.3 Set of POC for Variation in the Masculine Singular Definite Article

Possible Rankings	**C_C**	**#_C**
SONORITYSEQUENCING » *COMPLEX » PRIORITY	le	le
SONORITYSEQUENCING » PRIORITY » *COMPLEX	le	le
*COMPLEX » SONORITYSEQUENCING » PRIORITY	le	le
*COMPLEX » PRIORITY » SONORITYSEQUENCING	le	le
PRIORITY » SONORITYSEQUENCING » *COMPLEX	l	l
PRIORITY » *COMPLEX » SONORITYSEQUENCING	l	l

initial position versus 19 for the interconsonantal position. With more tokens the pattern may shift more towards that predicted by the possible rankings.

Regardless, POC can account for the variation seen in the Jèrriais masculine singular definite article allomorphy. This is seen in the tableaux below. In the tableaux in (56a), the ranking of SONORITYSEQUENCING » *COMPLEX » PRIORITY results in [le] surfacing in the utterance initial position.

To derive [l] in this environment, PRIORITY must outrank both *SONORITYSEQUENCING and *COMPLEX. This is seen in (56b), where the ranking of PRIORITY » *COMPLEX » SONORITYSEQUENCING results in [l] utterance initially. Interconsonantal variation is handled the same way, as seen in (56c) and (56d).

(56) OT/LS Analyses of Variation in Jèrriais with POC[27]

a. [**le** sjɛl] 'the sky'

/{l>le} sjɛl/	SONSEQ	*COMPLEX	PRIORITY	NOCODA
a. lsjɛl	*!	*		*
☞b. le.sjɛl		*	*	*

b. [l sjɛ̃] 'the man'

/{l>le} sjɛ̃/	PRIORITY	*COMPLEX	SONSEQ	NOCODA
☞a. lsjɛ̃		*	*	
b. le.sjɛ̃	*!	*		

[27] DEP and MAX are not shown in these tableaux, but are assumed to be ranked as seen in the analysis in (52).

c. [lɛs **le** mɔn] ‘leave the world’

/lɛs {l>le} mɔn/	SONSEQ	PRIORITY	*COMPLEX	NOCODA
a. lɛsl.mɔn	*!		*	**
☞b. lɛs.le.mɔn		*		**

d. [par **l** tʌn] ‘by the ton’

/par {l>le} tʌn/	PRIORITY	SONSEQ	*COMPLEX	NOCODA
☞a. parl.tʌn		*	*	**
b. par.le.tʌn	*!			**

The allomorphic variation seen in the masculine singular definite article can be accounted for by using lexically listed allomorphs, ordering among the allomorphs, and POC (in the case of variation). Ordering is necessary as the most frequently occurring allomorph, [l], often results in marked syllable structure that could be avoided with use of the other allomorph, [le]. By positing that Jèrriais is avoiding a marked allomorph at the expense of marked syllable structure, the variation can be successfully analyzed.

2.3.3.2 OT/LS Analysis of Plural Definite Article Allomorphy

As discussed in Section 2.1.3, there are three allomorphs for the plural definite article, [lei], [lz], and [leiz]. Their distribution is predictable, with [lei] occurring before consonants, [lz] occurring intervocalically, and [leiz] prevocalically when the word preceding the article ends in a closed syllable.

The distribution of [lei] can be explained as TETU. [lei] is prohibited from occurring prevocalically, which can be argued to be an avoidance of vowel hiatus, a marked configuration. In addition, the syllable shape of [lei], CV, is unmarked. The surfacing of [lei] before consonants can then be handled in the output by positing

*COMPLEX and NOCODA. No strict ranking is needed at this point as none of the constraints prefer the losing candidates. As seen in (57) below, the allomorph [leiz] will always violate NOCODA when it surfaces before a word with an onset and [lz] will violate *COMPLEX, and possibly NOCODA, as the allomorph must be syllabified into the adjacent codas and/or onsets.[28]

(57) Tableau Showing [lei]

/pur {lei, lz, leiz} sjɛn/	*COMPLEX	NOCODA
☞a. pur.**lei**.sjɛn	*	**
b. pur**l**.**z**sjɛn	**!	**
c. pur.**leiz**.sjɛn	*	***!

In order to eliminate [lei] prevocalically, NOHIATUS must be included. This is seen in the tableau in (58) below. Here NOHIATUS penalizes the prevocalic use of [lei] in candidate (58a). Yet, while markedness constraint interaction can account for the surfacing or nonsurfacing of [lei], it cannot derive [lz], as seen in (58), where [leiz] incorrectly surfaces where [lz] should. Deriving [lz] requires additional machinery, specifically that of allomorph ordering and the associated PRIORITY constraint.

(58) Tableau Illustrating the Need for Allomorph Ordering

/parmi {lei, lz, leiz} ãgjei/	NOHIATUS	*COMPLEX	NOCODA
a. par.mi.**lei**.ã.gjei	*!	*	*
☜b. par.mi**l**.**z**ã.gjei		*	**!
💣c. par.mi.**lei**.**z**ã.gjei		*	*

In order to capture the fact that [lz] surfaces even in the context of creating

[28] Candidates with unsyllabified segments are not considered in this analysis.

marked structures, I propose an ordering of the allomorphs and the implementation of PRIORITY to privilege the use of [lz] over [leiz]. Given the resultant marked nature of configurations containing [lz], [lz] is ordered over [leiz]. As [lei] results without ordering, it is unordered in regard to [lz] and [leiz], and thus the use of [lei] does not violate PRIORITY. The crucial ordering is that of [lz] over [leiz], which is seen in (59).

(59) Ordering of Jèrriais Plural Definite Article Allomorphs: {lei, (lz > leiz)}

In (60a) the use of PRIORITY, in coordination with the ordering of allomorphs, can be seen distinguishing between [lz] and [leiz]. High ranking NOHIATUS will always rule out [lei] prevocalically. In (60a), the use of the lower ordered [leiz], candidate (60a.iii), fatally violates PRIORITY, which crucially allows for the surfacing of [lz] over [leiz]. Without PRIORITY [leiz] would surface due to [lz]'s violation of NOCODA. Tableau (60b) illustrates that PRIORITY has no effect when other candidates violate the higher ranking markedness constraints. Excluding [lei] from the ordering has no detrimental effect on deriving [lei], as seen in (60c).

(60) Tableaux Showing PRIORITY, with Ordering [lei], ([lz] > [leiz])

a. [lz]

/parmi {lei, (lz < leiz)} ãgjei/	NOHIATUS	*COMPLEX	PRIORITY	NOCODA
i. par.mi.**lei**.ã. gjei	*!	*		*
☞ii. par.mi**l**.**z**ã.gjei		*		**
iii. par.mi.**lei**.**z**ã.gjei		*	*!	*

b. [leiz]

/oprei k {lei, (lz < leiz)} almã/	NoHiatus	*Complex	Priority	NoCoda
i. o.preik.**lei**.al.mã	*!	*		**
ii. o.preik.**lz**al.mã		**!		**
☞iii. o.preik.**lei**.**z**al.mã		*	*	**

c. [lei]

/pur {lei, (lz < leiz)} sj̱ɛn/	NoHiatus	*Complex	Priority	NoCoda
☞i. pur.**lei**.sj̱ɛn		*		**
ii. pur**l**.**z**sjɛn		**!		**
iii. pur.**leiz**.sjɛn		*	*!	***

With the plural definite article, the ordering of [lz] over [leiz] is critical. While markedness constraints can account for when [leiz] or [lei] surfaces, PRIORITY is crucial in determining when [lz] surfaces. Outside the intervocalic context, [lz] will always violate *COMPLEX and [leiz] will crucially always have one more violation of NOCODA than [lei]. Using a combination of markedness constraints, allomorph ordering, and PRIORITY, the variation of plural definite article allomorphs can be accounted for.

2.3.3.3 Summary

While allomorphy in Jèrriais definite articles is predictable, it has presented issues for analyses based on a single underlying representation. Incorporating the idea of LS, in listing all allomorphs of a morpheme in the input and ordering allomorphs when necessary, creates a much more successful analysis, as seen with the masculine singular and plural definite articles. Ordering of allomorphs and the associated PRIORITY constraint can help explain the creation of marked structures by allomorphs when alternatives exist to create unmarked structures through other allomorphs, as demonstrated by the masculine singular and the plural definite article allomorphs. LS and PRIORITY allow for the accounting of the creation of marked structure without abandoning the idea of markedness altogether. In fact, PRIORITY introduces a new sort of markedness: marked (i.e., dispreferred) versus unmarked (preferred) allomorphs. It also raises awareness that grammars may be sensitive to the markedness of allomorphs and be willing to sacrifice syllable wellformedness to preserve an unmarked allomorph.

The necessity of LS is not limited to classic OT. In Section 2.5.1, I show that LS is also required within the HS framework. Despite the gradualness of HS, which should allow for more intricate manipulation of phonological processes, LS is needed in order to account for the allomorphic variation seen in Jèrriais. The fact that it is necessary in both frameworks indicates that LS captures an essential property of the phonology.

2.4 Alternative OT-Based Analyses

As mentioned in Section 1.1, there are other approaches to PCSA. These include LPM-OT, Indexed Constraint Theory, and Cophonology Theory. While viable approaches to allomorphy, these theories encounter issues in handling Jèrriais definite article allomorphy. Some of the issues are inherent to the theory, as will be seen with LPM-OT; others are the same issues that plague classic OT.

2.4.1 Lexical Phonology Morphology-OT (LPM-OT)

Primarily attributed to two major works by Kiparsky (Kiparsky 1982b, 1982c), Lexical Phonology is a theory of the relationship between morphology and phonology and seems well suited to analyzing allomorphy in Jèrriais.

The exact realization of Lexical Phonology varies by analysis but currently it is instantiated in a constraint based system termed Lexical Phonology Morphology-OT (LPM-OT) (Kiparsky 2000). LPM-OT is based on the premise that the phonology is stratified into two major components, the lexical and the postlexical. In the lexical component words are built through affixation and can move through several strata with unique constraints and rankings. This process repeats until all word level morphological and phonological processes have taken place. At this point, the word leaves the lexical component and enters the syntax. It is in the syntax that the word is joined with other words to form the phrase. Upon leaving the syntax, the phrase formed in the syntax enters the postlexical component and there it is subject to postlexical morphological and phonological processes. All phrase-level processes, those which apply across word boundaries, must occur in the postlexical phonology. A key difference between the lexical and postlexical component is that postlexical processes occur only once with one set of constraint rankings.

The allomorphy seen in Jèrriais definite articles is sensitive to adjacent words, including those that occur before the definite article. This is seen in the variation of the prevocalic allomorphs [lz] and [leiz], where [lz] occurs after words ending in open syllables and [leiz] occurs after words ending in closed syllables. If it is assumed that all items are independent words, all phonological processes that occur across word boundaries must be relegated to the postlexical level. This is unfortunate as it does not make use of the key benefit of LPM-OT, that of stratification and application of different sets of constraints and constraint rankings. To take advantage of the stratification, it would be necessary to assume that some of the items in the phrase are not words but affixes. Definite articles can be treated as affixes, but the item preceding the definite article cannot. In the examples herein the majority of the words preceding the definite article are verbs, as in (61a) and (61b), and prepositions, as in (61c) and (61d).

(61)	a.	ʒ **ɑ̃lvɛːm** le vrɛ	'we took the seaweed'
	b.	**vɛː** l gardɛ̃	'see the garden'
	c.	**parmi** lz ɑ̃gjei	'among the English'
	d.	**swɔtr** lei moto	'after the cars'

Lexical verbs are treated as independent lexical items that are combined with the definite article and noun via the syntax. Prepositions can be treated as either lexical words or as proclitics, but are unlikely to be considered affixes.[29] Like verbs nonaffixal prepositions are not accessible until the postlexical level as all processes that cross word or clitic boundaries are relegated to the postlexical level.

As some of the definite article allomorphs are conditioned by lexical items on both sides, allomorph insertion cannot occur until the postlexical stage, regardless of assumptions about clitics and affixes. If allomorphy happened at the postlexical level all

[29] Carstairs (1981) notes that affixes are affected by the grammatical features of a root or stem and are positioned relative to those roots or stems while clitics are positioned relative to adjacent syntactic material. Prepositions in Jèrriais are not affected by the grammatical features of root or stem, do not attach to roots or stems, and are positioned relative to the noun phrase they modify.

the relevant processes are happening in parallel, so the multiple stages of LPM-OT are useless and the theory has no advantage over classic OT. Furthermore, allomorph insertion should not be allowed to wait until the postlexical level as the allomorph must be selected at the lexical level.

The only possible process taking place at the lexical level would be definite article allomorphy. This would entail treating allomorphs as affixes, as treating them as words would require that allomorphy take place at the postlexical level, thus losing all of the advantages LPM-OT presents. Under this assumption, with definite article allomorphy there is only one morphological process taking place in the lexical phonology, that of affixation of the definite article.[30] It appears that the rest of the phrase is formed in the syntax and all phonological processes that occur across word boundaries take place in the postlexical component. This requires a single ranking of constraints and the LPM-OT derivation then faces the same issues a classic OT derivation faces: harmonic bounding, use of dubious constraints, and incorrect constraint rankings for the language.

2.4.2 Indexed Constraint Theory

Indexed Constraint Theory (Alderete 2001; Itô & Mester 1999; McCarthy & Prince 1995; Pater 2000, 2007, 2010; Smith 1997) holds that a strict constraint ranking applies to the language, but that these constraints can be riven and indexed to specific domains, such part of speech or morphological context. For example, DEP can be split and indexed to target a part of speech (DEP-C_{noun}) or a morphological category, such as

[30] Other morphological processes may be occurring, such as gender and number morphology, but that is tangential to the processes under investigation here.

an affix (DEP-C_{affix}) or a clitic (DEP-C_{clitic}) (Inkelas & Zoll 2007). This is done to reflect idiosyncrasies in a language. For example Pater (2007) examines morphological derived environment effects where a phonological process only applies in a morphologically derived environment. He proposes the use of a markedness constraint that is indexed to apply only to affixes. Pater (2007) notes that the process of precoronal laminalization in Chumash applies only across morpheme boundaries. Specifically, when a sibilant affix precedes a nonstrident coronal – /t/, /l/, or /n/ – it laminalizes. This is seen in the data in (62). When the sibilant and nonstrident coronal are tautomorphemic the process fails to apply, as in (63).

(62) Laminalization in Chumash (Pater 2007: 284)

a.	/s + nanʔ/	[ʃnanʔ]	‘he goes’
b.	/s + tepuʔ/	[ʃtepuʔ]	‘he gambles’
c.	/s + loxitʔ/	[ʃloxitʔ]	‘he surpasses me’

(63) Lack of Laminalization in Chumash (Pater 2007: 284)

a.	[stumunkun]	‘mistletoe’
b.	[slowʔ]	‘eagle’
c.	[wastuʔ]	‘pleat’

The constraint ranking needed for either makes the wrong prediction for the other. This is seen in (64) below. Here high ranked IDENT-DIST, which preserves the [distributed] feature, penalizes laminalization of the sibilant, and *sT penalizes lack of laminalization.[31] This ranking correctly predicts lack of laminalization for the

[31] *sT is an OCP constraint, which penalizes adjacent segments whose [anterior] specifications are identical.

monomorphemic forms in (64a), but incorrectly predicts it in bimorphemic forms in (64b).

(64) Chumash Constraint Ranking Paradox

a. [stumunkun] ‘mistletoe’

/stumunkun/	IDENT-DIST	*sT
a. ʃtumunkun	*!	
☞b. stumunkun		*

b. [ʃtepuʔ] ‘he gambles’

/s + tepuʔ/	IDENT-DIST	*sT
☜a. ʃtepuʔ	*!	
💣b. stepu		*

To resolve this issue, Pater (2007) proposes indexing *sT to affixes – $*sT_{AFF}$. By ranking the indexed constraint over the faithfulness constraint, laminalization occurs in the morphologically derived environments but is blocked in the cases of tautomorphemic clusters.

(65) Tableaux Illustrating the Use of Indexed Constraint (Pater 2007: 285)

a. [stumunkun] ‘mistletoe’

/stumunkun/	$*sT_{AFF}$	IDENT-DIST	*sT
a. ʃtumunkun		*!	
☞b. stumunkun			*

b. [ʃtepuʔ] ‘he gambles’

/s + tepuʔ/	$*sT_{AFF}$	IDENT-DIST	*sT
☜a. ʃtepuʔ		*	
💣b. stepu	*!		*

As shown above, the use of indexed constraints can resolve constraint ranking paradoxes in that an indexed constraint replicates a candidate's violation profile. But critically indexed constraints do not resolve harmonic bounding, which is the issue seen in deriving [lz] in Jèrriais. As shown above in (29) repeated here as (66), the use of [lz] is harmonically bounded by [leiz].

(66) Comparative Tableau Illustrating Harmonic Bounding of [lz] by [leiz]

/parmi **leiz** ãgjei/	NOHIATUS	MAX-V	*COMPLEX	NOCODA
par.mi**l.z**ã.gjei ~ par.mi.**lei.z**ã.gjei		L		L

An indexed constraint could hypothetically favor the use of [lz]. But adding a morpheme or morpheme-category-specific constraint does little good. Indexed constraints are typically indexed for a specific lexical category, such as noun, or a morphological category, such as affix. As [leiz] and [lz] are allomorphs of the same morpheme, they are identical morphologically, so a constraint targeting the morpheme would target both [lz] and [leiz] as would one targeting the lexical category. Instead what would be needed is a constraint indexed to a single lexical item, which is different from the usual conception of indexed constraints. Thus Indexed Constraint Theory does not provide a solution to the harmonic bounding issues involving Jèrriais definite article allomorphy.

2.4.3 Cophonology Theory

Another possible approach to Jèrriais definite article allomorphy is that of Cophonology Theory (Anttila 1997, 2002; Inkelas 1998b; Inkelas & Zoll 2005; Orgun 1996, 1998, 1999; Orgun & Inkelas 2002). Similar to Indexed Constraint Theory, Cophonology Theory proposes there are multiple constraint rankings within a language and that these are each unique phonologies that co-occur within the language. Each phonology is indexed to a component of the language, such as morphological category and constructions, lexical class, etc. (Inkelas & Zoll 2007). For example, Turkish resolves vowel hiatus in several ways (Inkelas & Zoll 2007). There are several vowel initial suffixes which when attached to a vowel final stem trigger glide insertion or vowel deletion to resolve hiatus. Which repair strategy is employed depends on the morphological category. In (67a) and (67b), a glide is inserted between the stem and the suffix, the future suffix and the adverb suffix, respectively. In (67c) vowel hiatus between the negation and progressive suffix is resolved through vowel deletion instead of glide insertion.

(67) Vowel Hiatus Resolution in Turkish (Inkelas & Zoll 2007: 135-36)

a.	/anl**a-a**ʤak/	[anl**aja**'ʤak]	‘understand-FUT’
b.	/anl**a-ɯ**nʤa/	[anl**a'jɯ**nʤa]	‘understand-ADV’
c.	/anla-m**a-ɯ**jor/	[an'lam**ɯ**jor]	‘understand-NEG-PROG’

To account for this variation in repair strategies, Inkelas and Zoll (2007) propose two different cophonologies, one for the progressive suffix (Cophonology A) and one for the future and adverb suffixes (Cophonology B). In both cophonologies NOHIATUS is ranked highly to motivate repair, but the ranking of DEP-C and MAX-V are different. This is seen in (68). With the progressive suffix (Cophonology A) in (68a), DEP-C outranks MAX-V, leading to vowel deletion. With the adverb suffix (Cophonology B) in (68b), MAX-V outranks DEP-C, leading to glide insertion.

(68) Cophonologies for Turkish Vowel Hiatus (Inkelas & Zoll 2007: 135-36)

a. Cophonology A

/anla-ɯjor/	NoHiatus	Dep-C	Max-V
a. anlaɯjor	*!		
b. anlajɯjor		*!	
☞c. anlɯjor			*

b. Cophonology B

/anla-ɯnʤa/	NoHiatus	Max-V	Dep-C
a. anlaɯnʤa	*!		
☞b. anlajɯnʤa			*
c. anlɯnʤa		*!	

Given the ability of Cophonology Theory to account for what would be a constraint ranking paradox, it can be possibly applied to Jèrriais definite article allomorphy. But, unfortunately, it encounters the same issue that Indexed Constraint Theory did – that of [lz] and [leiz] belonging to the same morphological category. Cophonologies are specific to a part of speech or morpheme and as the allomorphs are part of the same morpheme, the Cophonology could not be indexed for the morpheme or the part of speech. Instead, it would have to be specific to a single lexical item, which is not how cophonologies typically work. Like Indexed Constraint Theory, Cophonology Theory cannot remedy the harmonic bounding seen in Jèrriais.

2.4.4 Summary

Using a single underlying representation in OT, in classic OT, LPM-OT, Indexed Constraint Theory, or Cophonology Theory, cannot satisfactorily account for the allomorphic variation of Jèrriais definite articles. Classic OT encounters issues in motivating an analysis, in the case of the masculine singular definite article, and deriving the correct allomorph in the case of the plural definite article. The plural definite article analysis results in harmonic bounding, the use of a theoretically dubious constraint, or a constraint ranking that is inconsistent with facts of the language. A serial OT analysis, that of LPM-OT, encounters the exact same issues as the phrase level allomorphy cannot take advantage of the serial nature of the framework. Indexed Constraint Theory and Cophonology Theory are not suited to handling the variation as they rely on the variation being due to a difference in lexical or morphological category and the variation in Jèrriais is within the same lexical and morphological category. Using multiple underlying representations within classic OT, OT/LS, leads to a successful analysis of the Jèrriais definite article allomorphy. This is also true for serial frameworks, such HS. HS, as with classic OT, requires the use of LS to correctly derive the definite article allomorphy.

2.5 Harmonic Serialism (HS)

HS shares many of the same premises as classic OT. The GEN component of the grammar generates candidates that are then evaluated by a series of ranked constraints to determine the winning output. In classic OT GEN is capable of making multiple changes at once to the input to generate possible candidates with direct mapping between the underlying and surface forms. This is where HS diverges. Within HS, GEN is restricted to making a single change to an input to generate the output candidate. While the mapping between underlying representation and output is direct in classic OT, the mapping is indirect in HS. This restriction to one change per candidate per step is known as Gradualness, defined below in (69).

(69) Gradualness (McCarthy 2008a: 276)

If β is a member of the set GEN(α), then no more than one unfaithful operation is required to transform α into β.

Gradualness requires that the derivation proceed serially, as often the final winning output varies from the input in multiple ways. In a derivation, GEN generates a series of candidates that vary from the input by one change.[32] Each candidate is compared and after each evaluation the optimal candidate is selected by EVAL and serves as the input for the next GEN-EVAL loop. At each step the ranking of constraints remains the same, unlike LPM-OT.[33] Also, each change must result in monotonic harmonic improvement of the candidates. The GEN-EVAL loop continues until a point of convergence is reached. Convergence occurs when the optimal output is identical to the input. HS is illustrated below with a modified example from McCarthy (2008a) and Elfner (2009), which is repeated in other works on HS. The nonce language illustrated below derives [paʧi] from /pat/. There are two processes involved, [i] epenthesis and palatalization of [t] before high front vowels. As GEN is restricted to making only one change at a time to any given candidate, both epenthesis and palatalization cannot occur in the same step. In the first step in (70), GEN creates two candidates, one which is fully faithful and one which has [i] epenthesized.

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[32] The nature of gradualness and what counts as a change has been the subject of much of the HS literature cited herein and is discussed in detail in Section 3.1.

[33] Except in the case of SV (Serial Variation), where EVAL may choose from partially order constraint sets at different steps to derive variation.

(70) Step 1of [patʃi]

/pat/	NoCoda	*ti	Dep	Ident[ant]
a. pat	*!			
☞b. pati		*	*	

Gen always generates a faithful candidate as convergence occurs only when the input and output are identical. The candidate that undergoes epenthesis wins and becomes the input. In Step 2 Gen produces candidates that differ from [pati] by only one change.

(71) Step 2 of [patʃi]

pati	NoCoda	*ti	Dep	Ident[ant]
a. pati		*!		
☞b. patʃi				*

The constraint ranking prefers the candidate that has undergone palatalization and [patʃi] becomes the input for Step 3. In Step 3, the fully faithful candidate is preferred by the constraint ranking over a form that undergoes depalatalization. As the winning candidate and the input are identical the derivation converges.

(72) Step 3 of [patʃi] (Convergence)

patʃi	NoCoda	*ti	Dep	Ident[ant]
☞a. patʃi				
b. pati		*!		*

An important aspect of HS is the fact that within the framework the grammar cannot look ahead; a candidate cannot win at some earlier point in the derivation simply because it will result in a better candidate later in the derivation. HS is restricted to achieving the local minimum of harmonic improvement. HS seems very appealing in an analysis of Jèrriais as it allows gradual manipulation of the allomorphs but, as will be shown, it encounters the same problems that plague classic OT.

2.5.1 HS Analysis of Jèrriais Definite Article Allomorphy

It is the restriction of the local minimum and requirement of harmonic improvement that prove problematic for analyzing Jèrriais in HS. With the plural definite article, the allomorph [lz] creates a more marked configuration than [leiz]. Within HS, the derivation cannot move from an unmarked configuration to a more marked configuration as it is not harmonically improving.

HS encounters the same issues as classic OT. HS, like classic OT, uses a single underlying representation. The proper allomorph then must derived from an underlying morpheme. If /leiz/ is underlying, at some point in the HS derivation, GEN must delete a vowel to derive [lz] or delete a consonant to derive [lei]. Deriving [lz] from /leiz/ requires a step where [ei] is deleted and results in harmonic bounding, as shown in (73), where there is no constraint the prefers [lz] over [leiz]. Deriving [lei] from /leiz/ requires a constraint ranking that is incorrect for the language, as shown in (74). Here ranking NOCODA and *COMPLEX over Max-C incorrectly predicts that Jèrriais would delete all codas or simplify all complex clusters.

(73) Comparative Tableau Illustrating Harmonic Bounding of [lz] with /leiz/

/parmi **leiz** ãgjei/	NOHIATUS	MAX-V	*COMPLEX	NOCODA
par.mi**l.z**ã.gjei ~ par.mi.**lei**.ã.gjei	W			L
par.mi**l.z**ã.gjei ~ par.mi.**lei.z**ã.gjei		L		L

(74) Comparative Tableau Illustrating Ranking Issues for [lei] with /leiz/

/dã **leiz** kjo:/	NoHiatus	*Complex	NoCoda	Max-C
dã.**lei**.kjo: ~ dã.**leiz**.kjo:			W	L
dã.**lei**.kjo: ~ dã**lz**.kjo:		W	W	L

These are the same issues that plague classic OT – harmonic bounding and incorrect constraint rankings. It was not the case of too many operations happening at once that posed issues for classic OT, which if that were the case, HS would be able to handle the Jèrriais data. Instead the issues from classic OT are inherited by HS.

In HS, as with classic OT, repair of the analysis requires the use of a *Structure constraint, which is theoretically questionable, or requires a constraint ranking that is inconsistent with the language. While HS offers solutions for phonological phenomena that have been problematic for classic OT, it cannot correctly derive the variation seen in Jèrriais definite article allomorphy. Instead, HS requires the inclusion of LS.

Prior to adopting HS/LS it is important to explore alternatives within HS to account for allomorphy. Currently the only approach to allomorphy in HS is HS with Optimal Interleaving (HS/OI). Below I explore an HS/OI analysis of Jèrriais definite article allomorphy and show that it is unable to account for the variation.

2.5.2 Harmonic Serialism with Optimal Interleaving (HS/OI)

With OI Wolf (2008) modified Optimality Theory-Candidate Chains (McCarthy 2007) to accommodate morphological processes. OI was later adapted for HS by McCarthy (2009a, 2011, 2012). With HS/OI, the main architecture of HS remains in place – serial derivations, Gradualness, convergence, harmonic improvement, etc. The main difference is that morphological spell-out occurs within the phonological derivation. In this framework there is the interweaving of morphological and phonological processes and their associated constraints. HS/OI assumes a realizational theory (Stump 2001) of morphology. Within this theory morphology starts with the assembling of abstract morphemes into tree structures which have meaningful features at their terminals. These tree/feature structures are the input and are referred to as morphs by Wolf (2008). These morphs are spelled out throughout the derivation, with the spelling out of morphs being dictated by constraints. Constraints within the derivation include those that are phonological in nature and those that enforce conditions of morphological well-formedness. These latter constraints ensure that the various features, such as gender and number, are realized. The ranking of various morphological faithfulness constraints can be modified so that the order of spell-out of various morphemes is dictated. These constraints include general constraints such as MAX-MORPH, which motivates the spell-out of morphemes in general, and more specific constraints that target the spell-out of specific features, such as gender or definiteness.

2.5.2.1 HS/OI Analysis of Jèrriais Definite Article Allomorphy

With HS/OI it is not the underlying representation that needs to be determined, but instead the breakdown of morphemes and the determination of which features are present for a given morpheme. HS/OI is a promising approach to Jèrriais allomorphy due to the fact that by breaking down the definite articles and inserting them piece by piece the use of LS could be avoided. For example, the plural definite article [leiz] could be broken down by definiteness and number, with [l] being the phonological realization of the definite feature and [eiz] as the phonological realization of the plural feature. By associating different pieces of the definite article with different morphological atoms, the definite article can be inserted bit by bit instead of all at once, perhaps slowing things down so the grammar can control which of [l] and [eiz] actually surfaces. Unfortunately, this is unsuccessful.

In order to implement HS/OI, the definite articles need to be broken down by features. There are three features of concern: definiteness, number, and gender. All of the Jèrriais definite articles have [l] as a common denominator – [leiz]/[lei]/[lz] plural, [l]/[le] masculine singular, and [l]/ [la] feminine singular definite article. It can be argued then that [l] is the phonological realization of definiteness in this case. The realization of the plural feature is the phone [z] as it is the only segment present in the plural definite article that is absent in the singular definite article and it is also found in the plural indefinite article allomorph [deiz]. I also associate the diphthong [ei] with the plural feature.[34] Singular can be argued to be the unmarked form and that the phonological realization of the singular feature is null. The only remaining component that could be the realization of gender is that of the vowel. Feminine is realized by the phone [a] and masculine by [ɛ/e]. There is no gender distinction in the plural definite article.

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[34] Regardless of whether the vowel in the plural definite article is treated as part of the plural feature (either as a redundant plural feature or as part of the plural feature, i.e., the plural feature is [eiz]) or as part of the definite feature (i.e., the definite feature is spelled out by [lei]), it does not affect the results of the derivation below. I treat it as part of the definite feature.

(75) Morphological Breakdown of Jèrriais Definite Articles[35]

Plural	[eiz]
Singular	∅
Definite	[l]
Masculine	[e]
Feminine	[a]

The constraints involved include both morphological and phonological constraints. Of interest here is the MAX-M(F) constraint, defined in (76). This constraint favors the insertion of morphs in HS/OI and is specified for a specific feature. In addition to MAX-M(F), I assume a MAX-M(ROOT) constraint (Bonet 2013) to motivate the spell-out of roots. This is necessary as otherwise there would be no motivation to realize the root specifically.

(76) MAX-M(F) – For every instance φ of the feature F at the morpheme level, assign a violation-mark if there is not an instance φ' of F at the morph level, such that $\varphi\Re\varphi'$ (Wolf 2008: 26).

In Step 1 of the HS/OI derivation in (77) there are two optimal candidates. High ranking MAX-M(ROOT) motivates the spell-out of both the noun and the preposition. Whether the noun or the preposition is spelled out first has no effect on the derivation. I will assume that the noun is spelled out first as Wolf (2008) proposes that most deeply embedded item is spelled out first. Candidate (77a.ii) becomes the input for Step 2,

[35] The alternative to breaking down morphemes into individual phonological components of realization is to treat the morphemes as portmanteau morphemes where the features have merged onto a single phonological realization. In other words, the three features under discussion are faithfully realized by the whole morpheme and the morpheme cannot be broken down further. This would not make the best use of HS/OI's architecture and does not affect the outcome of the analysis and therefore is not considered.

wherein the spell-out of the preposition occurs. In Step 3, the definite feature is spelled out before the plural feature due to the ranking of MAX-M(DEF) over MAX-M(PL). Whether the feature definiteness or plural is spelled out first does not affect the overall outcome. In Step 4, the plural feature is spelled out. Unfortunately at this point the derivation cannot move any further; instead it converges on [leiz], which is less marked than the attested form [lz]. There is no markedness constraint that favors [lz] over [leiz] and the faithfulness constraints favor [leiz], which is exactly the problem that arises in classic OT and HS and motivates the inclusion of LS in both theories.

(77) OI Derivation of [parmi lz ãgjei] 'among the English'

a. Step 1 of [parmi lz ãgjei] 'among the English'

AMONG DEF-PL ENGLISH	MAX-M(ROOT)	MAX-M(DEF)	*COMPLEX	NOHIATUS	MAX-M(PL)	MAX
i. AMONG DEF-PL ENGLISH	**!	*			*	
☞ii. AMONG DEF-PL ã.gjei	*	*			*	
iii. AMONG l-PL ENGLISH	**!				*	
☞iv. par.mi DEF-PL ENGLISH	*	*			*	

b. Step 2 of [parmi lz ãgjei] 'among the English'

AMONG DEF-PL ã.gjei	MAX-M(ROOT)	MAX-M(DEF)	*COMPLEX	NOHIATUS	MAX-M(PL)	MAX
i. AMONG DEF-PL ã.gjei	*!	*			*	
☞ii. par.mi DEF-PL ã.gjei		*		*	*	
iii. AMONG l-PL ã.gjei	*!				*	

c. Step 3 of [parmi lz ãgjei] 'among the English'

par.mi DEF-PL ã.gjei	MAX-M(ROOT)	MAX-M(DEF)	*COMPLEX	NOHIATUS	MAX-M(PL)	MAX
i. par.mi DEF-PL ã.gjei		*!		*	*	
ii. par.mi DEF ei.zã.gjei		*!		*		
☞iii. par.mi l-PL ã.gjei					*	

d. Step 4 of [parmi lz ãgjei] 'among the English'

par.mi l-PL ã.gjei	MAX-M(ROOT)	MAX-M(DEF)	*COMPLEX	NOHIATUS	MAX-M(PL)	MAX
i. par.mi l-PL ã.gjei					*!	
☞ii. par.mi.lei.zã.gjei						

e. Step 5 of [parmi lz ãgjei] 'among the English' (Convergence)

par.mi lei zã.gjei	MAX-M(ROOT)	MAX-M(DEF)	*COMPLEX	NOHIATUS	MAX-M(PL)	MAX
💣a. par.mi.lei.zã.gjei						
☜b. par.mil.zã.gjei						*!

The strong suit of HS/OI is the ability to dictate the order of spell-out by ordering morpheme realization constraints and phonological constraints. Unfortunately, the local minimum that results from the serial derivation and the requirement for harmonic improvement prevent a derivation, regardless of constraint ranking, from proceeding from a less marked to a more marked configuration, as is required for the realization of [lz].

2.6 Conclusion

Using either classic OT or HS, both of which use single underlying representations, cannot adequately account for Jèrriais definite article allomorphy. Both encounter the same problem, that of harmonic bounding, constraint rankings that are incorrect for the language as a whole, or the use of the theoretically questionable *STRUCTURE$_\sigma$ constraint. Alternative approaches, such as LPM-OT, Indexed Constraint Theory, Cophonology Theory, and HS/OI, are also unable to account for the variation. Instead both OT and HS require the use of LS to adequately account for the variation. The incorporation of LS into HS is discussed in the next chapter, including details of the incorporation and analyses of Jèrriais allomorphy and allomorphy in other languages.

CHAPTER 3

HARMONIC SERIALISM WITH LEXICAL SELECTION (HS/LS)

As noted above, HS allows for more intricate manipulation of a derivation and thus is a possible solution to the issues posed by Jèrriais definite article allomorphy. Unfortunately, as shown in the previous chapter, when attempting to account for Jèrriais allomorphy, HS encounters the same issues that classic OT does. Specifically in the Jèrriais plural definite article allomorphy, the requirement for harmonic improvement and the associated local minimum do not allow a derivation to move past the unmarked allomorph, [leiz], to the marked allomorph, [lz]. If HS is to be an adequate theory of phonology, it must be able to account for the Jèrriais definite article allomorphy. To account for Jèrriais allomorphy, and PCSA in general, HS requires the inclusion of LS. But, importing LS into HS raises questions as to how exactly LS should function within a serial framework. Below I use evidence from other languages to probe how LS must work in HS. First I explore two possible approaches to the gradualness restriction on GEN – faithfulness-based change and operation-based change. The approach used has ramifications for allomorph insertion, specifically in that one approach, that of the faithfulness approach, precludes treating allomorph insertion as a step. After arguing for an operation-based approach to gradualness I present evidence and argumentation that allomorph insertion is a step in HS, thus providing additional support for the operation-based approach advocated in the previous section. I then examine how allomorph insertion is handled in HS/LS. With allomorph insertion comes the issue of preventing more than one allomorph being inserted into a single candidate, an issue Wolf (2008) raises regarding the suitability of LS. After addressing the questions raised by the inclusion of LS in HS, I propose a HS/LS analysis of Jèrriais definite article allomorphy. As some of the cases of allomorphy analyzed in this dissertation result in opacity, I conclude with a discussion on opacity.

3.1 Gradualness and Change in HS/LS

Prince and Smolensky (1993/2004) in discussing a possible serial version of OT (HS) propose that in HS, GEN is limited to "a certain single modification" of the candidates (Prince & Smolensky 1993/2004: 86). But what counts as a modification is a matter of debate. How change should be defined with respect to the operations GEN is limited to applying within HS has important empirical consequences for allomorph insertion. Currently under consideration within the HS literature are two possible approaches to the restrictions placed on GEN regarding changes to candidates, the faithfulness-based approach and the operation-based approach. In a faithfulness-based approach change is defined in terms of faithfulness constraints. This approach is advocated in McCarthy (2007) for OT-CC and for HS in McCarthy (2000, 2002, 2006, 2007, 2008a, 2008b, 2009a, 2009b, 2010a, 2010b, 2010c, 2011, 2012, 2016). The thrust of this approach is that GEN is limited to applying a single unfaithful operation, defined in (69), repeated as (78) below, and operations are intrinsically linked to faithfulness constraints (McCarthy 2008a).

(78) Gradualness (McCarthy 2008a: 276)

If β is a member of the set GEN(α), then no more than one unfaithful operation is required to transform α into β.

Under this definition, in generating output candidates from an input (α), GEN can only apply a single unfaithful operation, such as deleting a segment, to generate an output candidate (candidate β). Gradualness as defined here is limited in the number of unfaithful operations it can apply, but there is no limit placed on the number of faithful operations it can apply. Faithful operations are those, such as prosodic parsing operations, that lack faithfulness consequences. For example, syllabification does not violate any faithfulness constraints and is considered a faithful operation under this approach. In addition, the application of an unfaithful operation may result in the violation of more than one faithfulness constraint (McCarthy 2008a). Determining what is an unfaithful operation is a matter of asking whether the constraints under consideration assign violations. These constraints are limited in McCarthy (2007) to DEP, MAX, and IDENT[f]. With the application of an unfaithful operation, it is important to define what that operation can target. According to McCarthy (2000, 2002, 2006, 2009a, 2011) and McCarthy et al. (2012b) these operations can delete or insert a single autosegmental line or feature.

The reason for treating change this way is that it means certain operations, specifically faithful operations like syllabification, can happen simultaneously with other operations. According to McCarthy (2010a), if syllabification is treated as a step it can lead to derivations that are not harmonically improving. McCarthy (2010a) illustrates this issue with an analysis of glottal stop and high vowel epenthesis in word initial clusters in Classic Arabic. McCarthy (2010a) notes that the first segment in [fʕal] 'do' must be part of a complex onset in the first line of the harmonic improvement tableau in (79).

(79) Harmonic Improvement Tableau /fʕal/ → [ʔif.ʕal] 'do!' (McCarthy 2010a)

	*COMPLEX-ONSET	MAX	CONTIGUITY	ONSET	DEP
Faithful fʕal	*				
Step 1 if.ʕal				*	*
Step 2 ʔif.ʕal					*

But in order to improve harmony, [f] must be resyllabified as the coda in Step 1 concurrent with the epenthesis of [i]. If syllabification were a step then the derivation would not be harmonically improving, as shown in (80). Here, epenthesis precedes syllabification and the first step in the derivation is not harmonically improving. This derivation then is impossible in HS.

(80) No Harmonic Improvement (McCarthy 2010a)

	*COMPLEX-ONSET	MAX	CONTIGUITY	ONSET	DEP
Faithful fʕal	*				
Step 1 i.fʕal	*			*	*
Step 2 if.ʕal				*	
Step 3 ʔif.ʕal					*

In light of the above issues, McCarthy (2008b, 2010a) further argue that syllabification is not a step based on the fact that syllabification is noncontrastive. He notes that syllabification (and resyllabification) within tautomorphemic sequences is never contrastive, and thus there are no faithfulness constraints that govern syllabification. Instead syllabification is achieved through markedness constraints such as PARSE, ONSET, etc. If a process is not governed by a faithfulness constraint it cannot be a step, as faithfulness constraints formalize changes according to McCarthy (2000, 2002, 2006, 2007, 2008a, 2008b, 2009a, 2009b, 2010a, 2010b, 2010c, 2011, 2012, 2016).

Contrary to McCarthy (2010a), Elfner (2009) argues that syllabification is a step in HS and proposes an alternative to the faithfulness-based approach to gradualness. Elfner (2009) proposes an operation-based definition of gradualness that restricts GEN to the application of a single phonological operation, which may or may not violate a faithfulness constraint. Elfner (2009) demonstrates the operation-based approach to gradualness by using a set of syllabification operations (project syllable, adjunction, and core syllabification) along with other phonological operation to analyze stress epenthesis interactions in Egyptian Arabic, Dakota, and Levantine Arabic. In Egyptian Arabic, stress normally falls on penultimate syllables only when they are heavy yet when words end with an illicit consonant cluster, the stress falls on the light penultimate syllable, as shown in (81). In (81a), stress falls on the light penultimate syllable, compared to the normal stress pattern shown in (81b) where in a series of light syllables, the stress is antepenultimate.

(81)	a.	/katab-t/	(ka)(tá)(bi̲t)/*(ká)(ta)(bit)	‘I wrote’	
	b.	/katab-u/	(ká)(ta)(bu)	‘they wrote’	(Elfner 2009: 33)

To account for this variation, she shows that there is an intermediate step where the penultimate syllable is heavy when stress is assigned and then epenthesis occurs afterwards. Prior to epenthesis, this syllable is word final. As the derivation is quite long (eight steps), it is summarized below in a harmonic improvement summary tableau (adapted from Elfner (2009)). Here syllabification takes place in the first two steps, followed by adjunction of the remaining unsyllabified coda [t] and projection of a minor syllable to satisfy PARSESEGMENT. After syllabification, stress is assigned to the heavy penultimate syllable. This is followed by adjunction of the penultimate syllable's coda in order to satisfy NOCODA. After adjunction, epenthesis takes place followed by convergence. The general idea is that the intermediate syllabification creates a heavy syllable that accounts for the stress shift from the normal pattern of antepenultimate to penultimate and this syllable then undergoes resyllabification to create a light penultimate syllable with stress.

(82) Harmonic Improvement Summary Tableau for [katábit] 'I wrote' (Elfner 2009)

Original Input:	/katab-t/	PARSESEG	SYLL-HEAD	PARSEσ	DEP-V	NOCODA	FOOTBIN	**Operations**
Step 1 *is less harmonic than*	(ka)tabt	4		1				Core Syllabification
Step 2 *is less harmonic than*	(ka)(ta)bt	2		2				Core Syllabification
Step 3 *is less harmonic than*	(ka)(tab)t	1				1		Adjunction (Coda)
Step 4 *is less harmonic than*	(ka)(tab)(t)		1			1		Project Minor Syllable
Step 5 *is less harmonic than*	(ka)[(táb)](t)		1	2		1		Stress
Step 6 *is less harmonic than*	(ka)[(tá)](bt)		1	2			1	Adjunction
Step 7 *is less harmonic than*	(ka)[(tá)](bit)			2	1	1	1	Epenthesis
Step 8 *Convergence*	(ka)[(tá)](bit)			2		1	1	No Change

The operation-based approach to gradualness is adopted in this dissertation, as only this approach to gradualness adequately accommodates allomorph insertion. I propose that treating change as the application of processes is more desirable as it better accounts for allomorph insertion, which does not violate any obvious faithfulness constraints. This fact and other issues that arise when faithfulness-based approach is used to define gradualness support an operation-based view of gradualness.

One issue with using a faithfulness-based approach to gradualness is determining which faithfulness constraint is violated by allomorph insertion. In Section 3.2, allomorph insertion is shown to be a change, yet it does not violate any obvious faithfulness constraint, as shown in the analysis in (83). PRIORITY is only violated when the allomorphs are ordered and nondefault allomorphs are used; otherwise, PRIORITY is not violated and cannot be the faithfulness constraint governing allomorph insertion. With the plural definite article, [lz] is ordered over [leiz] and [lei] is unordered, as discussed in Section 2.3.3.2. The only allomorph that violates PRIORITY is that of [leiz], while use of [lz] and [lei] incurs no violations.

(83) Allomorph Insertion and PRIORITY

/parmi {lei, (lz > leiz)} ãgjei/	NOHIATUS	*COMPLEX	PRIORITY	NOCODA
a. par.mi.**lei**.ã.gjei	*!			
☞b. par.mi**l**.**z**ã.gjei				*
c. par.mi.**lei**.**z**ã.gjei			*!	

Altering PRIORITY to regulate insertion of any and all allomorphs is also problematic as it is not one of the traditional faithfulness constraint types usually used to regulate change. There is also the issue of treating PRIORITY as a faithfulness constraint. PRIORITY enforces faithfulness to allomorph ordering, not faithfulness between the input and output. Instead PRIORITY acts more like a markedness constraint penalizing the use of more marked, nondefault allomorphs. To this end, reinterpreting

PRIORITY as a markedness constraint is argued for in Chapter 4.

Of the three constraint types considered by McCarthy (2007), none appears to be violated by allomorph insertion. DEP, IDENT, and MAX do not lend themselves well to regulating allomorph insertion. DEP tracks segments or features, not whole allomorphs and if included as the constraint violated by allomorph insertion would require insertion of the allomorph segment by segment or an adaptation similar to those used in OI and HS/OI.[36] In addition, GEN is not inserting anything in the output that is not already in the input. IDENT is not violated by allomorph insertion, as the morphological features present in the input are retained when the allomorph is inserted. Another possibility outside the traditional three above is that of CONTIGUITY. What is critical for the purposes here is that this constraint is sensitive to the string of input segments and penalizes removing or inserting segments in the middle of a string, but not at the edges. This constraint is unlikely to be violated by allomorph insertion. In general, affixation, excluding infixation and affix shifting, does not violate CONTIGUITY as affixation occurs at the periphery of stems, regardless of whether allomorphy is involved. As allomorph insertion does not alter the contiguity of a string of output segments present in either the roots or the allomorphs, CONTIGUITY is vacuously satisfied.

The issue of traditional faithfulness constraints being ill-suited for regulating allomorph insertion is not limited to HS/LS. This same issue arises with any theory of morphology within phonology, such as HS/OI and OI. In many HS/OI and OI analyses allomorph insertion itself does not violate a listed faithfulness constraint. Instead the

[36] Wolf (2008) proposes MAX-MORPH and DEP-MORPH to regulate insertion of morphs, though this is problematic as morph insertion itself does not violate these constraints, as discussed below. And, in any case, nothing is being inserted that was not already present in the input.

locus of violation is the failure to spell-out a morph. This is illustrated in McCarthy's (2012) HS/OI analysis of Arabic, part of which is shown in (84).[37] In HS/OI, MAX-MORPH(FS) constraints are used to motivate the spell-out of abstract morphs. Failure to spell-out a morph with phonological material incurs a violation. In (84) the spelling out of the root BOOK with [kita:b] is motivated by MAX-M(ROOT). Failure to spell-out the root is penalized in candidates (84b) and (84c). But it is not the spelling out of the morph BOOK in the winning candidate in Step 1 that violates a faithfulness constraint, but instead it is the failure to spell-out the other morph NOM that is the locus for the violation of MAX-M in candidate (84a). While candidate (84a) is indeed unfaithful to the input, this is not recorded in the form of a violation of a faithfulness constraint.

(84) Step 1 of HS/OI Derivation of kita:b-NOM$]_{Utt}$ (McCarthy 2012)

BOOK-NOM$]_{Utt}$	MAX-M(ROOT)	HIP	MAX-M
☞a. kita:b-NOM$]_{Utt}$			*
b. BOOK-NOM$]_{Utt}$	*!		**
c. BOOK-u$]_{Utt}$	*!	*	*

Instead, conceiving of a change as an operation, whether phonological or morphological, appears to be most promising. I follow Elfner (2009) and others (Jesney 2011; Pater 2012; Torres-Tamarit 2012) in restricting GEN to a single phonological or morphological operation per change.[38] These operations include those that violate faithfulness constraints, e.g., epenthesis and deletion, and those that are not tied to a faithfulness constraint, such as foot assignment (Elfner 2009). I include among these

[37] See also examples 21 through 23 in McCarthy (2011).

[38] While assuming this approach, I do not show the syllabification operations in my tableaux, as syllabification is not the central aim of this dissertation.

operations morphological operations, specifically selection of an allomorph from a list in the input, that GEN can apply in generating output candidates. I have modified the gradualness requirement on GEN to include the application of a single morphological operation. It is important to include morphological operations as insertion of an allomorph is a step, as is shown below in Section 3.2.

(85) Gradualness Requirement on GEN (adapted from Elfner 2009: 5)

Candidates differ from their input only by the application of one phonological or morphological operation.

In addition to treating allomorph insertion as a single step, I treat other phonological processes as single steps, specifically deletion. Deletion in HS has been treated in two different manners, as either a one-step or two-step process. Dealing with the latter first, deletion as a two-step process is advocated in McCarthy (2000, 2008a, 2009a). McCarthy (2000) notes that in rule-based phonology rules were limited to deleting (or inserting) a single autosegmental association line and that this assumption could be carried over to HS where GEN could be restricted to altering a candidate by deleting or adding a single association line or feature. McCarthy (2008a) argues that in the case of word medial consonant cluster simplification, deletion must be a two-step process in order to account for the onset/coda asymmetries seen in simplification (i.e., in VC.CV contexts, codas are deleted and never onsets). McCarthy (2009a) adopts an autosegmental phonology (Goldsmith 1976) in HS view and proposes that same assumptions about GEN as those put forth in McCarthy (2000). The position that deletion is a two-step process is predicated upon the faithfulness-based approach to GEN advocated in McCarthy (2000, 2008a, 2008b).

Deletion as a one-step process is also common in HS analyses. Elfner (2009), which advocates an operation-based approach for the gradualness restriction place on GEN in HS, treats deletion as a one-step process that can apply to a candidate. Deletion of consonants and/or vowels (and/or epenthesis) is treated as a single step in McCarthy (2008b, 2010a, 2010b, 2010c). This is based on the conception of GEN as being able to make a single alteration to a segment, including deletion. As the nature of deletion in HS is not the topic of this dissertation, I treat deletion as a single step following Elfner (2009) and McCarthy (2008b, 2010a, 2010b, 2010c).[39]

In the next section I argue for the necessity of treating morphological operations as steps. I treat allomorph insertion as a morphological operation that counts as a change within HS regardless of whether there is a faithfulness constraint present in the derivation violated by the process. As is shown below in Section 3.2, allomorph insertion is a change in the mapping and is a morphological operation, and thus allomorph insertion is a change that GEN can make to a candidate.

3.2 Allomorph Insertion Is a Step

Given the importance of being a step in HS, it is important to determine whether allomorph insertion is a step. Data from Jèrriais masculine singular definite article allomorphy suggest that it is indeed a step. Certain processes in Jèrriais must precede allomorph insertion, so allomorph insertion cannot "come for free" the way McCarthy (2010a) argues syllabification can; it must be a full-fledged member of the set of ordered processes in a derivation.

[39] Treating deletion as a two-step process is amenable with my analyses also.

Complex clusters, both word finally and initially, are allowed in Jèrriais, yet, as Liddicoat (1994: 139) notes, word final "consonants clusters with final /r/ are, however, rare. The preference is for deletion of the final consonants in such groups." There are instances where Cr surfaces, as seen in (86).

(86) Word Final Cr Clusters

a.	ʒ avõz a vã**dr** lei patat	'We are going to have to sell the potatoes'
b.	ɛ i lɛ: lɛ:si:**dr** sã rɛ̃n a mɑ̃ʒi	'and they left them without anything to eat'
c.	j ɑ̃n a ka**tr**	'there are four'
d.	ʒ kwɔri swɔ**tr** li	'I ran after him'

But in certain instances simplification of the obstruent + [r] cluster occurs, as shown in (87). The triggering environment for Cr simplification appears to be that of complex onsets. When the cluster occurs before a complex onset, the cluster is simplified. However, simplification occurs when the environment is apparently absent, as shown in (88).

(87) /o:tr/ [ɛ œn o:**t** trɑ̃t] 'some [other] thirty'

(88) /kõ**tr**/ [kõ**t** le prɔgrɛ:] 'against progress'

This is due to an interaction between phonology and allomorph insertion. Prior to allomorph insertion, the environment for simplification is present. Assuming that the phonology is blind to the content of lexically listed allomorphs, the word following the Cr cluster begins with a complex onset, [pr]. This cluster triggers simplification. If allomorph insertion were to occur prior to simplification, then the environment for simplification would be removed because [le] would be chosen and simplification would not take place. This is illustrated in (89).

(89) Derivation Illustrating Ordering of Allomorph Insertion and Cr Simplification

a. Simplification > Insertion

UR:	/kõtr {l>le} prɔgrɛː/
Simplification:	kõt {l>le} prɔgrɛː
Insertion:	kõt le prɔgrɛː
SR:	[kõt le prɔgrɛː]

b. Insertion > Simplification

UR:	/kõtr {l>le} prɔgrɛː/
Insertion:	kõtr le prɔgrɛː
Simplification:	kõtr le prɔgrɛː
SR:	*[kõtr le prɔgrɛː]

Allomorph insertion cannot occur freely as constraints like REALIZE MORPHEME, the constraint motiving allomorph insertion, would trigger insertion on the first step of every derivation and cluster simplification would not have the chance to precede it. Under the faithfulness-based approach to gradualness, this would be problematic in that insertion does not violate any faithfulness constraint, and as operations are defined by their relationship to faithfulness constraints, allomorph insertion would need to come for free, just as syllabification does under this approach. Under the operation-based approach, allomorph insertion is an operation that can be ordered with respect to other operations, such as deletion in this case.[40]

[40] Further support for treating allomorph insertion as a step comes from the analysis of Catalan in Chapter 4.

3.3 Allomorph Insertion

In order to implement HS/LS, the way in which GEN handles allomorph insertion must be understood. As Gradualness is a hallmark of HS, it may be expected that GEN's access to allomorphs is restricted. The serial nature of HS affords two conceptions of allomorph insertion. One is where in a single step GEN creates a set of candidates wherein each allomorph is represented by a unique candidate. This I refer to as simultaneous insertion. The second is where GEN can only access one allomorph per step. Here, in the initial step, GEN creates a candidate set where only the default, or highest ordered, allomorph is represented. On the subsequent steps, GEN creates candidate sets where only the next listed allomorph is represented. This I refer to as serial insertion as GEN works its way serially, step-by-step, through the list of allomorphs. I will argue for a simultaneous insertion approach.

With either flavor of allomorph insertion, there must be a constraint that motivates the phonological realization of the morpheme's allomorphs. I assume allomorph insertion is motivated by the constraint REALIZE MORPHEME (REALIZE; Kurisu 2001). REALIZE is concerned with phonological realization of morpheme features and realization by an allomorph satisfies this constraint.

(90) REALIZE MORPHEME (Kurisu 2001: 39)

Let α be a morphological form, β be a morphosyntactic category, and $F(\alpha)$ be the phonological form from which $F(\alpha+\beta)$ is derived to express a morphosyntactic category β. Then REALIZE MORPHEME is satisfied with respect to β iff $F(\alpha+\beta)\neq F(\alpha)$ phonologically.

I also assume that REALIZE is sensitive to the features of the morpheme, such as definiteness, number, and gender, not the allomorph. Which allomorph surfaces is not of concern to REALIZE, it is only concerned with whether the features of the morpheme are present in the output. Thus REALIZE only penalizes candidates that lack some phonological realization of the morpheme. This is seen in the HS/LS derivation of a nonce language in (91). Suppose in this nonce language there is a suffix with two allomorphs, [-n] and [-ən]. In this language there is an OCP prohibition against adjacent nasals. The allomorph [-n] surfaces after stems ending in oral consonants and vowels. The use of [-n] after oral consonants is penalized by *COMPLEX, but occurs nevertheless indicating an ordering of {-n > -ən}.

In the sample derivation in (91) simultaneous insertion is used. Here the morpheme's entire lexical entry is present in the output in candidate (91a.i) and as the lexical entry is not the phonological realization of the morpheme's features it violates REALIZE. This is more in keeping with how REALIZE is formulated in Kurisu (2001). A candidate that fails to realize any allomorph violates REALIZE, while the candidate that realizes at least one allomorph satisfies the constraint.

(91) HS/LS Derivation Illustrating REALIZE Simultaneous Insertion

a. Step 1 of [bern]

/ber {-n > -ən}/	REALIZE	OCP-NASAL	PRIORITY	DEP	*COMPLEX
i. ber {-n > -ən}	*!				
☞ii. bern					*
iii. be.rən			*!		

b. Step 2 of [bern] (Convergence)

bern	REALIZE	OCP-NASAL	PRIORITY	DEP	*COMPLEX
☞i. bern					*
ii. be.rən				*!	

Whether using simultaneous or serial allomorph insertion, REALIZE penalizes failure to insert an allomorph. With simultaneous insertion, in one step GEN generates a set which includes candidates that contain each possible allomorph, i.e., one candidate with [-n] and one candidate with [-ən], as shown in (91). GEN also produces a candidate where neither of the allomorphs is realized. In the example here, both allomorphs are inserted in Step 1, where the candidate with [-ən] is eliminated due to a PRIORITY violation. The candidate with [-n], candidate (91a.ii), wins and allomorph insertion is successful. This candidate then becomes the input for Step 2, where the derivation converges.

With simultaneous insertion, once allomorph insertion succeeds, the lexical set of all allomorphs is replaced with the successful allomorph. This is seen (91) where allomorph insertion was successful in Step 1 and the input of Step 2 contains only the successful allomorph. The PRIORITY constraint is only active until allomorph insertion succeeds as the relationships PRIORITY evaluates are then lost.

In serial insertion, GEN is limited in its actions regarding the allomorphs. GEN can select the entire lexical entry, thus not spelling out an allomorph, or select only one allomorph for candidate generation. In the initial step, GEN can generate candidates using only the highest ordered allomorph. Once a candidate containing that allomorph emerges as optimal on some step, GEN can subsequently produce candidates with the second allomorph. If one those candidates emerges on a later step, GEN can then access the third allomorph (if there is one). GEN continues to move down the list of allomorphs, generating a set of candidates from each allomorph for each step, until the list has been exhausted or the derivation converges. In HS this monotonic movement down the list is a step. For the nonce example here, two steps are needed to access the second allomorph. The first, higher ordered allomorph [-n] is inserted in Step 1 and [-ən] in Step 2, as shown in (92). In Step 2, PRIORITY penalizes the candidate bearing the nondefault allomorph, [-ən]. As the input and the output in Step 2 are identical, the derivation converges.

(92) HS/LS Derivation Illustrating Serial Insertion

a. Step 1 of [bern]

/ber {-n>-ən}/	REALIZE	OCP-NASAL	PRIORITY	DEP	*COMPLEX
i. ber {-n>-ən}	*!				
☞ii. bern {-ən}					*

b. Step 2 of [bern] (Convergence)

bern {ən}	REALIZE	OCP-NASAL	PRIORITY	DEP	*COMPLEX
☞i. bern {ən}					*
ii. be.rən			*!		

Realizing the second allomorph is possible, but only if REALIZE outranks the relevant markedness constraints, which is OCP-NASAL. In (93), use of the first allomorph violates OCP-NASAL, but the other candidate violates the higher ranked REALIZE. In Step 2, the faithful candidate violates OCP-NASAL fatally and the candidate with the secondary allomorph wins and would be converged upon in the third step (not shown).

(93) HS/LS Derivation Illustrating Serial Insertion

a. Step 1 of [bern]

/tem {-n>-ən}/	REALIZE	OCP-NASAL	PRIORITY	DEP	*COMPLEX
i. tem {-n>-ən}	*!				
☞ii. temn {-ən}		*			*

b. Step 2 of [bern] (Convergence)

temn {ən}	REALIZE	OCP-NASAL	PRIORITY	DEP	*COMPLEX
i. temn {-ən}		*!			*
☞ii. tem.ən			*		

While similar, each flavor of allomorph insertion carries with it certain benefits and detriments. Simultaneous is the simpler of the two, primarily due to the fact that serial insertion requires additional steps that will be difficult, and, in some cases, impossible, to realize. First I examine the benefits of simultaneous insertion and then discuss the main issue that arises with serial insertion.

The benefit of simultaneous insertion over serial insertion can be seen by examining arbitrary preference among PCSA. This type of preference is seen in the Dyirbal ergative suffix (Dixon 1972) and is ideal for a HS/LS based analysis, as LS can capture a language's preference for certain allomorphs regardless of markedness. The Dyirbal ergative suffix has four allomorphs. Of concern here are the two allomorphs that occur after vowel final noun stems, [-ŋgu] and [-gu], with [-ŋgu] occurring after disyllabic stems, as in (94a), and [-gu] after stems with three or more syllables, as in (94b) (Dixon 1972: 42).

(94) Nominative Ergative

a.	jaɽa	jaɽa**ŋgu**	'man'
b.	jamani	jamani**gu**	'rainbow'

To account for this allomorphy within classic OT, several analyses have been put forth (Bonet 2004; Bye 2006; McCarthy & Prince 1993b; Paster 2005, 2006, 2015), most of which rely upon multiple underlying representations, with Bonet (2004) providing an OT/LS analysis with unordered allomorphs assuming a lexical specification (or subcategorization) on [-ŋgu] for disyllabic stems. Wolf (2008) proposes an OI analysis and accounts for this preference for [-ŋgu] by positing that it has a stronger expression of the ergative feature. HS/LS can account for the distribution without appealing to subcategorization or variation in feature strength. The preference can be analyzed as a competition between a desire to use the [-ŋgu] allomorph and the need for that allomorph to affix to the head foot of the word.

Dyirbal has trochaic stress and feet are constructed from the left with primary stress on the initial syllable and secondary stress on all nonfinal odd-numbered syllables (Dixon 1972; McCarthy & Prince 1993b). With disyllabic nouns, the head foot and the stem are the same. [-ŋgu] then attaches only to the head foot of a word.

(95) Syllabification and Footing in Dyirbal

a.	(já.ɽa)**ŋgu**	'man'
b.	(já.ma)(nì.**gu**)	'rainbow'

This restriction is captured by the constraint AFFIX-TO-FOOT (McCarthy & Prince 1993b; Wolf 2008). In order to capture this pattern, I modify Wolf's constraint, and propose (96).[41]

(96) AFFIX-TO-FOOT: The affix [-ŋgu] must coincide with the right edge of the head foot.

Dyirbal's preference for [-ŋgu] over [-gu] is captured by ordering [-ŋgu] over [-gu], which is enforced by PRIORITY.[42]

Under the simultaneous analysis, GEN inserts a unique allomorph into each candidate in a single step. This is demonstrated in (97) and (98). In Step 1of (97), GEN generates three candidates, one without realized allomorphs (candidate (97a.i)), one with the default allomorph (candidate (97a.ii)), and one with the secondary allomorph (candidate (97a.iii)). The candidate that fails to realize any allomorph fatally violates high ranked REALIZE. The use of [-gu] in candidate (97a.iii) violates PRIORITY, while candidate (97a.ii), though more marked in terms of syllable structure, wins. This candidate is converged upon in Step 2, as attempts to better satisfy the markedness constraints by deletion of the offending coda violates MAX.

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[41] Wolf assumes that it is [ŋ], not [-ŋgu], that must be affixed to the head foot.

[42] Constraints regarding parsing, footing, and stress assignment are not included, but assumed to hold at some prior point in the derivation, as footing must be present prior to allomorph insertion. This is another argument in support of the position that allomorph insertion is a step.

(97) HS/LS Derivation of [jaɽaŋgu] 'man.ERG' with Simultaneous Insertion

a. Step 1 of [jaɽaŋgu] 'man.ERG'

/jaɽa {-ŋgu>-gu}/	REALIZE	AFX-TO-FT	PRIORITY	MAX	NOCODA	*ŋ
i. (já.ɽa) {-ŋgu>-gu}	*!					
☞ii. (já.ɽa)**ŋgu**					*	*
iii. (já.ɽa)**gu**			*!			

b. Step 2 of [jaɽaŋgu] 'man.ERG' (Convergence)

(já.ɽa)**ŋgu**	REALIZE	AFX-TO-FT	PRIORITY	MAX	NOCODA	*ŋ
☞i. (já.ɽa)**ŋgu**					*	*
ii. (já.ɽa)**gu**				*!		

Deriving a candidate with the secondary allomorph [-gu] is also possible, as shown below in (98). The head foot in this case is inaccessible to the [-ŋgu] suffix.[43] AFFIX-TO-FOOT penalizes candidate (98a.ii.) and while [-gu] is dispreferred by PRIORITY, it is the optimal candidate in this case and is converged upon in the second step.

[43] I assume that CONTIGUITY prevents a candidate from surfacing in which [-ŋgu] infixes to the right of the head foot.

(98) HS/LS Derivation of [jamanigu] ‘rainbow.ERG’ with Simultaneous Insertion

a. Step 1 of [jamanigu] ‘rainbow.ERG’

/jamani {-ŋgu > -gu}/	REALIZE	AFX-TO-FT	PRIORITY	MAX	NOCODA	*ŋ
i. (já.ma)ni {-ŋgu > -gu}	*!					
ii. (já.ma)(nì**ŋ**.**gu**)		*!			*	*
☞iii. (já.ma)(nì.**gu**)			*			

b. Step 2 of [jamanigu] ‘rainbow.ERG’ (Convergence)

(já.ma)(nì.**gu**)	REALIZE	AFX-TO-FT	PRIORITY	MAX	NOCODA	*ŋ
☞i. (já.ma)(nì.**gu**)						

Simultaneous insertion handles the arbitrary preference well and allows for a harmonically improving derivation. Unlike simultaneous insertion, serial insertion encounters issues in attempting to derive the pattern. One is that serial insertion involves inserting an allomorph only to delete it later and the other is that it is impossible for the derivation to be harmonically improving when deriving the allomorph [-gu].

In the serial insertion derivation in (99), the default allomorph is inserted first and this candidate competes with the candidate that fails to realize any allomorphy. As failure to realize any allomorph is penalized by REALIZE, the candidate with the default allomorph wins and becomes the input for Step 2. At Step 2, there are three possible candidates, one that is fully faithful, one where the unrealized allomorph {[-gu]} is deleted, and one where the suffix [-ŋgu] has been deleted. The second violates NoCoda and the last violates Realize. The surface form then would have a floating unrealized allomorph. This does not seem desirable. To avoid this there would need to be the stipulation that unrealized allomorphs are deleted at convergence or a constraint against unrealized allomorphs. This whole issue can be avoided by using simultaneous allomorph insertion, which appears to be a more theoretically desirable implementation.

While this derivation is not problematic, as it can derive the attested form, it illustrates part of the issue with serial insertion, which is that it is impossible to derive [-gu].

(99) HS/LS Derivation of [jaɽaŋgu] 'man.ERG' with Serial Insertion

a. Step 1 of [jaɽaŋgu] 'man.ERG'

/jaɽa {-ŋgu>-gu}/	Realize	Afx-to-Ft	Priority	Max	NoCoda	*ŋ
i. (já.ɽa) {-ŋgu>-gu}	*!					
☞ii. (já.ɽa)**ŋgu** {-gu}					*	*

b. Step 2 of [jaɽaŋgu] 'man.ERG'

(já.ɽaŋ)gu {-gu}	Realize	Afx-to-Ft	Priority	Max	NoCoda	*ŋ
☞i. (já.ɽa)**ŋgu** {-gu}						*
ii. (já.ɽa)**ŋgu**					*!	*
iii. (já.ɽa){-gu}	*!					

In order for [-gu] to surface, it must replace [-ŋgu]. There are two possible approaches to this. One is to delete [-ŋgu] and then insert [-gu]. This a Duke-of-York gambit (Pullum 1976). Here GEN must generate a candidate that contains the stem, but not [-ŋgu], and the secondary allomorph [-gu]. As allomorph insertion is a step, as is shown in Section 3.2, it stands to reason that removing an allomorph is also plausibly a step, thus these are two different changes that must take place in two separate steps. Serial insertion now involves inserting an allomorph only to delete it later. Attempting to do this is impossible as it is not harmonically improving. The second possibility is treating the process of replacing [-ŋgu] with [-gu] as a single operation.

Under the first approach, where [-ŋgu] is inserted and then deleted, in the first step in the derivation in (100), GEN produces a candidate without realized allomorphs, (candidate (100a.i)), and one where it has inserted the first allomorph, [-ŋgu] (candidate (100a.ii)). Failing to realize the morpheme is penalized by REALIZE, and the candidate with [-ŋgu] wins becoming the input for Step 2. GEN generates a candidate that fails to realize an allomorph (candidate (100b.i)), one where [-ŋgu] has been deleted (candidate (100b.ii)), and one where [-gu] has been inserted alongside [-ŋgu] (candidate (100b.iii)). Candidate (100b.ii) must win if [-gu] is to be inserted in the third step, yet it is not harmonically improving to delete [-ŋgu] as this violates REALIZE. Yet, as with the derivation above, the fully faithful candidate wins, there is convergence and it is impossible to derive [-gu].

(100) Duke-of-York Approach to Serial Insertion in HS/LS

a. Step 1 of [jamanigu] ‘rainbow.ERG’

/jamani {-ŋgu>-gu}/	REALIZE	AFX-TO-FT	PRIORITY	MAX	NOCODA	*ŋ
i. (já.ma)ni. {-ŋgu>-gu}	*!					
☞ii. (já.ma)(nìŋ.**gu**) {-gu}		*			*	*

b. Step 2 of [jamanigu] ‘rainbow.ERG’ (Convergence)

(já.ma)(nìŋ.**gu**) -{gu}	REALIZE	AFX-TO-FT	PRIORITY	MAX	NOCODA	*ŋ
💣i. (já.ma)(nìŋ.**gu**) {-gu}		*			*	*
ii. (já.ma)nì {-gu}	*!			*	*	
iii. (já.ma)(nìŋ.**gu**)**gu**		*	*!		*	*

The second approach, where deletion of [-ŋgu] and insertion of [-gu] is treated as a single operation, the derivation can successfully converge on the attested form, [jamanigu] ‘rainbow (erg)’. This is seen in (101). The derivation proceeds as that above, but differs in Step 2. Here GEN applies the hypothetical replacement operation to generate candidate (101b.iii). While violating PRIORITY, the other candidates violate the higher ranked REALIZE and AFFIX-TO-FOOT. This results in candidate (101b.iii) winning and becoming the input for Step 3, where it is converged upon.

(101) Replacement Approach to Serial Insertion in HS/LS

a. Step 1 of [jamanigu] 'rainbow.ERG''

/jamani {-ŋgu>-gu}/	REALIZE	AFX-TO-FT	PRIORITY	MAX	NOCODA	*ŋ
i. (já.ma)ni. {-ŋgu>-gu}	*!					
☞ii. (já.ma)(nì**ŋ.gu**) {-gu}		*			*	*

b. Step 2 of [jamanigu] 'rainbow.ERG'

(já.ma)(nì**ŋ.gu**) {-gu}	REALIZE	AFX-TO-FT	PRIORITY	MAX	NOCODA	*ŋ
i. (já.ma)(nì**ŋ.gu**) {-gu}		*!			*	*
ii. (já.ma)nì {-gu}	*!			*		
☞iii. (já.ma)(nì.**gu**)			*	*		

c. Step 3 of [jamanigu] 'rainbow.ERG' (Convergence)

(já.ma)(nì.**gu**)	REALIZE	AFX-TO-FT	PRIORITY	MAX	NOCODA	*ŋ
☞i. (já.ma)(nì.**gu**)						

While the replacement approach can generate the correct surface form, it is problematic. It incurs violations of both MAX and DEP (though DEP is not shown) and is incongruous with the way HS functions. In HS, even under the operation-based approach, insertion and deletion of features and segments are treated as single, unique changes. Why would the insertion and deletion of an allomorph be treated differently?

Outside of the context of serial insertion involving the use of the nondefault allomorph, there is no evidence to treat allomorph insertion and deletion differently than that of segments and features. Yet, positing the replacement operation is the only way to make serial insertion work. Given that simultaneous insertion avoids this issue entirely and that the Duke-of-York gambit is an essential aspect of the serial insertion flavor without the replacement operation, simultaneous insertion is a more attractive choice.

3.4 Preventing Dual Allomorphs

As allomorph insertion is a change and simultaneous insertion is used in this dissertation, GEN must be restricted in some way from inserting both allomorphs into a single candidate. This is an issue raised by Wolf (2008) with regard to analyses using multiple underlying representations. In OT/LS, Mascaró (1996a: 189) prevents this by positing the following assumption:

(102) For a lexical item L such that $\phi = a, b$: EVAL (GEN (a, b)) $=$ EVAL (GEN (a) $\cup$ GEN (b))

When a morpheme has two underlying forms, i.e., allomorphs in the input, the output candidates are the union of the two candidate sets. This is the union of GEN(a), the candidates containing allomorph *a* in the input and GEN(b), the candidates containing allomorph *b* in the input. When a morpheme in the input has more than one underlying form, candidates differ not only in what surface form they contain but also in which underlying form they select for.

Wolf (2008) argues that it is theoretically undesirable to use an external principle to regulate allomorph insertion. But this issue only arises in classic OT where

GEN is allowed to apply as many operations and changes to a single candidate as needed. This formulation of GEN then allows for the insertion of an unlimited number of allomorphs; hypothetically GEN could apply the allomorph insertion operation infinitely. HS/LS, on the other hand, predicts that double allomorph insertion is impossible. This is due to the fact that in HS and HS/LS GEN is restricted to applying one operation per step per candidate. If the operation of allomorph insertion is limited to inserting one allomorph at a time per candidate, then the insertion of two allomorphs would need to occur in two separate steps. Deriving a candidate with two allomorphs would then need to be a harmonically improving series of steps. For this reason, HS/LS precludes the possibility of dual insertion where OT/LS would incorrectly predict it. Moroccan Arabic illustrates this point.

In Moroccan Arabic (Harrell 1962 as cited in Mascaró 2007) the 3rd person masculine singular pronominal clitic has two allomorphs, [-h] and [-u], with [-h] occurring after stems that end in a vowel and [-u] occurring after stems that end in a consonant as shown in (103).

(103)	a.	xt^{ʕ}a	'error'	b.	xt^{ʕ}a-h	'his error'
		ʃafu	'they saw'		ʃafu-h	'they saw him'
		ktab	'book'		ktab-u	'his book'
		menn	'from'		men-u	'from him'

Mascaró (2007) provides an OT/LS analysis of these data where the issue of double allomorphs in a single candidate is a possibility. It is only in the postvocalic position where a candidate with both allomorphs is a possible winner. Postconsonantally, the candidate that uses both allomorphs, such as candidate (104d), is less harmonic than the winning candidate, candidate (104c) as use of both allomorphs creates a coda, while the candidate using only the attested allomorph, candidate (104c), does not.[44]

(104) OT/LS Analysis of Moroccan Arabic Allomorphy – [ktabu] ‘his book’

/ktab {-h, -u}/	REALIZE	MAX	DEP	ONSET	NOCODA	*COMPLEX
a. ktab {-h, -u}	*!				*	*
b. ktabh					*!	**
☞c. kta.bu						*
d. ktab.hu					*!	*

Postvocalically, as in (105) below, use of both allomorphs is more harmonic than use of the attested allomorph. In (105), the use of both allomorphs in candidate (105d) satisfies NOCODA and ONSET, while the attested form in candidate (105b) violates NOCODA.

The situation illustrated in (105) does not arise in HS/LS. In HS/LS GEN is restricted to inserting a single allomorph in a single step in a single candidate.

(105) OT/LS Analysis of Moroccan Arabic Allomorphy – [xtˤa-h] ‘his error’

/xtˤa {-h, -u}/	REALIZE	MAX	DEP	ONSET	NOCODA	*COMPLEX
a. xtˤa {-h, -u}	*!					*
☜b. xtˤah					*!	*
c. xtˤa.u				*!		*
💣d. xtˤa.hu						*

In (106) the restriction on GEN eliminates the problematic candidate of *[xtˤahu] seen in

[44] A fifth candidate, that of [kta.bhu] is not included as it would lose due to more gratuitous violations of *COMPLEX and would not affect the outcome.

candidate (105d) above. Instead in Step 1 of (106), the candidate with a single allomorph, that of [h] in candidate (106a.ii), wins and becomes the input for Step 2. As allomorph insertion is successful in Step 1, the allomorph [u] is unavailable for insertion in Step 2. In Step 2, the derivation converges on the attested output. In Step 2, attempting to epenthesize [u], which is identical to the phonological realization of the other allomorph, is prevented by DEP.[45]

(106) HS/LS Analysis of Moroccan Arabic [-h]/[-u] Allomorphy – [xtˤa-h] 'his error'

a. Step 1 of [xtˤa-h] 'his error'

/xtˤa {-h, -u}/	REALIZE	MAX	DEP	ONSET	NOCODA	*COMPLEX
i. xtˤa {-h, -u}	*!					*
☞ii. xtˤah					*	*
iii. xtˤa.u				*!		*

b. Step 2 of [xtˤa-h] 'his error' (Convergence)

xtˤa.h	REALIZE	MAX	DEP	ONSET	NOCODA	*COMPLEX
i. xtˤa.hu			*!		*	*
☞ii. xtˤah						*

Relying on the restrictions built in to GEN in HS/LS results in the correct prediction that a surface form never has two allomorphs of the same morpheme.

There is an alternative to appealing to the architecture of HS that warrants examination. This is the inclusion of a constraint that prohibits two allomorphs from appearing in a single candidate. Xu (2007) proposes the constraint *FEATURE SPLIT to ban the realization of the same features on multiple phonological components.

[45] At this point GEN is unable to access the other allomorph as after successful allomorph insertion, which takes place in Step 1, the lexical listing of allomorphs is not transmitted to the next step.

(107) *FEATURE SPLIT : A morphosyntactic or semantic feature value cannot be realized by more than one phonological form (Xu 2007: 6).

Yet appealing to a constraint like this has unfounded typological predictions. Specifically, if *FEATURE SPLIT is low ranked, then this predicts a language where more than one allomorph of a morpheme surfaces. I know of no language that allows this. Instead allowing this restriction to fall-out of the architecture of the theory is more desirable and produces the desired effect.

3.5 HS/LS Analyses of Jèrriais Definite Article Allomorphy

With the details of HS/LS worked out, I now return to the analysis of Jèrriais allomorphy. The success of an OT/LS analysis of Jèrriais definite article allomorphy carries over into an HS/LS analysis. HS/LS provides a full account of the allomorphy, and when Serial Variation (SV; Kimper 2008, 2011) is incorporated, it also accounts for the variation in the system.

3.5.1 HS/LS Analysis of Plural Definite Article Allomorphy

The incorporation of LS into HS is similar to that of OT/LS. As with the implementation in OT, allomorphs are lexically listed and, if need be, ordered in the input. With ordered allomorphs, the default allomorph dominates other allomorphs and use of nondefault allomorphs is penalized by PRIORITY. PRIORITY is only in effect in the steps leading up to and including that step in which allomorph insertion has succeeded. As PRIORITY is only concerned with use of nondefault allomorphs, once the information is lost in subsequent inputs PRIORITY has nothing to evaluate.

As shown above, using a single underlying representation in HS cannot account for the variation seen in the plural definite article. Specifically, harmonic bounding of [lz] by [leiz] occurs, as illustrated in the comparative tableau in (29), repeated here as (108). And while it can be circumvented by using /lz/, this results in a problematic ranking when deriving [lei].

(108) Comparative Tableau Illustrating Harmonic Bounding of [lz] by [leiz]

/parmi **leiz** ãgjei/	NoHiatus	Max	*Complex	NoCoda
par.mi**l.z**ã.gjei ~ par.mi.**lei.z**ã.gjei		L		L

To account for the plural definite article, an ordering of allomorphs must be put forth. As discussed in the OT/LS analysis, [lei] does not need to be ordered relative to the other allomorphs and [lei] can be derived without Priority, as shown in (109).

(109) Tableau Illustrating Ordering as Unnecessary to Derive [lei]

/pur {lei, lz, leiz} sj̠ɛn/	*Complex	NoCoda
☞a. pur.**lei**.sj̠ɛn	*	**
b. pur**l.z**sjɛn	**!	**
c. pur.**leiz**.sjɛn	*	***!

But deriving [lz] requires ordering between [lz] and [leiz] and Priority. I propose the same ordering as seen in the OT/LS analysis in Section 2.3.3.2, that of [lz] over [leiz], with no ordering between [lei] and [lz] and [leiz] – {lei, (lz>leiz)}. This is done to reflect the language's preference to use the allomorph that creates a more marked surface form despite the fact that there is a less marked alternative available. In other words, Jèrriais prefers to use [lz] even though it creates a coda (or complex cluster depending on syllabification) when it could instead use [leiz] and avoid the coda (or the cluster). Allomorph ordering and PRIORITY solve the harmonic bounding problem, as illustrated in (110). Here PRIORITY favors the use of [lz].

(110) Comparative Tableau Illustrating the Need for PRIORITY

/parmi {lei, (lz > leiz)} ãgjei/	NOHIATUS	PRIORITY	*COMPLEX	NOCODA
par.mi**l.z**ã.gjei ~ par.mi.**lei.z**ã.gjei		W		L
par.mi**l.z**ã.gjei ~ par.mi.**lei**.ã.gjei	W			L

This ranking is fully illustrated in the derivation in (111). Insertion of the allomorphs occurs in Step 1, where PRIORITY makes the choice between [leiz] and [lz]. In Step 2, there is no information in the input regarding allomorph ordering, rendering PRIORITY moot in this and any possible subsequent steps. The derivation then converges in Step 2, where the attempt to "improve" the definite article through epenthesis is prevented by the violation of DEP. [lz] is derivable in (111) due to the fact that PRIORITY favors [lz] over [leiz]. This was not possible in (108) as there was no constraint that preferred [lz] over [leiz].

(111) HS/LS Derivation of [parmi lz ãgjei] 'among the English'

a. Step 1 of [parmi lz ãgjei] 'among the English'

/parmi {lei, (lz > leiz)} ãgjei/	REALIZE	NOHIATUS	DEP	*COMPLEX	PRIORITY	NOCODA
i. par.mi.**lei**.ã. gjei		*!				
ii. par.mi.**lei.z**ã. gjei					*!	
☞iii. par.mi**l.z**ã. gjei						*
iv. parmi {lei, (lz > leiz)} ãgjei	*!					

b. Step 2 [parmi lz ãgjei] 'among the English' (Convergence)

par.mi**l.z**ã.gjei	REALIZE	NOHIATUS	DEP	*COMPLEX	PRIORITY	NO CODA
☞i. par.mi**l.z**ã.gjei						*
ii. par.mi.**lei.z**ã.gjei			*!			

When a higher-ranking constraint, such *COMPLEX, is present [leiz] can be derived, as seen in (112). In the tableau in (112a), PRIORITY is not the determining constraint. NOHIATUS rules out [lei] and *COMPLEX eliminates [lz] as the definite article creates a complex coda.[46] In Step 2 [leiz] is converged upon as attempts to delete the [z] or [ei] violate NOHIATUS and *COMPLEX, respectively.

(112) HS/LS Derivation of [oprei k leiz almã]

a. Step 1 of [oprei k leiz almã] 'after the Germans'

/oprei k {lei, (lz>leiz)} almã/	REALIZE	NOHIATUS	DEP	*COMPLEX	PRIORITY	NOCODA
i. o.preik.**lei**.al.mã		*!				
☞ii. o.preik.**lei.z**al.mã					*	
iii. o.preik**l.z**al.mã				*!		
iv. oprei k {lei, (lz>leiz)} almã	*!					

[46]The definite article could be syllabified as a complex onset and the result would be the same.

b. Step 2 of [oprei k leiz almã] 'after the Germans' (Convergence)

o.preik.**lei.z**al.mã	REALIZE	NOHIATUS	DEP	*COMPLEX	PRIORITY	NOCODA
i. o.preik.**lei**.al.mã		*!				
☞ii. o.preik.**lei.z**al.mã						
iii. o.preik**l.z**al.mã				*!		

Using HS/LS also allows for an analysis of [lei] without resorting to the ranking of NOCODA over MAX-C, which was problematic in that it is inconsistent with the fact that Jèrriais allows codas, both word internally and finally. In the tableau in (113a), PRIORITY penalizes the use of [leiz], while *COMPLEX eliminates [lz] due the creation of a complex coda.[47] Failure to realize an allomorph is penalized by REALIZE. [lei] is then converged upon in Step 2.

(113) HS/LS Derivation of [dã lei kjo:] 'in the fields'

a. Step 1 of [dã lei kjo:] 'in the fields'

/dã {lei, (lz>leiz)} kjo:/	REALIZE	NOHIATUS	DEP	*COMPLEX	PRIORITY	NOCODA
☞i. dã.**lei**.kjo:						
ii. dã.**leiz**.kjo:					*!	*
iii. dã**lz**.kjo:				*!		*
iv. dã {(lz>leiz>), lei} kjo:	*!					

[47] Even if [lei] were included in the ordering and violated PRIORITY, it would win.

b. Step 2 of [dɑ̃ lei kjo:] 'in the fields' (Convergence)

dɑ̃.**lei**.kjo:	REALIZE	NOHIATUS	DEP	*COMPLEX	PRIORITY	NOCODA
☞i. dɑ̃.**lei**.kjo:						
ii. dɑ̃.**leiz**.kjo:			*!			*

As with OT, HS requires the inclusion of LS to account for allomorphic variation in the Jèrriais plural definite article. Ordering [lz] over [leiz] reflects the language's preference to use [lz] even when it creates marked surface forms. Using LS in HS and ordering allomorphs also accounts for the variation in the masculine singular definite article.

3.5.2 HS/LS Analysis of Masculine Singular Definite Article Allomorphy

As with the plural definite article allomorphy, that seen in the masculine singular definite article can be accounted for within HS by lexically listing and ordering the masculine singular definite article allomorphs. The allomorph [l] in any context other than prevocalic results in harmonic bounding by [le]. This can be seen in the comparative tableau in (114). Here regardless of how [l] is syllabified, the constraints all prefer the use of [leiz].

(114) Comparative Tableau Illustrating Harmonic Bounding of [l] by [le]

/vɛ: {l, le} gardẽ/	SONSEQ	*COMPLEX	NOCODA
vɛ:l.gar.dẽ ~ vɛ:.le.gar.dẽ			L
vɛ:.lgar.dẽ ~ vɛ:.le.gar.dẽ	L	L	

Ordering the allomorphs as {l > le} and using PRIORITY resolves this issue as seen in

(115). This ordering reflects the language's preference to use [l] even when it creates marked syllable structure. That allomorphic variation here does not result in TETU is explained by positing that [l] is the default masculine singular definite article allomorph.

(115) Comparative Tableau Illustrating the Need for PRIORITY

/vɛː {l>le} gardẽ/	PRIORITY	SONSEQ	*COMPLEX	NOCODA
vɛːl.gar.dẽ ~ vɛː.le.gar.dẽ	W			L
vɛː.lgar.dẽ ~ vɛː.le.gar.dẽ	W	L	L	

In the derivation in (116) below, candidate (116a.i) violates REALIZE, while use of the nondefault allomorph [le] in candidate (116a.iii) violates PRIORITY. Even though [l] results in a coda that the use of [le] would have avoided, it is the default allomorph and is preferred by the constraint ranking. Candidate (116a.ii) wins and becomes the input in Step 2 where it is converged upon. Attempts to repair the complex cluster through epenthesis are ruled out by highly ranking DEP.

(116) HS/LS Derivation of [fɛ l brɑ̃kaʒ] 'did the 'branchage''

a. Step 1 of [fɛ l brɑ̃kaʒ] 'did the 'branchage''

/fe {l>le} brɑ̃kaʒ/	DEP	REALIZE	PRIORITY	NOCODA
i. fe {l>le} brɑ̃kaʒ		*!		*
☞ii. fel.brɑ̃.kaʒ				**
iii. fe.le.brɑ̃.kaʒ			*!	*

b. Step 2 of [fɛ l brɑ̃kaʒ] 'did the 'branchage'' (Convergence)

fel.brɑ̃.kaʒ	DEP	REALIZE	PRIORITY	NOCODA
☞i. fel.brɑ̃.kaʒ				**
ii. fe.lə.brɑ̃.kaʒ	*!			*

The other allomorph [le] only surfaces where the use of [l] would create a series of four consonants, as shown in (117) below

(117) a. [fɛ **l** brɑ̃kaʒ] 'did the 'branchage''

b. [ʒ ɑ̃lvɛ:m **le** vrɛ] 'we took the seaweed'

In order to derive [le], the use of [l] must violate constraint(s) ranked higher than PRIORITY, which in this case is SONORITYSEQUENCING and *COMPLEX. This can be seen in the derivation in (118). As with [l] above, the candidate that fails to realize an allomorph is ruled out by REALIZE, due its failure to realize an allomorph. The use of the default allomorph [l] incurs violations of both SONORITYSEQUENCING (fatally) and *COMPLEX. SONORITYSEQUENCING is needed, as was noted above, due to the fact that if [l] is syllabified into the onset, it incurs the same number of violations as the use of [le], which would then lose due its violation of PRIORITY. Candidate (118a.iv), which uses [le], wins in Step 1 and is converged upon in Step 2.

(118) HS/LS Derivation of [ʒ ɑ̃lvɛ:m **le** vrɛ] 'we took the seaweed'

a. Step 1 of [ʒ ɑ̃lvɛ:m **le** vrɛ] 'we took the seaweed'

/ʒ ɑ̃lvɛ:m {l>le} vrɛ/	DEP	SONSEQ	REALIZE	MAX	*COMPLEX	PRIORITY	NOCODA
i. ʒɑ̃l.vɛ:m {l>le} vrɛ			*!		*		**
ii. ʒɑ̃l.vɛ:ml.vrɛ		*!			**		**
iii. ʒɑ̃l.vɛ:m.lvrɛ		*!			*		**
☞iv. ʒɑ̃l.vɛ:m.le.vrɛ					*	*	**

b. Step 2 of [ʒ ɑ̃lvɛ:m **le** vrɛ] ‘we took the seaweed’ (Convergence)

ʒɑ̃l.vɛ:m.le.vrɛ	DEP	SONSEQ	REALIZE	MAX	*COMPLEX	PRIORITY	NOCODA
☞i. ʒɑ̃l.vɛ:m.le.vrɛ					*		**
ii. ʒɑ̃l.vɛ:m.le.rɛ				*!			**

As noted above, allomorph insertion in Jèrriais must occur after simplification of word final Cr clusters. Complex clusters, both word finally and initially, are allowed in Jèrriais, yet there is a preference to simplify word final Cr clusters (Liddicoat 1994). In the derivation in (119) high ranking SONORITYSEQUENCING penalizes candidates that retain [tr] word finally. Attempting to use the default allomorph [l] in candidate (119a.ii) violates SONORITYSEQUENCING also. Candidate (119a.iv), which has simplified the cluster, wins. As SONORITYSEQUENCING outranks REALIZE it is better to simplify the consonant cluster first than it is to insert an allomorph thus obtaining the correct sequence of events. In Step 2, allomorph insertion succeeds. Use of the default allomorph is ruled out by *COMPLEX and SONORITYSEQUENCING. Use of the lower ranked allomorph, [le], is penalized by PRIORITY, but is the winner and is converged upon on Step 3.

(119) HS/LS Derivation of [kõt le prɔgrɛ:] ‘against progress’

a. Step 1 of [kõt le prɔgrɛ:] ‘against progress’

/kõtr {l>le} prɔgrɛ:/	DEP	SONSEQ	REALIZE	MAX	*COMPLEX	PRIORITY	NOCODA
i. kõtr. {l>le} prɔ.grɛ:		*!	*		***		*
ii. kõtr.lprɔ.grɛ:		*!			***		*
iii. kõtr.le.prɔ.grɛ:		*!			***	*	*
iv. kõt.rə {l>le} prɔ.grɛ:	*!						
☞v. kõt. {l>le} prɔ.grɛ:			*	*	**		

b. Step 2 of [kõt le prɔgrɛ:] ‘against progress’

kõt {l>le} prɔ.grɛ:	DEP	SONSEQ	REALIZE	MAX	*COMPLEX	PRIORITY	NOCODA
i. kõt {l>le} prɔ.grɛ:			*!		**		*
ii. kõtl.prɔ.grɛ:		*!			***		*
☞iii. kõt.le.prɔ.grɛ:					**	*	*

c. Step 3 of [kõt le prɔgrɛ:] ‘against progress’ (Convergence)

kõt.le.prɔgrɛ:	DEP	SONSEQ	REALIZE	MAX	*COMPLEX	PRIORITY	NOCODA
☞i. kõt.le.prɔ.grɛ:					**		
ii. kõt.le.rɔ.grɛ:				*!			

The ranking needed to derive the masculine singular definite article allomorphy is compatible with that needed to derive the plural definite article. The ranking is illustrated with a Hasse diagram in Figure 3.1.

The variation seen in certain environments for the masculine singular definite article can be accounted for by appealing to Serial Variation (SV; Kimper 2008, 2011). SV combines Partially Order Constraints (POC; Anttila 1997, 2007) with the serial nature of HS to allow for a different constraint ordering at each step in a derivation. This is due to the fact each step accesses EVAL and allows for a "new selection of a total order from the grammar's partial order" (Kimper 2008: 4). The partial ranking of concern here is that of SONORITYSEQUENCING, *COMPLEX, and PRIORITY. Thus far, the ordering has been SONORITYSEQUENCING » *COMPLEX » PRIORITY, as illustrated in the

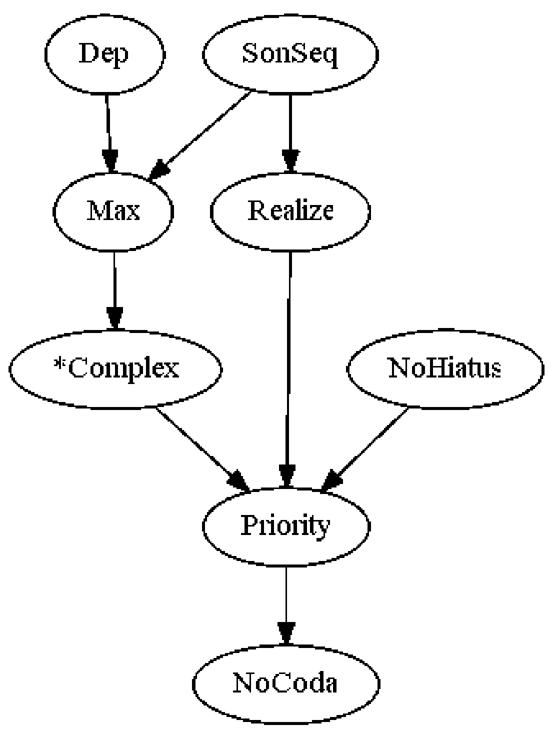

Figure 3.1 Jèrriais Definite Article Allomorphy Constraint Ranking Hasse Diagram[48]

[48] This Hasse diagram was generated using OTSoft2.3.2 (Hayes et al. 2013).

Hasse diagram in Figure 3.1. SONORITYSEQUENCING and *COMPLEX do not need to be ranked with respect to one another, but both must outrank PRIORITY to derive the allomorphy seen so far.

The ordering of SONORITYSEQUENCING, *COMPLEX » PRIORITY will result in [le] surfacing the environment of C_C, as shown in (120) Any ordering where these two markedness constraints outrank PRIORITY will result in [le] while ordering of PRIORITY over the markedness constraints will result in [l].

(120) HS/LS Derivation with SV

a. Step 1 of [lɛs le mɔn] 'leave the world'

/lɛs {l>le} mɔn/	DEP	SONSEQ	REALIZE	MAX	*COMPLEX	PRIORITY	NOCODA
i. lɛs {l>le} mɔn			*!				**
ii. lɛsl.mɔn		*!			*		**
☞iii. lɛs.le.mɔn						*	**

b. Step 2 of [lɛs le mɔn] 'leave the world' (Convergence)

lɛs.le.mɔn	DEP	SONSEQ	REALIZE	MAX	*COMPLEX	PRIORITY	NOCODA
☞i. lɛs.le.mɔn							**
ii. lɛs.le.mɔ.nə	*!						*

[le] is the form predicted by the current instantiation of the ranking. In order to derive variation that occurs in this position, EVAL must produce a ranking where PRIORITY outranks SONORITYSEQUENCING and *COMPLEX. In the first step of the HS/LS

with SV analysis in (121), EVAL produces a ranking of PRIORITY » SONORITYSEQUENCING, *COMPLEX. This results in candidate (121a.iii), which contains [l], to win at Step 1. It becomes the input for Step 2. Here EVAL could produce a different ranking of the three constraints and it would not affect the final surface form as attempts to repair the SONORITYSEQUENCING and *COMPLEX issues violate DEP or MAX, which are not part of the partially ordered constraint set.

(121) HS/LS Derivation with SV

a. Step 1 of [pɔ:s l tã] 'pass the time'

/pɔ:s {l>le} tã/	DEP	REALIZE	MAX	PRIORITY	SONSEQ	*COMPLEX	NOCODA
i. pɔ:s {l>le} tã		*!					*
ii. pɔ:s.le.tã				*!			
☞iii. pɔ:s.ltã					*	*	

b. Step 2 of [pɔ:s l tã] 'pass the time' (Convergence)

pɔ:s.ltã	DEP	REALIZE	MAX	PRIORITY	SONSEQ	*COMPLEX	NOCODA
☞i. pɔ:s.ltã					*	*	
ii. pɔ:s.lə.tã	*!						
iii. pɔ:s.tã			*!				

This same approach can account for the variation seen in the utterance initial position also. SV is most robustly demonstrated by an analysis requiring several steps, such as that of [kõt l fo:sɛ] 'by the hedgerow', which requires Cr simplification prior to allomorph insertion. In the HS/LS with SV derivation below, SONORITYSEQUENCING penalizes candidates that fail to simplify the Cr cluster, as in candidates (122a.i), (122a.iii), and (122a.iv). Candidate (122a.ii) simplifies forgoing allomorph realization and is the input for Step 2. Here EVAL can choose from several POC sets. To derive [kõt l fosɛ:], the POC set of PRIORITY » SONORITYSEQUENCING » *COMPLEX is needed. This ordering allows for the surfacing of [l] interconsonantally instead of [le], as would happen if SONORITYSEQUENCING or *COMPLEX outranked PRIORITY. The derivation converges in Step 3 using the ranking from Step 2.

(122) HS/LS with SV Analysis of [kõt l fosɛ:] 'by the hedgerow'

a. Step 1 of [kõt l fosɛ:] 'by the hedgerow'

kõtr {l>le} fosɛ:	DEP	SONSEQ	REALIZE	MAX	*COMPLEX	PRIORITY	NOCODA
i. kõtr {l>le} fo.sɛ:		*!	*		*		*
☞ii. kõt {l>le} fo.sɛ:			*				*
iii. kõtr.lfo.sɛ:		*!*			**		*
iv. kõtr.le.fosɛ:		*!					*

b. Step 2 of [kõt l fosɛ:] 'by the hedgerow'

kõt {l>le} fo.sɛ:	DEP	REALIZE	MAX	PRIORITY	SONSEQ	*COMPLEX	NOCODA
i. kõt {l>le} fo.sɛ:		*!					*
☞ii. kõtl.fo.sɛ:					*	*	*
iii. kõt.le.fo.sɛ:				*!			*

c. Step 3 of [kõt l fosɛ:] ‘by the hedgerow’ (Convergence)

kõtl.fo.sɛ:	DEP	REALIZE	MAX	PRIORITY	SONSEQ	*COMPLEX	NOCODA
☞i. kõtl.fo.sɛ:					*	*	*
ii. kõt.lə.fo.sɛ:	*!						*

Using SV allows for an accounting of the variation in the Jèrriais masculine singular definite article data. By allowing EVAL to select from a set of partially ordered constraints, variation occurs in the utterance initial position and in the interconsonantal position.

3.5.3 Summary

LS, while originally designed for OT, is necessary within HS despite the gradualness of HS, which can allow more intricate manipulation of allomorphic variation that might be expected to render LS superfluous. The necessity of LS in both OT and HS shows that this framework captures a robust property of phonological grammars and is an essential theoretical tool regardless of the larger theory – OT or HS – that is adopted.

3.6 Opacity in HS

Serial frameworks, such as Lexical Phonology-Morphology OT (LPM-OT) (Kiparsky 2000) and OT-CC (McCarthy 2007), lend themselves well to modeling opacity. HS, as a serial framework, may seem to lend itself well to modeling opacity in phonology, but according to McCarthy (2000), HS is only able to account for a limited number of opaque phenomena. With the inclusion of LS, HS can account for opacity associated with the interleaving of morphological and phonological processes. With this type of opacity, a phonological process will obscure the original environment that triggered allomorph insertion, in essence rendering a surface form that appears to have selected the wrong allomorph. This is the same issue that was seen with Jèrriais plural definite article allomorphy and Cr simplification. Opacity of this variety is also seen with the Polish locative singular suffix for masculine and neuter nouns (Łubowicz 2006, 2007). This suffix has two allomorphs, [-e] and [-u], with stems ending in underlying prepalatals taking the [-u] suffix and stems ending in alveolars /t, d, n, s, z/ taking the [-e] suffix. The [-e] suffix then triggers coronal palatalization (Gussmann 1980; Rubach 1984) of the alveolars and dentals which then surface as prepalatals. Thus the contrast between alveolars and prepalatals is neutralized in this position, as demonstrated in (123) below.[49] In (123a) the locative suffix [-e] triggers palatalization of the preceding coronals. The resultant surface forms have made opaque the triggering environment for allomorph insertion making the surface form appear as though it has taken the wrong suffix. In (123b), the stems ending underlyingly in prepalatals select the [-u] suffix.

[49] Following Łubowicz (2007), who proposes an OT analysis of this phenomenon using multiple underlying representations, I use the following transcriptions for Polish prepalatals: [ś] – voiceless prepalatal fricative, [ź] – voiced prepalatal fricative, [ć] – voiceless prepalatal affricate, [dź] – voiced prepalatal affricate, and [ń] – prepalatal nasal.

(123) Alveolar/Prepalatal Neutralization (Łubowicz 2007)

a. Coronal Palatalization

Nominative sg.	Locative sg.	Gloss
lis[t]	o liś[ć] + e	'letter'
obia[d]	o obie[dź] + e	'dinner'
ok[n]	o ok[ń] + e	'window'
bruda[s]	o bruda[ś] + e	'dirty man'
łobu[z]	o łobu[ź] + e	'trouble maker'

b. Underlying Prepalatals

Nominative sg.	Locative sg.	Gloss
liś[ć]	o liś[ć] + u	'leaf'
narzę[dź]	narzę[dź] + u	'tool'
ko[ń]	o ko[ń] + u	'horse'
łoso[ś]	o łoso[ś] + u	'salmon'
pa[ź]	o pa[ź] + u	'type of butterfly'

With a serial framework like HS/LS, this type of opacity naturally falls out without any additional stipulations or mechanisms. HS/LS allows for the ordering of morphological processes and phonological processes. Specifically, in Polish, allomorph insertion can precede palatalization. There are several constraints that motivate the palatalization before front vowels. One, PAL, prohibits anterior coronals followed by a front vowel, as defined in (124). The prohibition against coronals preceding back vowels is captured by the constraint *FRONT/u.[50]

---

[50] Following Łubowicz (2007), palatals are treated as back consonants.

(124) PAL: No anterior coronal followed by a front vowel (Łubowicz 2007)

(125) *FRONT/u: No back vowels after front consonants (Łubowicz 2007)

My analysis of place assimilation follows the assumptions made by McCarthy (2008a) in that assimilation is a two-step process of place deletion followed by place assimilation. To implement this, I use the following constraint:

(126) HAVEPLACE: Assign one violation mark for every segment that has no Place specification (McCarthy 2008a)

I also assume that the allomorphs are unordered, as neither allomorph seems to be preferred in the face of markedness and the phonology repairs any markedness that surfaces as a result of allomorph choice. In ordering the processes, allomorph choice affects whether or not palatalization takes place; therefore allomorph insertion must precede assimilation. In Step 1 of (127), failure to realize an allomorph in candidate (127a.i) is penalized by REALIZE while realization of the allomorph [-u] after the front consonant [t] is penalized by *FRONT/u. Despite violating PAL and OCP[-back], [liste] wins, becoming the input for the next step. In Step 2, in order to satisfy PAL, the height place feature of [t], is deleted in candidate (127b.ii). Candidate (127b.iii) attempts to satisfy these through deletion of the suffix, which is penalized by MAX. In Step 3, the place feature of [+high] is assigned in candidate (127c.ii). This better satisfies HAVEPLACE. The derivation then converges in Step 4.

(127) HS/LS Analysis of [lisće] 'letter'

a. Step 1 of [lisće] 'letter'

/list {e, u}/	REALIZE	*FRONT/u	MAX	PAL	HAVEPLACE	OCP [-back]	DEP(place)
i. list {e, u}	*!						
ii. listu		*!					
☞iii. liste				*		*	

b. Step 2 of [lisće] 'letter'

liste	Realize	*FRONT/u	MAX	PAL	HAVEPLACE	OCP[-back]	DEP(place)
i. liste				*!		*	
☞ii. lisTe					*		
iii. list			*!				

c. Step 3 of [lisće] 'letter'

lisTe	Realize	*FRONT/u	MAX	PAL	HAVEPLACE	OCP[-back]	DEP(place)
i. lisTe					*!		
☞ii. lisće						*	

d. Step 4 of [lisće] 'letter' (Convergence)

lisće	Realize	*FRONT/u	MAX	PAL	HAVEPLACE	OCP[-back]	DEP(place)
☞i. lisće						*	
ii. lisć			*!				

The analysis for [liśću] is much simpler as [ć] and [u] agree in height and have contrastive [back] features. In Step 1 of (128) [liśću] harmonically bounds the other two candidates. The derivation then converges in Step 2.

(128) HS/LS Analysis of [liśću] 'letter'

a. Step 1 of [liśću] 'leaf'

/liść {e, u}/	REALIZE	*FRONT/u	MAX	PAL	HAVEPLACE	OCP[-back]	DEP(place)
i. liść {e, u}	*!						
ii. liśće						*!	
☞iii. liśću							

b. Step 2 of [liśću] 'leaf' (Convergence)

liśću	REALIZE	*FRONT/u	MAX	PAL	HAVEPLACE	OCP[-back]	DEP(place)
☞i. liśću							
ii. liść			*!				

The opacity present in the Polish locative is a natural consequence of the serial nature of the framework, where processes must be ordered. The need for ordering of processes is behind several analyses of the Polish locative (Rubach 2003; Wolf 2008).

Rubach (2003) proposes a derivational OT analysis, which is a serial version of OT similar to that of LPM-OT, and argues that versions of OT typically used to treat opacity, such as Output-Output (Benua 1997/2000) and Sympathy (McCarthy 1999a, 1999b), cannot account for the Polish locative facts.

Wolf (2008) analyzes this process with OI relying on Local Optimality to choose the proper allomorph and treating derived and nonderived segments differently. Local Optimality is a requirement assumed in OT-CC that the building of a chain will be harmonically improving, similar to the harmonic improvement assumed for HS, and that when GEN is building valid chains off of an existing subchain it is only allowed to pursue the most harmonic way of doing so. According to Wolf (2008), the constraint *Te drives palatalization of a coronal before [-e] and *u prevents the candidate [listu] from surfacing. In order to derive [lisću], which would be prevented by *u from surfacing, Wolf proposes a distinction between underlying /će/ and derived [će]. Specifically that /će/ contains two instances of [-back], while [će] shares a single feature of [-back].[51] In (129), the first part of the derivation of [lisće] is shown. Here *u prevents [listu], which satisfies *Te, from winning.

(129) OI Harmonic Improvement Tableau of [lisće] 'letter' (Wolf 2008: 172)

<ROOT-LOC, list-LOC…	OCP[-back]	*u	*Te	IDENT[-back]
…liste> *Is more harmonic than:*			*	
…listu>		*		

[51] This seems to counter Richness of the Base.

From here, palatalization can take place and the winning candidate [lisće] will not be penalized by high ranking OCP[-back], as there is only one instance of [-back] shared by two segments and not two adjacent [-back] features. OCP[-back] can then prevent the underived form of [lisće] from winning when competing with [lisću], as shown in (130).

(130) OI Harmonic Improvement Tableau of [lisću] ‘leaf’ (Wolf 2008: 172)

<ROOT-LOC, lisć-LOC…	OCP[-back]	*u	*Te	IDENT[-back]
…lisću> *Is more harmonic than:*		*		
…lisće>	*			

While this does account for data, Wolf (2008) must rely on the distinction between derived and underived clusters, whereas this distinction is not necessary for an HS/LS analysis. Using HS/LS allows the distinction between derived and underived clusters to fall out of the analysis, instead of invoking an outside stipulation. The ability to handle certain flavors of opacity is a strong suit of HS/LS, despite the fact that HS itself is not a theory of opacity.

3.7 Conclusion

HS in and of itself cannot account for the allomorphic variation seen in Jèrriais definite articles. Like classic OT, HS encounters issues in trying to derive a more marked configuration in the face of less marked options. Instead, using HS/LS allows a satisfactory accounting of the facts. By treating allomorph insertion as a change, allomorph insertion can be ordered relative to the other processes. This is helpful in dealing with certain instances of opacity.

CHAPTER 4

CATALAN

4.1 Introduction

In this chapter I propose an HS/LS analysis of Catalan plural allomorphy and its interaction with several word final phonological processes. The main purpose of this analysis is to provide additional support for the revision of PRIORITY. This is important because PRIORITY, as envisioned by Mascaró (2007) and others, has been criticized (Wolf 2008) as being gradient and thus theoretically undesirable. Under my interpretation and analysis, PRIORITY is no longer a faithfulness constraint with an unlimited number of orderings possible. Instead I argue that PRIORITY is a markedness constraint that penalizes the use of nondefault allomorphs, as defined in (131).

(131) PRIORITY (revised) – Assign one violation mark for use of any allomorph other than the default allomorph.

Given allomorphs A, B, and C, they are no longer ordered {A > B > C} as in the original instantiation of LS. Instead, A is designated the default allomorphy, and PRIORITY assigns one violation to candidates that use any allomorph other than A. In other words, the use of B or C incurs only one violation of PRIORITY instead of one violation for B, two violations for C, and so on.

Evidence for an unlimited ordering of allomorphs has come from languages such as Catalan, which is argued by Mascaró (2007) and Bonet et al. (2007) to require a three-way ordering of allomorphs, and Judeo-Spanish, which is argued by Bradley and Smith (2011) to require a three-way ordering of nominal gender allomorphs.[52] I propose a different interpretation of the Catalan facts to reduce the ordering to a binary, default/nondefault ordering. This brings the Catalan analysis in-line with other analyses, such as those for Jèrriais, Dyirbal, and Moroccan Arabic proposed in this dissertation. Portions of the analysis in this chapter are directly contrasted with that of Bonet et al. (2007), which provides an OT/LS analysis. Specifically, I contrast my HS/LS analysis of the interaction of plural formation with schwa epenthesis to the OT/LS analysis proposed by Bonet et al. (2007). In their analysis a ranking contradiction arises in using OT/LS to analyze both schwa epenthesis and plural formation. To remedy this Bonet et al. (2007) rely on Output-Output and alignment constraints. This ranking contradiction does not arise when HS/LS is used.

My interpretation and analysis of the data vary from that offered by Bonet et al. (2007) and have several benefits over theirs. First I propose treating the variation seen with plural formation in Catalan masculine nominals as allomorphic variation of the plural affix while Bonet et al. (2007) treat the variation as allomorphic variation of a separate gender marker. I argue that there is no evidence for overt gender morphology in the relevant data apart from the gender information carried by the plural suffix itself. Second, I use HS as the basis versus that of OT. My approach allows for the elimination

[52] While not handled here, a reanalysis of the Judeo-Spanish facts to reduce the ternary distinction to a binary one is possible. This reanalysis involves a reinterpretation of the data similar to that proposed here for Catalan.

of several mechanisms necessary in Bonet et al. (2007). In addition, my analysis can account for the interaction of four phonological processes with that of plural formation in Catalan.

Catalan provides evidence for treating allomorph insertion as a step in HS. This is due to the necessity of ordering allomorph insertion in relation to schwa epenthesis. Catalan employs schwa epenthesis to resolve various phonotactic issues, such as OCP and sonority sequencing problems. This epenthesis must occur after allomorph insertion or the wrong surface form arises.

I first present the necessary phonotactic information for understanding the analyses and the basics of how plural formation and schwa epenthesis work in Catalan.. I then present the Bonet et al. interpretation of the Catalan data and their OT/LS analysis of plural formation and schwa epenthesis. I next present my interpretation of the data and my analysis of plural formation and schwa epenthesis. I then discuss how the two analyses differ and why my HS/LS analysis, and my interpretation of the data, provides a better accounting of the facts. I conclude by examining several other word final phonological processes that interact with plural allomorphy and demonstrating that an HS/LS can be extended to account for these interactions.

4.2 Catalan Phonotactics, Plural Formation, and Schwa Epenthesis

As plural formation and schwa epenthesis are affected by the phonotactics of the language, I first present a discussion on Catalan word final phonotactics, specifically that of allowable word final segments. I then discuss how the plural is formed in Catalan and how schwa epenthesis is used to resolve sonority and OCP issues.

4.2.1 Catalan Phonotactics

Catalan allows a number of word final codas, including all voiceless stops, voiceless fricatives, voiceless affricates, all nasals including the allophone [ŋ], all laterals, and the rhotic trill, examples of which are shown in (132).

(132) Word Final Singleton Codas (Hualde 1992: 379)

a.	[káp]	'head	h.	[ʎúm]	'light'
b.	[gát]	'cat'	i.	[təlɛ́fon]	'telephone'
c.	[pɔ́k]	'little'	j.	[báɲ]	'bath'
d.	[rɔ́ʧ]	'red	k.	[báŋ]	'bank'
e.	[báf]	'steam'	l.	[mál]	'badly'
f.	[gós]	'dog'	m.	[báʎ]	'dance'
g.	[báʃ]	'low'	n.	[már]	'sea'

The lack of word final voiced obstruents in Catalan is due a regular process of word final obstruent devoicing, which is illustrated in (133) below.

(133) Word Final Obstruent Devoicing in Catalan (Caro Reina 2014: 371)

a.	/b/	[sá**β**ən]	'know-3PL.PRES.IND'
		[sá**p**]	'know.3SG.PRES.IND'
b.	/d/	[pér**ð**ən]	'lose-3PL.PRES.IND'
		[pɛ́r**t**]	'lose.3SG.PRES.IND'
c.	/g/	[gɾɔ́**ɣ**ə]	'yellow.FEM'
		[gɾɔ́**k**]	'yellow.MASC'
d.	/z/	[pəʒɛ́**z**ə]	'farmer.FEM'
		[pəʒɛ́**s**]	'farmer.MASC'

The devoicing process is somewhat obscured by spirantization, but with /z/, in (133d), the devoicing process can be clearly seen, with /z/ surfacing faithfully intervocalically but becoming [s] word finally.

In addition to singleton codas, word final consonant clusters are generally allowed in Catalan, as seen in the examples in (134).[53]

(134) Word Final Complex Codas

a. Nasal + Obstruent (Wheeler 2005: 172)

i. [əgzémt] 'exempt'

ii. [pɔ́ɲʃ] 'punch'

b. Lateral + Stop (Hualde 1992: 380)

i. [bálp] 'numb'

ii. [kálk] 'calque'

c. Rhotic + Stop (Wheeler 2005: 221)

i. [sérp] 'snake'

ii. [árk] 'ark'

d. Fricative + Stop (Hualde 1992: 380)

i. [kásp] 'a town'

ii. [fósk] 'dark'

e. Nasal + Fricative (Wheeler 1979: 17)

i. [fóns] 'bottom'

ii. [díns] 'inside'

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[53] Caro Reina (2014) notes that Catalan codas are limited to clusters of two or three consonants. Also, the addition of the plural marker /s/ creates additional allowable clusters. For discussion on the plural allomorphy, see Section 4.2.2.

f.	Lateral + Fricative			
	i.	[gólf]	'gulf'	(Wheeler 2005: 221)
	ii.	[ɛ́lʃ]	'a city'	(Wheeler 1979: 18)
g.	Rhotic + Nasal (Wheeler 1979: 16)			
	i.	[iɱfɛ́rn]	'hell'	
	i.	[əʃárm]	'magical cure'	
h.	Lateral + Nasal (Wheeler 1979: 16)			
	i.	[sálm]	'psalm'	
	ii.	[ɛ́lm]	'helmet'	

Catalan also allows all vowels to surface to surface word finally. Catalan has a seven vowel phoneme inventory: /ɔ, o, u, a, ɛ, e, i/, all of which surface in stressed syllables (Crosswhite 1999; Hualde 1992; Mascaró 1976). In the unstressed position, vowels reduce to [i], [u], and [ə], as illustrated in (135).

(135) Vowel Reduction in Catalan (Crosswhite 1999: 138)

a.	/a/	s**á**k	'sack'
		s**ə**kɛ́t	'small sack'
b.	/ɛ/	p**ɛ́**l	'hair'
		p**ə**lút	'hairy'
c.	/e/	s**é**rp	'snake'
		s**ə**rpɔ́tə	'big snake'
d.	/ɔ/	p**ɔ́**rt	'harbor'
		p**u**rtuári	'related to harbor'
e.	/o/	g**ó**s	'dog'

		g**u**sás	'big dog'
f.	/i/	pr**í**m	'thin'
		əpr**i**má	'to make thin'
g.	/u/	ʎ**ú**m	'light'
		ʎ**u**minós	'light (adj.)'

The front nonhigh vowels /a/, /ɛ/, and /e/ reduce to [ə], while the back vowels /ɔ/ and /o/ reduce to [u]. The vowels /i/ and /u/ surface faithfully as [i] and [u] respectively. Due to the preservation of the vowels [ɔ, o, a, ɛ, e,] in stressed positions and the possibility of word final stress, all vowels are attested word finally.[54] As vowels reduce to [u, i, ə], ultimate stress is not necessary for these vowels to surface word finally.

(136) Word Final Vowels

a.	[sufá]	'sofa'	(Hualde 1992: 386)
b.	[kəfɛ́]	'coffee'	(Hualde 1992: 386)
c.	[kəré]	'street'	(Wheeler 2005: 33)
d.	[flɔ́]	'flower'	(Wheeler 2005: 333)
e.	[əksió]	'action'	(Wheeler 1979: xiii)
f.	[biulí]	'violin'	(Wheeler 2005: 98)
g.	[mósu]	'lad'	(Bonet et al. 2007: 916)
h.	[kámə]	'leg'	(Wheeler 1979: 26)

The composition of the word final coda affects plural formation in both genders.

[54] The distribution of [ɔ] word finally may be limited to monosyllabic words, where it thus must be stressed. All other vowels are found word finally in both mono- and polysyllabic words.

4.2.2 Plural Formation

In Catalan, the plural is formed by the addition of a suffix. This suffix is /-s/, as (137) shows, but there is allomorphic variation as described in the following discussion.[55]

(137) Catalan Plural Formation

a.	[gɔ́t]	[gɔ́t-s]	'glass(es).MASC'	(Bonet et al. 2007: 916)
b.	[mósu]	[mósu-s]	'lad(s).MASC'	(Bonet et al. 2007: 916)
c.	[əksió]	[əksió-s]	'action(s).FEM'	(Wheeler 1979: xiii)
d.	[sál]	[sál-s]	'salt(s).FEM'	(Bonet et al. 2007: 916)

The formation of the plural exhibits variation, with the form of the plural allomorph being affected by the gender of the nominal and phonological conditioning.

4.2.2.1 Masculine Nominals and Plural Formation

Masculine nominals (nouns and adjectives) in Catalan exhibit the same word final phonotactics as described above in (132), (134), and (136). Masculine nouns can end in a licit coda consonant, as in (138a) and (138b), a consonant cluster as in (138c), (138d), and (138e), or a vowel, as in (138f) through (138j).

(138) Masculine Singular Nouns (Bonet et al. 2007: 916)

a.	[gɔ́t]	'glass'	(Bonet et al. 2007: 916)
b.	[pás]	'step'	(Bonet et al. 2007: 916)
c.	[míkst]	'mixed'	(Wheeler 1979: 22)

[55] The plural morpheme has been described as either /s/ (Bonet et al. 2007; Hualde 1992; Mascaró 1976, 1987; Wheeler 1979) or /z/ (Wheeler 2005). I follow the more popular interpretation and treat it as /s/.

d.	[kálk]	'calque'	(Hualde 1992: 380)
e.	[bálz]	'waltz	(Hualde 1992: 275)
f.	[mósu]	'lad'	(Bonet et al. 2007: 916)
g.	[páɾə]	'father'	(Bonet et al. 2007: 916)
h.	[biulí]	'violin'	(Wheeler 2005: 98)
i.	[katalá]	'Catalan'	(Hualde 1992: 386)
j.	[kəfɛ́]	'coffee'	(Hualde 1992: 386)

Typically, the plural is formed by affixing the suffix /-s/ to the stem, as shown previously in (137) and here in (139).

(139) Masculine Plural Nouns with [-s]

a.	[gɔ́t]	[gɔ́t-s]	'glasses'	(Bonet et al. 2007: 916)
b.	[mósu]	[mósu-s]	'lads'	(Bonet et al. 2007: 916)
c.	[páɾə]	[páɾə-s]	'fathers'	(Bonet et al. 2007: 916)
d.	[kálk]	[kálk-s]	'calques'	(Hualde 1992: 381)

In cases where the masculine noun ends in a sibilant, such as [s], [z], [ʃ], and [ʒ], as in (140), the form surfaces with an intervening [u]. This is due to a prohibition against adjacent sibilants, which is typically attributed (Bonet & Lloret 2002; Bonet et al. 2007; Wheeler 2005) to the Obligatory Contour Principle (OCP; Goldsmith 1976; Leben 1973).

(140) Masculine Plural Nouns with [-us]

a.	[pás]	[pás**us**]	'step(s)'	(Bonet et al. 2007: 916)
b.	[gɾás]	[gɾás**us**]	'fat(s)'	(Bonet et al. 2007: 916)
c.	[bálz]	[bálz**us**]	'waltz(es)'	(Hualde 1992: 275)

Formation of the plural does have a few idiosyncrasies. In cases where the word ends in [st] or [sk], there is optionality in how the plural is formed. In these cases, the plural can be formed with either [-s] or [-us], though there is a preference in most varieties to use [-us] (Hualde 1992: 380).[56]

(141) Variation in Plural Allomorphy (Hualde 1992: 410)

a.	[bɔ́sk]	[bɔ́sk**s**]/[bɔ́sk**us**]	'forest(s)'
b.	[kɔ́st]	[kɔ́st**s**]/[kɔ́st**us**]	'cost(s)'

In summary the plural is formed in masculine nominals with the addition of the suffix /-s/, which can appear as [-us] when the stem ends in a sibilant. I treat this variation as plural allomorphy, while Bonet et al. (2007) treat it as gender marker allomorphy. This is discussed in detail in the relevant analyses below.

4.2.2.2 Feminine Nominals and Plural Formation

As with the masculine, the phonotactics of Catalan feminine nominals pattern after language wide phonotactics described above in (132), (134), and (136). Catalan feminine nouns and adjectives can end in a licit coda consonant (or cluster) or vowel with the plural being formed by adding /-s/, as seen in (142a) through (142e). As with the masculine, there are certain idiosyncrasies. Within feminine nominals, nouns and adjectives are treated differently with regard to plural formation. Feminine nouns that end in sibilants are unmarked for plural, such as that seen in (142f) and (142g).

[56] Hualde (1992: 410) notes that "in the plural of items ending in /-sC/, [u]-insertion in the plural is only optional but seems to correspond to the most general pronunciation."

(142) Catalan Feminine Noun Allomorphy

a.	[tákə]	[tákəs]	'stain(s)'	(Bonet et al. 2007: 916)
b.	[əksió]	[əksiós]	'action(s)'	(Wheeler 1979: xiii)
c.	[sál]	[sáls]	'salt(s)'	(Bonet et al. 2007: 916)
d.	[ʎúm]	[ʎúms]	'light(s)	(Hualde 1992: 381)
e.	[kárn]	[kárns]	'meat(s)'	(Wheeler 2005: 228)
f.	[póls]	[póls]	'dust(s)'	(Wheeler 1979: 22)
g.	[fáls]	[fáls]	'sickle(s)'	(Wheeler 1979: 22)

Like masculine plurals the feminine is still sensitive to OCP-sibilant effects, but only in feminine adjectives. But whereas masculine nominals use [u] to resolve OCP issues, feminine adjectives use [ə]. This is shown in (143).

(143)	a.	[fəlís]	[fəlís<u>ə</u>s]	'happy.FEM.SG/PL'	(Bonet et al. 2007: 917)
	b.	*audaç*	*audaç*[<u>ə</u>s]	'audacious.FEM.SG/PL'	(Hualde 1992: 333)
	c.	*veloç*	*veloç*[<u>ə</u>s]	'fast.FEM.SG/PL'	(Hualde 1992: 333)

As schwa epenthesis is a language wide pattern, both Bonet et al. (2007) and I analyze this phenomenon as a case of epenthesis.

<u>4.2.2.3 Summary</u>

The plural in Catalan is formed by affixation of the suffix /-s/. In masculine nominals when the stem ends in a sibilant the suffix surfaces with an intervening [u]. In feminine nouns when the stem ends in a sibilant, there is no overt marking of the plural. In feminine adjectives when the stem ends in a sibilant the suffix surfaces with an intervening [ə].

4.2.3 Schwa Epenthesis

Schwa epenthesis is a language wide phenomenon in Catalan, being used to resolve a variety of problematic phonotactic configurations, including adjacent sibilants, as seen above with plural formation in feminine adjectives, and word final consonant clusters that violate the Sonority Sequencing Principle (SSP; Clements 1990: 285).

The use of schwa epenthesis to break up adjacent sibilants at word edges is seen in feminine adjectives, as shown above, and it is also seen in inflected verbs, as shown in (144). In (144b), the verb ends in a /s/ and is followed by the second person singular inflectional suffix, /-s/. Schwa is epenthesized to break up these two adjacent sibilants.[57]

(144) Schwa Epenthesis in Verbs with OCP-Sibilant Problems (Bonet et al. 2007: 917)

a.	/tus/	[tús]	's/he coughs'
b.	/tus-s/	[túsə̲s]	'you cough'

In addition to the schwa epenthesis seen in verbs with OCP-sibilant issues, there are cases where Catalan employs schwa epenthesis to revolve sonority issues. This occurs when an underlying consonant cluster violates the sonority requirements of the language. While Catalan allows complex onsets and codas, as seen in (134) above, they must rise and fall in sonority, respectively.[58] Wheeler (2005) proposes the following sonority hierarchy for Catalan.

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[57] Epenthetic schwa is underlined to distinguish it from underlying vowels that reduce to schwa.

[58] Except in the case of clusters derived by the addition of the plural morpheme /-s/. Clusters created with the addition of /-s/ are acceptable regardless of the sonority profile of the cluster (Caro Reina 2014). This is not unexpected as in many languages /s/ patterns differently than other fricatives with regard to the Sonority Sequencing Principle (see Parker (2002) for discussion on sonority and /s/).

(145) Catalan Sonority Hierarchy (Wheeler 2005: 255)

Glides [j, w] > Tap [ɾ] > Laterals, Trills [l, ʎ, r] > Nasals [m, n, ɲ] > Sibilant Continuants [s, ʃ, z, ʒ] > Nonstrident Continuant Obstruents [β, ð, ɣ] > Nonsibilant Stops/Strident Continuants [f, p, t, k, b, d, g]

Schwa is epenthesized when a word final (or initial) cluster violates SSP. In (146), the consonant clusters violate the sonority sequencing requirements of Catalan. In (146a) and (146b), the coda's sonority falls then rises and in (146c) the onset falls then rises in sonority.

(146) Schwa Epenthesis for SSP Issues (Bonet et al. 2007: 916)

a.	/templ/	[témpl<u>ə</u>]	'temple'
b.	/tɛndɾ/	[tɛ́ndɾ<u>ə</u>]	'tender'
c.	/stɾiptis/	[<u>ə</u>stɾíptis]	'striptease'

Schwa epenthesis interacts with the formation of the plural and this interaction is the basis of the Bonet et al. (2007) analysis.

<u>4.3 Bonet et al. (2007) Analysis of Catalan</u>

Bonet et al. (2007) analyze the variation of certain word final segments in Catalan as allomorphic variation in gender markers. They interpret the peculiarity of [u] in masculine words to indicate that [u] is in fact a separate morpheme – a gender marker. They extrapolate from this that schwa in words like [páɾəs] 'fathers' is also a masculine marker, and for masculine words with neither of those suffixes they posit a null masculine suffix. The necessity of this third, null allomorph suggests that there is no masculine suffix after all: masculine words can end with any segment, including any vowel, as shown above in (138), and there is no evidence for a productive suffix.

Bonet et al. (2007) argue that ∅ is the unmarked and most common ending among Catalan masculine nouns, followed by the marked forms of [u] and [ə]. This is reflected in their proposed ordering of {∅ > u > ə}. In cases, such as (147d), where [u] is not found in the underlying form but appears in the plural due to SSP issues, they propose that the [u] is not epenthetic or part of the plural suffix but is the masculine allomorph [u].

(147) Masculine Nominal Allomorphs (Bonet et al. 2007: 916)

a.	/mos-u/	[mósu]	/mos-u-s/	[mósus]	‘lad(s)’
b.	/paɾ-ə/	[páɾə]	/paɾ-ə-s/	[páɾəs]	‘father(s)’
c.	/gɔt-∅/	[gɔ́t]	/gɔt-∅-s/	[gɔ́ts]	‘glass(es)’
d.	/pas-∅/	[pás]	/pas-u-s/	[pásus]	‘steps’

Stems surface with a null allomorph ((147a) and (147d)) unless the stem has a lexical subcategorization requirement for one of the two marked allomorphs [u] and [ə], (147b) and (147c), respectively.[59] The selection of the correct allomorph is ensured by the constraint RESPECT, defined in (148). If a stem does not subcategorize for an allomorph, as is the case of masculine nouns with the null allomorph, RESPECT is not violated by use of other allomorphs.

(148) RESPECT – Respect idiosyncratic lexical specifications (Bonet et al. 2007: 918)

By ranking RESPECT over PRIORITY lexically marked forms select the marked allomorphs [u] and [e] when subcategorized for, as demonstrated in (149).

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[59] The subcategorization requirement of a stem is indicated with a subscript segment on the stem in the input.

(149) Tableau Illustrating Allomorph Choice in Catalan (Bonet et al. 2007: 919)

/mos$_u$-{∅ > u > ə}/	RESPECT	PRIORITY
a. mós	*!	
☞b. mósu		*
c. mósə	*!	**

These constraints are outranked by SONORITYSEQUENCING to account for the epenthetic schwa, which is underlined, in cases where peripheral consonant clusters do not abide by SSP, as in (150).

(150) a. /templ/ [témplə̲] 'temple'

b. /templ/ [témplə̲s] 'temples' (Bonet et al. 2007: 916)

In the tableau in (151), candidates (151a) and (151d) abide by PRIORITY as they contain the highest ordered allomorph, ∅, but candidate (151a) violates SONORITYSEQUENCING. Use of the lower ordered allomorphs in candidates (151b) ([-u]) and (151c) ([-ə]) is penalized by PRIORITY. Candidate (151d), despite the similarity of the epenthetic vowel to the allomorph schwa, does not violate PRIORITY as the schwa is epenthetic and not the allomorph schwa.

(151) Schwa Epenthesis to Resolve SSP Violations (Bonet et al. 2007: 920)

/templ-{∅ > u > ə}/	SONSEQ	RESPECT	PRIORITY	DEP
a. tómpl∅	*!			
b. témplu			*!	
c. témplə			*!*	
☞d. témplə̲				*

For feminine nominals, Bonet et al. (2007) propose that schwa is the default allomorph and rank the allomorphs as {ə > ∅}. As with the masculine, the lower ranked allomorph surfaces due to lexical subcategorization requirements on the stem. This analysis works the same as that in (149), but with {ə > ∅}.

In cases, such as (152), where OCP issues arise, Bonet et al. (2007) treat the feminine differently than the masculine.

(152) [fəlís] [fəlísə̠s] 'happy.FEM.SG/PL' (Bonet et al. 2007: 917)

They analyze schwa as epenthetic, not as the feminine allomorph. To capture this the constraint OCP-SIBILANT (OCP-SIB) is used.

(153) OCP-SIBILANT – assign one violation for each instance of adjacent sibilant segments

Bonet et al. (2007) propose the following ranking: OCP-SIB, RESPECT » PRIORITY » DEP to motivate epenthesis between sibilants. In (154) OCP-SIB motivates the over-riding of the subcategorized null allomorph and Respect penalizes use of the allomorphic schwa in candidate (154b). The candidate with the epenthetic schwa, candidate (154c), wins.

(154) Schwa Epenthesis in Catalan Feminine Forms (Bonet et al. 2007: 921)

/fəlis$_{\varnothing}$-{ə > ∅}-s/	OCP-SIB	RESPECT	PRIORITY	DEP
a. fəlíss	*!		*	
b. fəlísəs		*!		
☞c. fəlísə̠s			*	*

While this constraint ranking accounts for the Bonet et al. interpretation of the feminine, it makes the wrong prediction with respect to masculine allomorphs. This ranking predicts incorrectly that masculine OCP-SIB violations will be resolved with schwa epenthesis, as shown in (155). Subcategorizing for [u] in this case would solve this issue, but only in the case of the plural as subcategorization would result in [u] surfacing in the singular also, which is incorrect as the singular is [pás], not *[pásu].

(155) Incorrect Prediction of Schwa Epenthesis for Masculine (Bonet et al. 2007: 921)

/pas-{∅ > u > ə}-s/	OCP-SIB	RESPECT	PRIORITY	DEP
a. páss	*!			
☜b. pásus			*!	
c. pásəs			*!*	
💣d. pásə̱s				*

Bonet et al. (2007) resolve this issue and account for the asymmetry between the masculine and feminine by proposing that formation of the plural is paradigmatic in nature and appeal to Output-Output correspondence (Benua 1995, 1997/2000). They argue the plural form is the affixed form based on the singular form and propose an Output-Output constraint for vocalic segments. This constraint, defined in (156), penalizes any output that does not faithfully realize all the vowels present in the base.

(156) OO – Every vocalic segment in the base has a correspondent in the affixed form[60]

They also propose an alignment constraint that requires the edge of morphemes to align, as defined in (157).

(157) ALIGN-MM – Align the left edge of a morph X with the right edge of a morph Y (Bonet et al. 2007: 922)

The interaction of the OO constraint and ALIGN-MM results in epenthesis in the

[60]This constraint is also referred to as MAX-V-OO.

case of feminine OCP-SIB violations but prevents it in cases of masculine OCP-SIB violations, as seen in (158) and (159), respectively. Here OO is not violated as the vowels present in base are all present in the outputs. In (158), OCP-SIB and RESPECT eliminate candidates that result in adjacent sibilants (candidate (158a)) or that violate the subcategorization requirement of the stem (candidate (158b)), respectively.

(158) OO-Based Analysis of Feminine Plural (Bonet et al. 2007: 924)

/fəlis-{ə > ∅}-s/ Base: [fəlís]	OCP-SIB	RESPECT	OO	ALIGN-MM	PRIORITY	DEP
a. fəlíss	*!					
b. fəlísəs		*!				
☞c. fəlísə̲s				*	*	*

In (159) OCP-SIB penalizes candidate (159a) due to adjacent sibilants. The problematic epenthesis candidate, candidate (159d), is eliminated by the alignment constraint as the schwa forces a misalignment between the stem and the suffix. PRIORITY then is the distinguishing constraint that penalizes use of the allomorphic schwa (candidate (159c)) to a greater degree than the use of the allomorph [-u] (candidate (159b)).

(159) OO-Based Analysis of Masculine Plural (Bonet et al. 2007: 923)

/pas-{∅ > u > ə}-s/ Base: [pás]	OCP-SIB	OO	ALIGN-MM	PRIORITY	DEP
a. páss	*!				
☞b. pásus				*	
c. pásəs				**!	
d. pásə̲s			*!		*

In cases of epenthesis, OO penalizes the use of other vowels to repair SONORITYSEQUENCING violations, though it is PRIORITY that is the critical constraint. In (160) SONORITYSEQUENCING penalizes candidate (160a) as no repair of the disallowed coda consonant cluster has occurred. Candidates (160a), (160b), and (160c) all violated OO, as they do not contain the epenthetic schwa found in the base, but as candidate (160d) violates equally ranked ALIGN-MM, it is PRIORITY that determines the winner, which is candidate (160d) as it uses the default allomorph, ∅.

(160) OO-Based Analysis of Masculine Plural (Bonet et al. 2007: 923)

/templ-{∅>u>ə}-s/ Base: [témplə]	SONSEQ	OO	ALIGN-MM	PRIORITY	DEP
a. templs	*!	*			
b. témplus		*		*!	
c. témpləs		*		*!*	
☞d. témpl<u>ə</u>s			*		*

4.3.1 Summary

The OT/LS analysis presented by Bonet et al. (2007) does account for the data. They treat the variation in forming the plural in masculine nominals as one of allomorphic variation of the masculine gender marker and variation in forming the plural in feminine adjectives as one of epenthesis. The ranking needed to account for epenthesis in feminine adjectives with OCP-sibilant issues and masculine nominals with SSP issues makes the wrong prediction with regard to nominal stems that end in sibilants. To resolve this issue they appeal to Output-Output and alignment constraints. Their analysis also requires null allomorphs and a three-way distinction among the masculine gender allomorphs, which entails a gradient PRIORITY constraint. PRIORITY is not the only gradient constraint they use; alignment constraints also have been criticized (McCarthy 2003, 2004, 2009a) as being gradient. Gradient constraints and null allomorphs can be avoided by using HS/LS.

4.4 HS/LS Analysis of Catalan

The following is an HS/LS analysis of plural allomorphy in Catalan and is support for the position that the lexical ordering of allomorphs is limited to a default/nondefault distinction and not a total order on the n-ary set of allomorphs. In this analysis I treat the variation seen in forming the masculine plural as one of plural allomorphy, not gender allomorphy as Bonet et al. (2007) propose. I propose an ordered set of plural allomorphs for the masculine and I treat treatment feminine OCP-sibilant resolution as one of epenthesis.

4.4.1 Masculine Nominals

I posit that the masculine plural morpheme has an ordered pair of {-s > -us}. In the plural morpheme, the allomorph [-s] is the default allomorph, with the [-us] form appearing only when there is an OCP-sibilant issue. The choice of [-s] as the default allomorph is due to the fact that the use of [-s] can result in the creation of word final consonant clusters that violate sonority considerations, such as those shown in (161). In the codas in (161a) and (161b) sonority falls then rises, as according to the Catalan sonority hierarchy in (145) nonsibilant stops/strident continuants ([p] and [f]) are lower in sonority than sibilants. In (161b) and (161c), the coda cluster created by the use of

[-s] has a rising sonority profile. All of these violate SSP.

(161) Word Final Coda Clusters formed with the Plural [-s]

a.	[bálps]	'numb.PL'	(Hualde 1992: 381)
b.	[gólfs]	'gulfs'	(Wheeler 2005: 228)
c.	[gɔ́ts]	'glasses'	(Bonet et al. 2007: 916)
d.	[əmíks]	'friends'	(Caro Reina 2014: 373)

The use of the other allomorph [-us] would avoid these coda clusters and lead to less marked syllable structure, yet this allomorph is not used. The [-us] allomorph only surfaces when the word ends in a sibilant. Thus the default allomorph surfaces in most circumstances and the nondefault allomorph only surfaces when forced by adjacent sibilants.

As adjacent sibilants are disallowed in Catalan, OCP-SIB must be highly ranked, as must be REALIZE, as no form surfaces with an unrealized plural morpheme.[61] In the analysis in (162), the constraint OCP-SIB motivates the use of the nondefault allomorph and must be ranked above PRIORITY to do so. REALIZE must also outrank PRIORITY or else the grammar would prefer nonrealization of any allomorph in the face of using a nondefault allomorph. In (162a), failure to realize any allomorph in the faithful candidate (162a.i) violates REALIZE. Use of the nondefault allomorph in candidate (162a.iii) is penalized by PRIORITY, but as it is lower ranked than OCP-SIB and REALIZE,

[61] There is a small set of words, restricted to feminine nouns that end in a sibilant, that surface without the plural marker, exemplified in (142f) and (142g). These forms underlyingly end in /s/, which should trigger epenthesis in the feminine. This is not predicted by the analysis. Several possible remedies are appealing to lexical strata constraints (Itô & Mester 1999) or with lexically indexed constraints (Pater 2000). As the set of lexical exceptions is restricted to feminine nouns ending in sibilants, I do not address them in this analysis nor are they addressed in Bonet et al. (2007).

this candidate wins and is the input for Step 2, where the derivation converges.

(162) HS/LS Analysis of [pás**u**s] ‘steps’

a. Step 1 of [pás**u**s] ‘steps’

/pas {-s>-us}/	REALIZE	OCP-SIB	PRIORITY	DEP
i. pás {-s>-us}	*!			
ii. páss		*!		
☞iii. pá.sus			*	

b. Step 2 of [pás**u**s] ‘steps’ (Convergence)

pá.sus	REALIZE	OCP-SIB	PRIORITY	DEP
☞i. pá.sus				
ii. pá.su.sə̲				*!

For a candidate without a final sibilant, the allomorph [-s] surfaces, as shown in (163). Here PRIORITY penalizes the use of the nondefault allomorph in candidate (163a.iii). As the default allomorph, [-s], does not violate OCP-SIB, candidate (163a.ii) wins.

(163) HS/LS Analysis of [gólfs] ‘gulfs’

a. Step 1 of [gólfs] ‘gulfs’

/golf {-s>-us}/	REALIZE	OCP-SIB	PRIORITY	DEP
i. gólf {-s>-us}	*!			
☞ii. gólfs				
iii. gólfus			*!	

b. Step 2 of [gólfs] ‘gulfs’ (Convergence)

gólfs	REALIZE	OCP-SIB	PRIORITY	DEP
☞i. gólfs				

The ranking needed to derive the masculine can also derive schwa epenthesis and plural formation in stems ending in consonant clusters that violate SSP. Sonority sequencing requirements, represented by the constraint SONORITYSEQUENCING, lead to schwa epenthesis in certain nouns, such as in the masculine noun [témplə̠] 'temple'.

In order to account for schwa epenthesis, it is necessary to include a constraint penalizing word final homorganic consonant clusters. Word finally, Catalan simplifies word final homorganic consonant clusters that are composed of a sonorant plus an obstruent. This can be seen in (164). When the cluster is word internal the two segments can be syllabified into separate syllables, as in the diminutive forms in (164), and the cluster is retained. When the cluster is word final, the obstruent is deleted.

(164) Homorganic Consonant Cluster Simplification of Nasal + Obstruent Clusters

a.	/púnt/, /punt-ɛ́t/	[pún], [puntɛ́t]	'point', 'point.DIM'
b.	/kánp/, kanp-ɛ́t/	[kám], [kampɛ́t]	'field', 'field.DIM'
c.	/bánk/, /bank-ɛ́t/	[báŋ], [baŋkɛ́t]	'bank', bank.DIM'

This prohibition against word final homorganic consonant clusters is captured by the constraint *GEMINATECODA (Wheeler 2005).

(165) *GEMINATECODA – Assign one violation for each set of adjacent consonants in a coda that share values of both place and manner (where 'manner' denotes one or more of [cont] Sibilant, Nasal, Lateral, Rhotic) (Wheeler 2005: 224)

With the ranking of CONTIGUITY and *GEMINATECODA over DEP epenthesis occurs in [témplə̠] instead of deletion.[62] In Step 1 of (166), there are several ways to

[62] Ranking MAX over DEP would solve this issue but, as will be shown in Section 4.6.1, this would make the wrong predictions in word final nasal deletion, where DEP must outrank MAX.

resolve the SONORITYSEQUENCING issue. One is to delete an offending segment, as in candidate (166a.ii) where [l] is deleted. The remaining cluster still violates high ranked *GEMINATECODA. Deletion of the final segment of the coda leaves a cluster that violates * GEMINATECODA.[63] This is not surprising as * GEMINATECODA is a sonority based constraint as a geminate's sonority profile is flat, i.e., a sonority plateau. The other strategy is to epenthesize schwa, as in candidates (166a.i) and (166a.iii). In candidate (166a.iii), epenthesis within the cluster is penalized by CONTIGUITY. Candidate (166a.i) has word final epenthesis and only violates the rather low ranked DEP. This candidate wins to become the input of Step 2 where it is converged upon.

(166) HS Derivation of [témplə] 'temple'

a. Step 1 of [témplə] 'temple'

/templ/	SONSEQ	CONTIGUITY	*GEMCODA	DEP	MAX
☞i. tém.plə̲				*	
ii. témp			*!		*
iii. tém.pə̲l		*!		*	
iv. templ	*!				

[63] In the case of [ə̲stríptis] 'striptease', deletion of [s] can be prevented by an anchor constraint or an IDENT[SIB]. Deletion of internal segments is prevented by CONTIGUITY.

b. Step 2 of [témplə] ‘temple’ (Convergence)

témpl<u>ə</u>	SONSEQ	CONTIGUITY	*GEMCODA	DEP	MAX
☞i. tém.pl<u>ə</u>				*	
ii. témpl	*!				*

Deriving the plural form of [témpl<u>ə</u>] – [témpl<u>ə</u>s] – is also possible. In the plural, use of the nondefault allomorph [-us] would resolve the SSP issue and avoid a DEP violation, but use of [-us] to resolve SONORITYSEQUENCING violations is not an attested repair strategy. This is reflected by ranking PRIORITY over SONORITYSEQUENCING and treating allomorph insertion as a step that can precede schwa epenthesis. In Step 1 of (167), GEN can either epenthesize schwa to resolve the sonority sequencing issue or it can insert an allomorph. Failure to realize an allomorph in favor of epenthesizing schwa in candidates (167a.iv) and (167a.v) or deleting a segment as in candidate (167a.vi) is penalized by high ranking REALIZE. Instead PRIORITY favors the use of [-s] in spite of the SONORITYSEQUENCING violation, which the use of [-us] or schwa epenthesis would address. In Step 2, the sonority issues remains and schwa is epenthesized in candidate (167b.ii) to resolve this violation. This candidate becomes the input for Step 3 and is converged upon.

(167) HS/LS Analysis of [témpləs] ‘temples’

a. Step 1 of [témpləs] ‘temples’

/templ {-s>-us}/	Realize	Priority	SonSeq	Contiguity	Dep	Max
i. templ {-s>-us}	*!		*			
☞ii. templs			*			
iii. tém.plus		*!				
iv. tém.plə̲ {-s>-us}	*!				*	
v. tém.pə̲l {-s>-us}	*!			*	*	
vi. témp {-s>-us}	*!					*

b. Step 2 of [témpləs] ‘temples’

templs	Realize	Priority	SonSeq	Contiguity	Dep	Max
i. templs			*!			
☞ii. tém.plə̲s				*	*	

c. Step 3 of [témpləs] ‘temples’ (Convergence)

tém.plə̲s	Realize	Priority	SonSeq	Contiguity	Dep	Max
☞i. tém.plə̲s						
ii. tém.pə̲.lə̲s					*!	

By using HS/LS, treating allomorph insertion as a step, and treating the variation in plural formation as allomorphic variation, I can account for both schwa epenthesis and plural formation in Catalan masculine nominals. This analysis can also account for plural formation in feminine adjectives with OCP-sibilant issues.

4.4.2 Feminine Adjectives

Feminine adjectives are also sensitive to OCP-sibilant issues. As shown above in (143) and repeated here as (168a), the adjective [fɛlís] *feliç* 'happy' ends in a sibilant and in the feminine schwa appears between the stem and the plural /-s/.

(168)	a.	[fəlís]	[fəlísə̱s]	'happy.FEM.SG/PL'
	b.	[fəlís]	[fəlísus]	'happy.MASC.SG/PL'

(Bonet et al. 2007: 917)

In the masculine form of this adjective, [u] intervenes between the two sibilants, as shown in (168b). An analysis of feminine OCP-sibilant issues can be one of allomorph realization or one of epenthesis; both are compatible with the constraint rankings needed for all other analyses presented herein. As it is desirous to limit the amount of information stored in the lexicon, it is best to treat this as a case of epenthesis. In an epenthesis based analysis, the lone allomorph is listed, just like the root, and therefore PRIORITY is unnecessary, as is the step of allomorph insertion, though REALIZE is included to prevent nonrealization of the plural (or the root for that matter). This is seen in the analysis in (169). There is one modification that needs to be made to the constraint ranking, this is the strict ranking of REALIZE over OCP-SIB. This is not problematic, as in the analysis of OCP-sibilant issues in the masculine these two constraints were freely rankable with respect to one another and implementing a strict ranking does not affect the outcome of the analysis in (162). In Step 1 of (169), the ranking of REALIZE over OCP-SIB favors candidate (169a.ii) even though realizing the morpheme violates OCP-SIB. In the second step, this OCP-sibilant issue is addressed through epenthesis. REALIZE continues to penalize deletion of the plural morpheme [-s] as a possible repair of the OCP-sibilant issues, as seen with candidate (169b.ii). Deletion of the first [s] is penalized by CONTIGUITY. The candidate that employs epenthesis violates only DEP and is the winner of Step 2 and converged upon in Step 3.

(169) HS/LS Analysis of [fəlísəs] 'happy.FEM.PL'

a. Step 1 of [fəlísəs] 'happy.FEM.PL'

/fəlis$_1$-s$_2$/	REALIZE	OCP-SIB	CONTIGUITY	*GEMCODA	DEP	MAX
i. fəlís$_1$	*!					
☞ii. fəlís$_1$s$_2$		*		*		

b. Step 2 of [fəlísəs] 'happy.FEM.PL'

fəlís$_1$s$_2$	REALIZE	OCP-SIB	CONTIGUITY	*GEMCODA	DEP	MAX
i. fəlís$_1$s$_2$		*!				
ii. fəlís$_1$	*!					*
iii. fəlís$_2$			*!			*
☞iv. fəlís$_1$ə̲s$_2$					*	

c. Step 3 of [fəlísəs] ‘happy.FEM.PL’ (Convergence)

$fəlís_1\underline{ə}s_2$	REALIZE	OCP-SIB	CONTIGUITY	*GEMCODA	DEP	MAX
☞i. $fəlís_1\underline{ə}s_2$						

Treating the feminine as a case of epenthesis and ranking OCP-SIBILANT over REALIZE allows for an accounting of epenthesis in plural formation in feminine adjectives.

4.5 HS/LS Analysis vs. OT/LS Analysis

The OT/LS analysis does account for the data, as interpreted by Bonet et al. (2007), but it is not necessarily the most desirable solution. Bonet et al. (2007) treats the variation seen in the masculine as a case of allomorphic variation within the masculine gender marker and not the plural morpheme. First, there is little evidence for the three-way allomorphy of the masculine. As noted in Section 4.2.1, Catalan nominals can end in any licit consonant, consonant cluster, or vowel, regardless of gender. This is seen in the data in (170) and (171).[64]

(170) Word Final Consonants

	Masculine		Feminine		
a.	[gát]	‘cat’	[səlút]	‘health’	(Wheeler 2005: 7)
b.	[gós]	‘dog’	[fəlís]	‘happy	

[64] Most of the data in these examples have already been cited in the dissertation. Data that have not been cited previously are cited here.

c.	[báɲ]	‘bath’	[ʎúm]	‘light’
d.	[mál]	‘badly	[sál]	‘salt’
e.	[már]	‘sea’	[mártir]	‘martyr’ (Wheeler 2005: 25)
f.	[gólf]	‘gulf’	[sérp]	‘snake’
g.	[iɱfέrn]	‘hell’	[kárn]	‘meat’

(171) Word Final Vowels

	Masculine		Feminine	
a.	[sufá]	‘sofa’	[má]	‘hand
b.	[kəfέ]	‘coffee’	[mərsέ]	‘mercy’ (Mascaró 1976: 28)
c.	[kəré]	‘street’	[biədʤé]	‘traveler’
d.	[sɔ́]	‘sound’	[flɔ́]	‘flower’
e.	[fəlkó]	‘hawk’	[əksió]	‘action’
f.	[biulí]	‘violin’	[təstimɔ́ni]	‘testimony’
g.	[mósu]	‘lad’		
h.	[páɾə]	‘father’	[tákə]	‘stain’

In addition there is an active vowel reduction process in Catalan. Catalan has a seven-vowel phoneme inventory: /ɔ, o, u, a, ɛ, e, i/, all of which surface in stressed syllables (Crosswhite 1999; Hualde 1992; Mascaró 1976). In the unstressed position, vowels reduce to [i], [u], and [ə], as illustrated in (135).

(172) Vowel Reduction in Catalan (Crosswhite 1999: 138)

a.	/a/	sák	‘sack’
		səkέt	‘small sack’
b.	/ɛ/	pέl	‘hair’

		p**ə**lút	'hairy'
c.	/e/	s**é**rp	'snake'
		s**ə**rpɔ́tə	'big snake'
d.	/ɔ/	p**ɔ́**rt	'harbor'
		p**u**rtuári	'related to harbor'
e.	/o/	g**ó**s	'dog'
		g**u**sás	'big dog'
f.	/i/	pr**í**m	'thin'
		əpr**i**má	'to make thin'
g.	/u/	ʎ**ú**m	'light'
		ʎ**u**minós	'light (adj.)'

The front nonhigh vowels /a/, /ɛ/, and /e/ reduce to [ə], while the back vowels /ɔ/ and /o/ reduce to [u]. The vowels /i/ and /u/ surface faithfully as [i] and [u], respectively. Due to the preservation of the vowels [ɔ, o, a, ɛ, e,] in stressed positions and the possibility of word final stress, all vowels are attested word finally.

The null allomorph posited by Bonet et al. (2007) then must surface after all vowels, except [u] and [ə] in the masculine forms and [ə] in the feminine forms. The fact that the null allomorph is the default form highlights the fact that there is no commonality among the masculine or feminine forms that suggests a gender-marking morpheme. In addition, the vocalic gender allomorphs they propose ([u] and [ə]) coincide with the vowels found in unstressed positions and the final vowel in Catalan is typically unstressed. Given the vowel reduction process in Catalan, it seems less likely that the markers posited by Bonet et al. (2007) are indeed gender allomorphs than that they simply reflect the vowel inventory in unstressed positions. In addition, their analysis also invokes the use of subcategorization requirements in order to account for the shape of the word final segment. In LS, subcategorization and allomorph ordering are two independent mechanisms that effectively do the same thing – ensure proper allomorph insertion. There is no reason LS should have this redundancy. Instead the proper analysis is to posit that the segment is part of the lexical entry for the word.[65] This then avoids the need for the RESPECT constraint to enforce supposed lexical idiosyncrasies, it eliminates a morpheme whose default allomorph is null, and it obviates much of the theoretical machinery Bonet et al. (2007) require.

The Bonet et al. analysis also requires the use of Output-Output correspondence, a mechanism that can be avoided by reinterpreting the word final variation and using HS/LS. Yet their use of Output-Output does not appear to be necessary. In all the tableaux using OO presented herein, which are all of the tableaux using OO in Bonet et al. (2007), the OO constraint is never critical, i.e., it never is the deciding constraint between two candidates. Instead it is the alignment constraint that proves critical.

As noted above, alignment constraints have been criticized as being gradient and resulting in certain pathologies (McCarthy 2003, 2004, 2009a). By using HS/LS, alignment constraints are no longer needed. This is not surprising as the architecture of HS has made the use of alignment constraints for other phonological phenomenon, such as feature spreading and affix displacement, unnecessary (McCarthy 2009a).

The need for three distinct allomorphs is unnecessary in Catalan. Using a three-way distinction requires a gradient PRIORITY. Reanalyzing the data brings the language

[65] Certain segments are not part of the stem, such epenthetic schwa and segments that are part of suffixes, such as the masculine plural suffix allomorph [-us].

in-line with the hypothesis that there is only a single distinction in allomorph ordering, that of default and nondefault. PRIORITY can then be recast as a markedness constraint that is categorical and penalizes the use of the more marked, i.e. nondefault, allomorph.

(173) PRIORITY (revised) – Assign one violation mark for use of any allomorph other than the default allomorph.

With PRIORITY only sensitive to a binary distinction (default vs. nondefault) the issue of gradience falls away, and, crucially, a language that is otherwise evidence for the original version of PRIORITY falls away. As an added benefit the analysis for Catalan is now simpler, no longer requiring lexical subcategorization, alignment constraints, null allomorphs, and Output-Output correspondence.

4.6 HS/LS Analyses of Other Phonological Processes in Catalan

One goal of this chapter is an account of the plural allomorphy. Given the success of an HS/LS analysis of schwa epenthesis and plural formation it is worth looking at how an HS/LS analysis can be extended to the interaction of other word final phonological processes with plural allomorphy in Catalan. In the following sections I present analyses of the interaction of nasal place assimilation, homorganic consonant cluster simplification, word final nasal deletion, and plural formation. I will first present an analysis of word final nasal deletion and plural formation, followed by an analysis of nasal place assimilation and homorganic consonant cluster simplification. This is followed by an analysis of nasal place assimilation, word final homorganic consonant cluster simplification, and plural formation. I conclude with an analysis of the homorganic consonant cluster simplification and word final nasal deletion. These last two processes are in a counter-feeding opaque relationship. Counter-feeding opacity has proved challenging for HS (McCarthy 2000, 2007) and I provide a possible way of handling it in HS.

4.6.1 Analysis of Word Final Nasal Deletion and Plural Formation

In general word final nasals are allowed, as seen in the examples in (170) above. Yet when [n] is the coda of a word final stressed syllable, it deletes. This can be seen by comparing the forms in (174), where word final [n] is deleted, with those in (175), where it is retained. In (175a) and (175b) the word final [n] is part of a heterorganic consonant cluster and in (175c) and (175d) [n] follow an unstressed vowel.

(174) Word Final Nasal Deletion (Hualde 1992: 405)

a.	/kətəlán/	[kətəlá]	‘Catalan’
b.	/plɛ́n/	[plɛ́]	‘full’
c.	/kuzín/	[kuzí]	‘cousin’

(175) Word Final Nasal Retention (Hualde 1992: 405-06)

a.	/karn/	[kárn]	‘meat’
b.	/iβɛrn/	[iβɛ́rn]	‘winter’
c.	/təlɛfon/	[təlɛ́fon]	‘telephone’
d.	/əgzamən/	[əgzámən]	‘exam’

To motivate the deletion of [n], I propose the constraint *V́n#, which prohibits word final [n] in stressed syllables.[66]

[66] This constraint is a cover constraint for those discussed in Wheeler (2005) used to analyze this process in classic OT.

(176) *V́n# – assign one violation for each instance of [n] that occurs word finally following a stressed syllable

As epenthesis is a productive process in Catalan it must be prevented as a repair strategy in the case of word final nasals. This is done by ranking DEP over MAX. It may appear that this is counter to the patterns exhibited thus far in Catalan, but as seen below it is a necessary ranking and is still compatible with the above analyses of schwa epenthesis. In the tableau in (177) high ranking *V́n# motivates the deletion of [n] in candidate (177a.ii) and epenthesis in candidate (177a.iii) while penalizing the fully faithful candidate. Ranking DEP over MAX allows for the attested form, that which undergoes [n] deletion, to win. This form is converged upon in Step 2.

(177) HS/LS Derivation of [plɛ́] 'full.MASC.'

a. Step 1 of [plɛ́] 'full.MASC'

/plɛn/	DEP	*V́n	MAX
i. plɛ́n		*!	
☞ii. plɛ́			*
iii. plɛ́.nə̲	*!		

b. Step 2 of [plɛ́] 'full.MASC' (Convergence)

plɛ́	DEP	*V́n	MAX
☞i. plɛ́			

Word final nasal deletion and plural formation interact, with plural formation removing the environment for and preventing word final nasal deletion. When the plural is formed from a stem that normally undergoes word final nasal deletion, nasal deletion does not take place as seen in (178).

(178) Plural Formation and Word Final Nasal Deletion (Hualde 1992: 405)

	Masc. Sg.	Masc. Pl.	
a.	[plɛ́]	[plɛ́ns]	‘full’
b.	[kətəlá]	[kətəláns]	‘Catalan’
c.	[kuzí]	[kuzíns]	‘cousin’

This can be accounted for by ranking the constraints in a way that allows allomorph insertion to occur first, thus removing the environment that triggers deletion.

With the inclusion of the plural allomorphs in the input, REALIZE and PRIORITY are included in the ranking in addition to those seen above in (177). In Step 1 of (179) failure to realize the allomorphs by the candidate undergoing word final nasal deletion (candidate (179a.iii) is penalized by REALIZE, as is candidate (179a.ii). The two candidates with realized allomorphs do not violate any constraint ranked higher than REALIZE and the candidate with the nondefault allomorph [-us] is penalized by PRIORITY. Thus candidate (179a.i) wins and is converged upon as the winner in Step 2. In Step 2, the deletion of [n] is blocked by MAX while deletion of the plural allomorph is penalized by REALIZE.

(179) HS/LS Derivation of form [plɛ́ns] ‘full.MASC.PL’

a. Step 1 of form [plɛ́ns] ‘full.MASC.PL’

/plɛn {-s>-us}/	REALIZE	PRIORITY	*V́n	MAX
☞i. plɛ́ns				
ii. plɛ́n {-s>-us}	*!		*	
iii. plɛ́ {-s>-us}	*!			*
iv. plɛ́.nus		*!		

b. Step 2 of form [plɛ́ns] 'full.MASC.PL' (Convergence)

plɛ́ns	REALIZE	PRIORITY	*V́n	MAX
☞i. plɛ́ns				
ii. plɛ́s				*!
iii. plɛ́n	*!		*	*

The lack of nasal deletion in the plural is due to the fact that the realization of the plural allomorph in the first step eliminates violations of both *V́n# and REALIZE and succeeds over a candidate that satisfies only one of these markedness constraints.

4.6.2 Nasal Place Assimilation, Homorganic Consonant Cluster Simplification, and Plural Formation

While plural formation interacts with nasal place assimilation and homorganic consonant cluster simplification, the latter two processes also interact with each other. Nasal place assimilation feeds homorganic consonant cluster simplification. Below I first present an analysis of the interaction of nasal place assimilation and homorganic consonant cluster simplification. I follow this with an analysis of the interaction of all three processes.

4.6.2.1 Analysis of Nasal Place Assimilation and Homorganic Consonant Cluster Simplification

Stem finally, in /n/ + obstruent clusters, the coronal nasal assimilates to the following consonant's place of articulation (Hualde 1992). [67] This is shown in (180).

[67] Hualde (1992) presents the nasals here as underspecified. Wheeler (2005) treats the nasals as underlyingly specified for place and not undergoing nasal place assimilation. Other analyses (Herrick

(180) Nasal Place Assimilation (adapted from Hualde 1992: 404)

a.	/punt-ɛt/	[puntɛ́t]	'point.DIM'
b.	/kanp-ɛt/	[kampɛ́t]	'field.DIM'
c.	/bank-ɛt/	[baŋkɛ́t]	'bank.DIM'

Assimilation only occurs with /n/. The underlying nasals /m/ and /ɲ/ never assimilate, as shown in (181).

(181) Lack of Nasal Place Assimilation

a.	[əgzémt]	'exempt'	(Wheeler 2005: 172)
b.	[aɲ fəlís]	'a happy year'	(Herrick 2002: 29)[68]

Nasal place assimilation leads to the creation of homorganic consonant clusters. When homorganic consonant clusters occur word finally, they are simplified, with the word final obstruent being deleted. These are restricted to homorganic clusters of nasal + obstruent and lateral + obstruent (Hualde 1992: 402-03). Word final lateral + obstruent homorganic clusters simplification can be seen in (182)

(182) Homorganic Consonant Cluster Simplification of Lateral + Obstruent Clusters

a.	/alt/	[ál]	'high	(Hualde 1992: 380)
b.	/molt/	[mól]	'much'	(Caro Reina 2014: 377)

Of interest here is simplification of homorganic nasal + obstruent clusters. This

2002; Mascaró 1976) treat the nasals as underlyingly coronal. The nasals /m/ and /ɲ/ do not assimilate, but [n] never surfaces in comparable clusters like [np] and [nk]. So assimilation is not merely a matter of underlying specified place versus no place specification.

[68] Nasal place assimilation occurs both within the word (word final consonant clusters) and across word boundaries. For example, the /n/ in /son/ 'they are' assimilates to the following word's onset's place of articulation – [sóm pɔ́ks] 'they are few' (Hualde 1992: 395). See Mascaró (1976), Kiparsky (1985), and Herrick (2002) for discussion and different approaches to nasal place assimilation in Catalan.

simplification can be seen in (183) below. When the cluster is word internal, as in the diminutive forms in (183), the cluster is retained. When the cluster is word final, the obstruent is deleted.

(183) Homorganic Consonant Cluster Simplification of Nasal + Obstruent Clusters

a.	/punt/, /punt-ɛt/	[pún], [puntɛ́t]	'point', 'point.DIM'
b.	/kanp/, kanp-ɛt/	[kám], [kampɛ́t]	'field', 'field.DIM'
c.	/bank/, /bank-ɛt/	[báŋ], [baŋkɛ́t]	'bank', 'bank.DIM'

(adapted from Hualde 1992: 404)

Deletion of the second consonant in homorganic consonant cluster could bleed nasal place assimilation. If simplification took place prior to assimilation, then the bare nominal forms in (183) would surface with [n] word finally. Instead they surface with the place of articulation of the deleted obstruent, i.e., [m] and [ŋ] in (183b) and (183c), respectively. As lack of assimilation is not the pattern, the processes are in a feeding relationship, with nasal place assimilation preceding homorganic consonant cluster simplification.

To account for this interaction, several new constraints are needed. Simplification here is assumed to be one of coalescence, for reasons that will be explained in the next section on the interaction between word final nasal deletion and homorganic consonant cluster simplification. Coalescence is done to preserve the underlying obstruent's place feature to which the nasal is linked. Preservation of the obstruent feature is enforced through an obstruent specific MAXPLACE constraint modeled on those proposed by Lombardi (1998, 2001).[69] MAXPLACE(Obstruent) is violated when an underlying obstruent's place feature is deleted.

(184) MAXPLACE(Obstruent) – Assign one violation for every obstruent place feature in the input that lacks a correspondent obstruent place feature in the output.

Homorganic consonant cluster simplification interacts with nasal place assimilation, with the former occurring after the latter. Nasal place assimilation in NC codas is motivated by the constraint NPA.

(185) NPA – Assign one violation for each segment in an NC sequence where every Place linked to C is not linked to N, and vice versa (Padgett 1995)

According to McCarthy (2008a) place assimilation is a two-step process, with the delinking of the nasal's place of assimilation and the nasal then linking to the stop's place of articulation.[70] The constraint HAVEPLACE (McCarthy 2008a) is used here to prevent any segment from surfacing without a place of articulation.

In Catalan there is a prohibition against any type of geminate in the coda position, which Wheeler (2005) attributes to perceptual motivation. Homorganic coda consonants that share place and continuance are disallowed (Wheeler 2005). As noted above in Section 4.4.1, this prohibition against word final homorganic consonant clusters is captured by the constraint *GEMINATECODA (Wheeler 2005). This constraint could be satisfied by the deletion of either the nasal or the obstruent. To prevent

[69] The use of feature specific constraints is not new (Lombardi 1998; Pater 2004) and can account for the distinctive treatment of derived nasals in the next section.

[70] Kaplan (2011a) notes that place assimilation could also be achieved by spreading the feature first, then deleting the unwanted feature from the target.

unattested deletion of the nasal, the constraint CONTIGUITY is used.

In the tableaux below, the form [kám] 'field' is derived from /kánp/. Here the /n/ loses its place of articulation and becomes [m] by linking to the obstruent's place of articulation, after which either the obstruent is deleted or the nasal and obstruent coalesce. Whether it is deletion or coalescence is discussed with Steps 3 and 4 of the derivation in (186) below.

There are several ways to satisfy NPA, the constraint motivating homorganic consonant cluster simplification. One is to delete one of the two offending segments, as seen in candidates (186a.ii) and (186a.iii) in Step 1 of (186). Deletion of the obstruent in candidate (186a.ii) is penalized by MAXPLACE(Obstruent) and that of the nasal by CONTIGUITY. Failure to make any changes, as in candidate (186a.i), is penalized twice by NPA. This is due to the way that NPA is structured, which requires the nasal to share the consonant's place of articulation and the consonant to share the nasal's place of articulation. Thus a violation is incurred by each segment in the NC cluster. Candidate (186a.iv) violates NPA once, as the underspecified consonant no longer has a place of articulation that could violate NPA. While candidate (186a.iv) violates HAVEPLACE due to the placeless nasal, it wins and is the input for Step 2. In Step 2 NPA penalizes the fully faithful candidate's placeless nasal, while deletion of the placeless nasal is penalized by CONTIGUITY. The candidate with the assimilated nasal is most harmonic and proceeds as the input for Step 3. Here *GEMINATECODA penalizes the now homorganic consonant cluster. To satisfy this constraint one of the offending segments can be deleted entirely, as in candidate (186c.iv) where [m] is deleted. This violates CONTIGUITY. As the nasal is linked to the obstruent's place of articulation, deleting the obstruent in its entirety is not possible, as in candidate (186c.iii), because it violates MAXPLACE(Obstruent). Instead coalescence is the more desirable solution, as this does not violate MAX, MAXPLACE(Obstruent), or CONTIGUITY, and satisfies*GEMINATECODA.[71] The coalesced candidate wins and is the input for Step 4. In Step 4, the derivation converges upon the candidate where the word final nasal is retained, as in [kám], as deletion of [m] incurs a violation of MAX.

(186) HS Derivation of [kám] ‘field’

a. Step 1 of [kám] ‘field’

/kanp/	MAXPLACE(Obs)	CONTIGUITY	NPA	HAVEPLACE	*GEMCODA	DEP	*V́n#	MAX
i. kánp			**!					
ii. kán	*!						*	*
iii. káp		*!						*
☞iv. káNp			*	*				

[71] Coalescence could be treated as a single process in the operation-based approach here, which would entail nasal place assimilation being part of coalescence. If it is treated as a single process, to prevent coalescence in the diminutive a positional faithfulness constraint would be needed to preserve the second onset in forms like [kámpɛt]. I treat it as a multistep process.

b. Step 2 of [kám] 'field'

káNp	MaxPlace(Obs)	Contiguity	NPA	HavePlace	*GemCoda	Dep	*V́n#	Max
i. káNp			*!	*				
ii. káp		*!						*
☞iii kámp					*			

c. Step 3 of [kám] 'field'

$\text{kám}_1\text{p}_2$	MaxPlace(Obs)	Contiguity	NPA	HavePlace	*GemCoda	Dep	*V́n#	Max
i. kámp					*!			
☞ii. kám_{12}								
iii. kám_1	*!							*
iv. káp		*!						*

d. Step 4 of [kám] 'field' (Convergence)

kám_{12}	MaxPlace(Obs)	Contiguity	NPA	HavePlace	*GemCoda	Dep	*V́n#	Max
☞i. kám_{12}								
ii. ká								*!

By ranking NPA over *GEMINATECODA nasal place assimilation can occur first creating the environment for homorganic consonant cluster simplification. These two processes then interact with plural formation.

4.6.2.2 Analysis of Nasal Place Assimilation, Homorganic Consonant Cluster Simplification, and Plural Formation

There is interaction between plural formation, nasal place assimilation, and word final homorganic consonant cluster simplification. With the plural it might be expected that the [-us] form would surface allowing the cluster to be retained but this is not the case, as seen in (187). Instead the cluster is simplified and the [-s] form is used. Forms that use [-us] or do not simplify the cluster are ungrammatical.

(187) Formation of Plural with Underlying Homorganic Consonant Clusters (Wheeler 2005: 227)

a.	/pɔnt/	[pɔ́ns]	*[pɔ́ntus]/*[pɔ́nts]	'bridges'
b.	/kanp/	[káms]	*[kámpus]/*[kámps]	'fields'
c.	/alt/	[áls]	*[áltus]/*[álts]	'high.MASC.PL'

There are cases where the cluster is retained. In the case of the diminutive, these clusters surface intact, as can be seen by the forms in (188).[72]

[72] While the analysis does not address diminutive formation, it is amenable to it. The diminutive suffix does not experience allomorphic variation so there is only one form that appears in the input as a suffix to the stem. As homorganic consonant cluster simplification only affects word final clusters, the environment is absent when the diminutive suffix is present.

(188) Homorganic Consonant Cluster Simplification and Retention (adapted from Hualde 1992: 404)

a. [pú**n**], [pu**nt**ɛ́t] ‘point’, ‘point.DIM’

b. [ká**m**], [ka**mp**ɛ́t] ‘field’, ‘field.DIM’

c. [bá**ŋ**], [ba**ŋk**ɛ́t] ‘bank’, ‘bank.DIM’

Given the simplification of the cluster with the plural, the simplification process must take place before plural formation, and after diminutive formation, as the plural suffix would protect clusters from simplification and the forms would surface with the clusters and the [-us] plural allomorph, e.g., *[kámpus] vs. [káms] ‘fields’.

In the analysis in (189), plural formation does not prevent the simplification of homorganic consonant clusters. This derivation is similar to that of the singular. In the first step of (189) there are two primary types of changes that can be made: altering the stem to satisfy NPA or allomorph insertion to satisfy REALIZE. REALIZE is ranked highly in Catalan and this ranking forces allomorph realization to occur before cluster simplification. In Step 1 candidates that undergo allomorph insertion are favored over those that attempt to satisfy NPA in Step 1. PRIORITY distinguishes between the two remaining candidates, and as the form does not end in a sibilant (the only environment in which the [-us] allomorph appears), the candidate with default allomorph wins and becomes the input for Step 2. From here the derivation proceeds as it does for the singular in (186).

(189) HS/LS Derivation of [káms] ‘fields’

a. Step 1 of [káms] ‘fields’

/kanp {-s>-us}/	Realize	MaxPlace(Obs)	Priority	Contiguity	NPA	HavePlace	*GemCoda	Dep	*V́N#	Max
i. kánp {-s>-us}	*!				**					
ii. kán {-s>-us}	*!	*!							*	*
iii. káp {-s>-us}	*!			*						*
iv. káNp {-s>-us}	*!				*	*				
☞v. kánps					**					
vi. kán.pus			*!							

b. Step 2 of [káms] ‘fields’

kánps	Realize	MaxPlace(Obs)	Priority	Contiguity	NPA	HavePlace	*GemCoda	Dep	*V́N#	Max
i. kánps					**!					
ii. káns		*!		*						*
iii. káps				*!						*
☞iv. káNps					*	*				

c. Step 3 of [káms] ‘fields’

káNps	REALIZE	MAXPLACE(Obs)	PRIORITY	CONTIGUITY	NPA	HAVEPLACE	*GEMCODA	DEP	*V́N#	MAX
i. káNps					*!	*				
☞ii. kámps							*			
iii. káNs		*!		*		*				*
iv. káps				*!						*

d. Step 4 of [káms] ‘fields’

$\text{kám}_1\text{p}_2\text{s}$	REALIZE	MAXPLACE(Obs)	PRIORITY	CONTIGUITY	NPA	HAVEPLACE	*GEMCODA	DEP	*V́N#	MAX
i. $\text{kám}_1\text{p}_2\text{s}$							*!			
☞ii. $\text{kám}_{12}\text{s}$										
iii. $\text{kám}_1\text{s}$		*!		*		*				*
iv. $\text{káp}_2\text{s}$				*!						*

e. Step 5 of [káms] ‘fields’ (Convergence)

$\text{kám}_{12}\text{s}$	REALIZE	MAXPLACE(Obs)	PRIORITY	CONTIGUITY	NPA	HAVEPLACE	*GEMCODA	DEP	*V́N#	MAX
☞i. $\text{kám}_{12}\text{s}$										
ii. kás				*!						**

Thus far the interaction of word final nasal deletion and plural formation and of nasal place assimilation, homorganic consonant cluster simplification, and plural formation have been accounted for separately. Yet, word final nasal deletion and homorganic consonant cluster simplification also interact.

4.6.3 Analysis of Homorganic Consonant Cluster Simplification and Word Final Nasal Deletion

Word final nasal deletion does not apply to nasals created through homorganic consonant cluster simplification. This is demonstrated in (190) below.

(190) Interaction of Word Final Nasal Deletion & Homorganic Consonant Cluster Simplification (Hualde 1992: 406)

a.	/iɱfant/	[iɱfán]/*[iɱfá]	‘infant’
b.	/fəkund/	[fəkún]/*[fəkú]	‘fertile’

This is a case of counter-feeding opacity, where a form seems like it should have undergone a phonological process but does not (Baković 2007; Kiparsky 1973, 1976). In Catalan forms like [iɱfán] ‘infant’ seem as though they should have undergone word final nasal deletion, but did not because, in derivational terms, the operation that created the context for nasal deletion applied after the point in the derivation in which nasal deletion applied. HS is not a theory of opacity and the types of opacity it can account for are limited, with counter-feeding opacity being almost impossible to account for in HS (McCarthy 2000, 2007). Accounting for opacity in HS is not the central aim of this dissertation, but it can be handled in under certain representational assumptions. The specific facts of Catalan, coalesced nasals being preserved, lends itself to a previously unnoticed approach to opacity and while it may be stop-gap herein it may lead to a general solution to certain types of opacity in HS.

In Catalan there is a difference between word final nasals that are derived as a result of nasal place assimilation and homorganic consonant cluster simplification and word final nasals that were underlyingly word final. Derived nasals do not undergo word final nasal deletion, while nonderived nasals do. How the preservation of derived nasals is captured in the phonology depends on how homorganic consonant cluster simplification is achieved and the nature of inputs in HS. This problem can be illustrated through discussion of the derivation [iɱfáns] 'infants'.

When deriving [iɱfán] from /iɱfant/, it is difficult to preserve the word final coronal nasal. This is seen in the derivation in (191). Underlyingly, the word final cluster is already homorganic, so there is no nasal place assimilation. Instead the word final [t] coalesces, which violates *V́n, but not MAX. Deleting [t] altogether violates MAX, as in candidate (191a.iii). Failing to eliminate [t] in some manner violates *GEMINATECODA. Deleting [n] instead of [t] results in a violation of CONTIGUITY. The issue arises in Step 2. Here deletion of [n] is more harmonic than retention.

(191) HS Derivation of [iɱfán] ‘infant’

a. Step 1 of [iɱfán] ‘infant’

/iɱfant/	MAXPLACE(Obs)	CONTIGUITY	NPA	HAVEPLACE	*GEMCODA	DEP	*V́n#	MAX
i. iɱfánt					*!			
☞ii. iɱfán$_{12}$							*	
iii. iɱfán							*	*!
iv. iɱfát		*!						*

b. Step 2 of [iɱfán] ‘infant’

iɱfán$_{12}$	MAXPLACE(Obs)	CONTIGUITY	NPA	HAVEPLACE	*GEMCODA	DEP	*V́n#	MAX
☜i. iɱfán$_{12}$							*!	
💣ii. iɱfá								*

While this derivation works quite successfully for [kám] ‘field’, as [m] is allowed word finally in stressed syllables, deriving a form such as [iɱfán] ‘infant’ encounters issues. The ranking of *V́n# over MAX is necessary in order to derive forms such as [plɛ̃́] ‘full’, which undergoes word final nasal deletion. The key difference between a form like [plɛ̃́], which is derived from /plɛn/, and [iɱfán] is that the latter derives its place of articulation from the adjacent obstruent, in this case [t], while the former’s place of articulation is underlying or underived. This is a case of derived environment blocking (DEB) effects but varies from that seen and discussed in much of the literature. Typically, DEB involves the blocking of a phonological process in a nonderived environment (nonderived environment blocking – NDEB) and is the topic of much of the literature (Burzio 2011; Hall 2006; Inkelas 1998a; Kiparsky 1982a, 1993a; Łubowicz 2002). The case here is that of counter-feeding opacity – where the environment for a phonological process to apply is present, but the process fails to apply. This results in a ranking paradox, where one ranking is needed for derived, coalesced segments and one for nonderived segments.

Thus far the issue of coalescence has not been addressed in the HS literature and thus approaches on how to handle it are absent. [73] One solution lies in how the theory handles coalesced segments – whether indices are inherited by the input of subsequent steps and how the segments are treated by GEN and EVAL. As Catalan treats derived and nonderived nasals differently in regard to word final nasal deletion, this must somehow be reflected in the grammar. I will assume that indices are inherited and visible to EVAL. By doing so, the grammar has some way to distinguish derived from underived segments. This assumption raises the question of whether a segment with two indices can be deleted in one step or must it occur in two? If it is treated as a two-step deletion process, then the winner will be [iɱfán$_{12}$], as the deletion of either index invokes a violation of MAX, as in (192a). But under the operation-based approach adopted here, deletion of a whole segment is possible. Unfortunately, if the whole segment is deleted, the attested candidate loses, as retaining word final [n] would violate the higher ranked *V́n# and deletion of [n] would only violate the lower ranked MAX. Deletion of the

[73] I am aware of only one HS analysis (Samko 2011) that includes coalescence. Unfortunately coalescence occurs in the penultimate step of the derivation and the last step is not included in the analysis.

whole segment incurs two violations of MAX as the indices stand in correspondence to two segments and this opens up a possible solution. Opacity, and NDEB, is sometimes dealt with through the local conjunction of constraints in classic OT (Kager 2010). Using a complex constraint of [MAX & MAX] (MAX^2), which is violated if and only if a candidate incurs two violations of MAX, and ranking it over *V́n#, allows for the accounting of the facts. In (192b) MAX^2 penalizes deletion of [m_{12}] in candidate (192b.ii). This results in the attested form winning.

(192) Hypothetical Step 2 for the HS of [iɱfán] 'infant' – With Index Inheritance

a. Indices Deleted One-at-a-Time

iɱfán$_{12}$	MAXPLACE(Obs)	CONTIGUITY	NPA	HAVEPLACE	*GEMCODA	DEP	*V́n#	MAX
☞i. iɱfán$_{12}$							*	
ii. iɱfán$_{1}$							*	*!
iii. iɱfán$_{2}$							*	*!

b. Whole Segment Deleted, MAX^2 Included

iɱfán$_{12}$	MAXPLACE(Obs)	CONTIGUITY	NPA	HAVEPLACE	*GEMCODA	MAX^2	DEP	*V́n#	MAX
☞i. iɱfán$_{12}$								*	
ii. iɱfá						*!			**

Regardless of the solution chosen, restricting deletion to one index at a time or using a conjoined constraint, some measure must be implemented within in HS in order to handle counterfeeding opacity of this nature. Both approaches make certain assumptions about the treatment of coalescence and indexation in HS. Specifically they assume that GEN and EVAL are sensitive to the fact that coalesced segments are comprised underlyingly of two distinct segments. This is not that different from the treatment of coalesced segments in classic OT. In classic OT, coalescence does not violate MAX and the deletion of a coalesced segment violates MAX twice. Approaching certain types of opacity this way may prove beneficial and warrants future research.

4.7 Catalan Constraint Ranking Summary

Accounting for the various processes occurring among Catalan nominals requires a number of constraints and the ordering of various processes. This can be achieved through a serialist framework using the ranking shown in the Hasse diagram in Figure 4.1.[74]

There are several processes that this constraint ranking needs to account for: OCP-sibilant resolution, nasal place assimilation, homorganic consonant cluster simplification, word final nasal deletion, schwa epenthesis, and plural formation.

Avoiding adjacent sibilants in Catalan is done either through allomorphy, as in the case of the masculine, or through schwa epenthesis, as in the case of the feminine. The ranking necessary for OCP-sibilant resolution in the masculine requires OCP-SIB and REALIZE to outrank PRIORITY. REALIZE forces the realization of allomorphs even

[74] This diagram was generated using OTSoft 2.3.2 (Hayes et al. 2013). The constraint rankings were also verified using OTSoft 2.3.2.

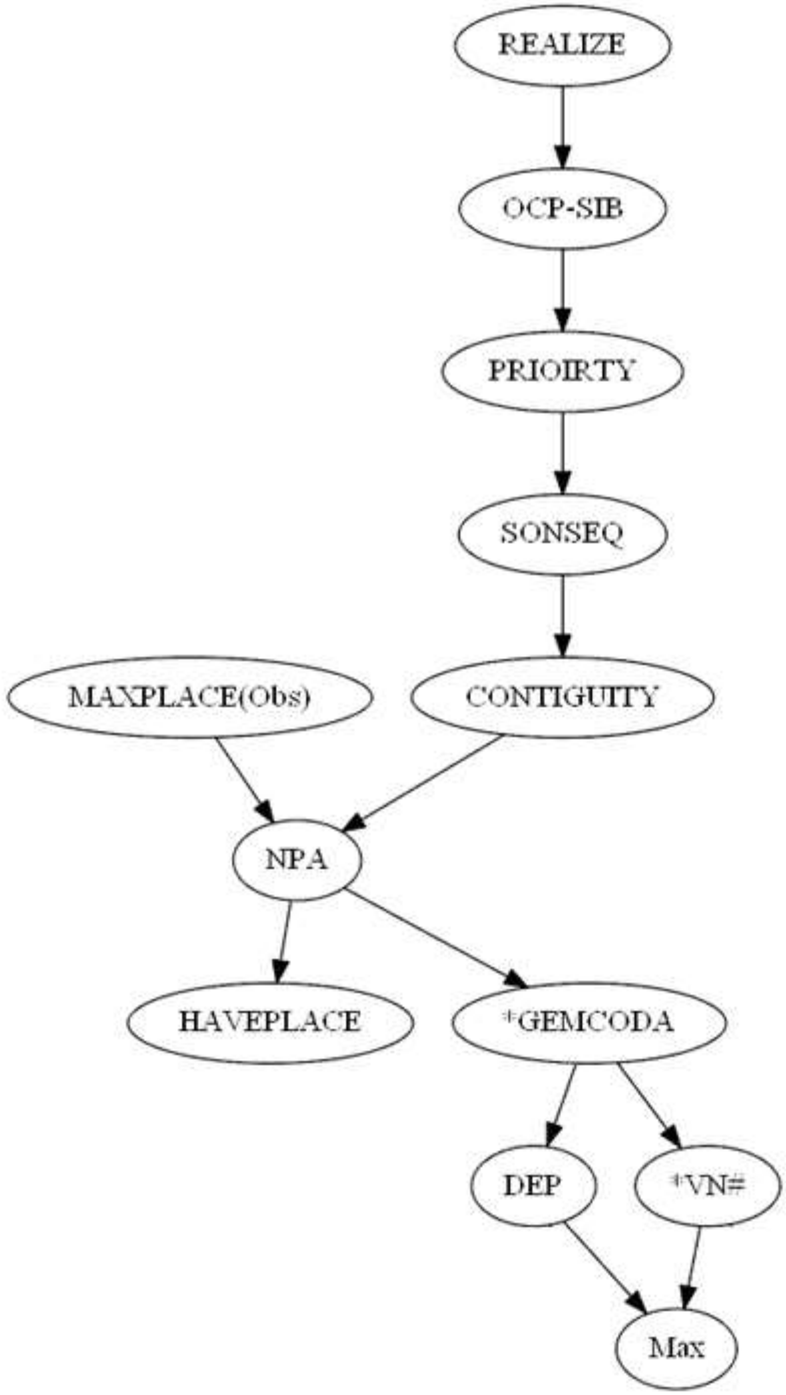

Figure 4.1 Catalan Nominal Constraint Ranking Hasse Diagram

when doing so requires the use of the nondefault allomorph, which requires REALIZE to outrank PRIORITY. OCP-SIB outranking PRIORITY allows for [-us] to surface in cases where [-s] will violate OCP-SIB. For the feminine, REALIZE must outrank OCP-SIB in order for the plural morpheme [-s] to be realized, which then creates the environment for schwa epenthesis. All of these must eventually outrank DEP in order for epenthesis to occur. To prevent deletion of offending sibilants and favor epenthesis, CONTIGUITY must outrank DEP.

Nasal place assimilation is motivated by NPA. NPA must outrank HAVEPLACE in order to allow the place deletion needed for the two-step assimilation process. CONTIGUITY and MAXPLACE(Obstruent) must outrank NPA to prevent deletion of one of the two NC segments, which would satisfy NPA. NPA outranks *GEMINATECODA in order to motivate the assimilation of the now placeless nasal. * GEMINATECODA motivates simplification of the now homorganic consonant cluster, but the ranking of NPA over it prefers the fully assimilated candidate to that which contains a placeless consonant. *GEMINATECODA motivates the simplification of the newly created homorganic cluster and must outrank *V́n# as simplification creates a word final nasal that violates *V́n#. Coalescence of the nasal and consonant instead of deletion of the consonant is motivated by ranking MAXPLACE(Obstruent) over MAX. Word final nasal deletion requires that DEP outrank MAX as epenthesis is never used to resolve word final nasals.

REALIZE and PRIORITY govern allomorph insertion. REALIZE wants some allomorph to appear; ranking other constraints above it means that the processes motivated by those constraints precede allomorph insertion. PRIORITY wants the default allomorph to appear; ranking constraints above it means those constraints have the power to force the other allomorph to appear. The Hasse diagram illustrates which processes precede allomorph insertion and what kinds of things can motivate the appearance of a nondefault allomorph.

The apparent ranking paradox that occurs with word final nasal deletion is resolved with the use of HS/LS due to the serial, one change per step nature of HS and the fact that realization of the plural allomorph satisfies both constraints (REALIZE and *V́n#). Cases that are truly epenthetic, such as those illustrated with SSP violations, are compatible with those that are variation of the plural morpheme.

4.8 Conclusion

I have offered a different interpretation of Catalan nominals, directly contrasting with that proposed by Bonet et al. (2007). Under my interpretation the variation seen with the plural formation is allomorphic variation of the plural suffix not variation of a gender marker.

Catalan has number of word final phonological processes that interact with the formation of the plural. These included nasal place assimilation, homorganic consonant cluster simplification, word final nasal deletion, and schwa epenthesis. When the plural is formed, word final [n] is not deleted. This is due to the fact that the plural allomorph is inserted prior to nasal deletion, removing the environment necessary for deletion. In the singular, nasals only delete when they are underlyingly word final, with nasals derived through word final homorganic consonant cluster simplification are retained. This raises the issue of how to account for counter-feeding opacity in HS. I propose two possible solutions based on the assumption that GEN and EVAL are sensitive to the nature of coalesced segments. This assumption can be handled in one of two ways – deleting each index one at a time or deleting the whole segment at once. Both approaches yield the correct surface form, with the latter requiring local constraint conjunction.

Catalan provides support for the idea that there only exists a default/nondefault distinction among allomorphs. This is a desired change as the previous instantiation of PRIORITY was problematic in that, as Wolf (2008) notes, it would have to evaluate candidates gradiently. Treating allomorph ordering as a default/nondefault distinction and reducing the number of allomorphs in competition with each other facilitates this simplification and this issue of gradience is avoided. By reinterpreting the data, I have reduced the number of potential allomorphs to only two in Catalan plural formation variation. I have also shown that HS/LS allows for the analysis of the interaction of four different phonological processes (word final nasal deletion, nasal place assimilation, homorganic consonant cluster simplification, schwa epenthesis) with one morphophonological process (plural formation).

CHAPTER 5

CONCLUSION

5.1 Summary

A sound theory of phonology must account for a wide array of phonological processes, including PCSA. Previously in HS there were two ways in which PCSA was handled: either as any other phonological process, thus erasing the distinction between allophony and allomorphy, or with HS/OI, which is unable to account for certain cases of PCSA, such as the Jèrriais plural definite article allomorphy in Chapter 2 and the Catalan allomorphy in Bonet (2013). I have proposed in this dissertation a third, more desirable approach to allomorphy within HS, that of HS/LS. HS/LS allows for an accounting of data that is problematic for other approaches, for a wide array of PCSA, and for certain cases of opacity.

As shown in Chapter 2, Jèrriais plural and masculine singular definite article allomorphy is problematic for classic OT and for HS. Specifically analyzing the plural definite article allomorphy in either theory requires the use of economy constraints or a ranking inconsistent with the language, both of which are argued to be unacceptable. These issues carry over into other OT-based theories of allomorphy – LPM-OT, Indexed Constraint Theory, and Cophonology Theory. Instead the inclusion of LS within both theories is necessary to successfully account for not only the plural definite article allomorphy but also the masculine singular definite article allomorphy. Implementing LS within HS raises several questions about the nature of allomorphy in HS and the mechanics of HS. How GEN handles allomorph insertion in a derivation is a key issue. Given the serial nature of HS, it is possible for allomorphs to be inserted serially in the derivations, with each step's candidates containing one allomorph or simultaneously. The serial approach is unacceptable as it required ordering of the allomorphs even when ordering is not always necessary, or desirable. In HS/LS ordering is done only in those cases where there is a default allomorph. When ordering is absent how GEN is to proceed through the list of allomorphs is unknown. Ordering of procession is important as the use of one allomorph, regardless of attestation, could harmonically bound the attested allomorph. Serial insertion also requires the insertion and then deletion of previous allomorphs in order to derive lower ordered/later-inserted allomorphs. This is seen in the case of arbitrary preference in Dyirbal in Section 3.3 where the derivation is unable to successfully derive the lower ordered allomorph. Simultaneous insertion of allomorphs is a more desirable solution as it is able to successfully account for all of the data in this dissertation. GEN then has access to all lexically listed allomorphs but is restricted by its own architecture from inserting more than one allomorph per step per candidate. This restriction resolves one of the issues raised by Wolf (2008) regarding LS – that of dual allomorph insertion. In OT/LS, it is possible for GEN to insert more than one allomorph per candidate. Mascaró (2007) solves this issue by appealing to an assumption that allomorph evaluation is achieved through unions of sets. The use of external principles or assumptions to regulate GEN is undesirable, as pointed out by Wolf (2008). Instead by using HS instead of OT, this problem is avoided. In HS, the gradualness restriction on GEN, which is part of the architecture of the theory, allows GEN to only perform one phonological or morphological operation per step per candidate. Thus GEN can only insert one allomorph per candidate per step.

Another issue raised by Wolf (2008) is that of the noncategorical nature of PRIORITY, the LS faithfulness constraint which enforces respect of lexical ordering of allomorphs. As put forth in all other works on LS but this one, PRIORITY is a gradient constraint. As there is no limit on the number of listed allomorphs a morpheme can have, it is possible that there is an unlimited ordering of allomorphs. This requires PRIORITY to evaluate candidates gradiently. In order to resolve this issue, I propose in Chapter 4 that there is only a binary distinction in ordering, i.e., there is only ever a default vs. nondefault distinction among ordered allomorphs. Of all of the analyses proposing ordered allomorphs, only two propose an ordering of more than two, that of Bonet et al. (2007) for Catalan and Bradley and Smith (2011) for Judeo Spanish. Chapter 4 proposes a successful reinterpretation of the Catalan data along with an analysis using a revised PRIORITY constraint. PRIORITY is revised to become a markedness constraint that penalizes the use of nondefault allomorphs. This revision resolves the gradiency issue associated with the original version of PRIORITY.

A key issue raised in this dissertation involves the nature of GEN. How GEN functions and the restrictions on it are central themes in much of the literature on HS. The operations that GEN is allowed to apply in HS vary, but there are currently two main approaches. One is the faithfulness-based approach. As noted in Section 3.1, under this approach operations are intrinsically linked to faithfulness constraints, such as MAX and DEP. GEN is then limited to applying only one unfaithful operation per candidate, but may apply as many faithful operations, such as syllabification, as desired. This approach results in allomorph insertion being a faithful operation as there is no faithfulness constraint that is violated by allomorph insertion. The second approach is the operation-based approach, which limits GEN to applying a single phonological or morphological operation. Under this approach allomorph insertion is an operation that GEN may apply to a candidate. This is a more desirable approach, as in Chapter 3 allomorph insertion is shown to be a change/operation that must be ordered with regard to other phonological operations.

Allomorph insertion is an operation that GEN can apply. Failing to realize an allomorphy is penalized by REALIZE. If a candidate succeeds despite violating REALIZE, the allomorph can be realized in subsequent steps. The necessity of treating allomorph insertion as a step is again supported by the analyses in Chapter 4 of Catalan. As shown, certain processes must be ordered with respect of allomorph insertion. Failure to do so results in being unable to derive the correct candidate.

Having established the architecture of HS/LS, I presented a successful analysis of Jèrriais definite article allomorphy, which stymied analyses in classic OT and HS. HS/LS is able to handle the preference for using a marked allomorph over an unmarked allomorph by appealing to the notion of a default allomorph. The current theory of allomorphy in HS, that of HS/OI, is shown to be inadequate to the task of accounting for Jèrriais definite article allomorphy.

In addition to accounting for Jèrriais allomorphy, I showed that HS/LS is also able to account for certain cases of opacity, specifically those that involve allomorphy.

An analysis of palatalization in Polish locatives shows that HS/LS can account for opacity. The issue of opacity arises again in the analysis of Catalan in Chapter 4.

In Chapter 4 I present an analysis of four word final phonological processes and their interaction with formation of the plural in Catalan nominals. This is done to provide support for reinterpreting PRIORITY as a markedness constraint. By analyzing the variation in Catalan plural formation as one of plural allomorphy and not gender marker allomorphy, as Bonet et al. (2007) propose doing, I am able to reduce a three-way allomorphy distinction to a binary, default/nondefault distinction. This is beneficial as it brings Catalan into alignment with other languages' allomorphic distinctions and it creates a simpler analysis.

In the end accounting for allomorphy in HS requires the use of multiple underlying representations and in some cases the ordering of allomorphs. This is achieved through the incorporation of LS into HS.

5.2 Future Research

The analysis of Catalan in Chapter 4 raises an important issue that needs to be examined – that of the treatment of coalescence in HS. In attempting to derive [iɱfán] 'infant' from /iɱfant/, the issue of derived versus nonderived nasals arises. In Catalan, nonderived word final nasals, i.e., those that are present underlyingly, that are in a stressed syllable are deleted, as in [plɛ́] (from /plɛn/ 'full'), while derived nasals, as in [iɱfán], are retained. I propose that GEN is sensitive to the indices inherited with the coalesced segments from previous steps in a derivation. There are two ways to approach this. One way is to treat deletion of a coalesced segment as a single step that incurs two violations of MAX. The other way is to assume the grammar can only delete one index at a time. Both of these approaches account for data and allow the grammar to distinguish between derived and nonderived segments. In the end this issue needs to be explored in more depth. The issue of derived environment block effects is a critical issue in any theory and a theory of phonology must be able to account for these effects as they are seen in a variety of languages.

Another area of research is the frequency of proposed default allomorphs. This dissertation posits that in certain cases, languages have a default allomorph that is preferred except in certain subcontexts. Interestingly, in Jèrriais those allomorphs which are posited as default allomorphs, [l] and [lz] for the masculine singular and plural definite articles, respectively, are the most frequently occurring. In the data used for this dissertation, there were 211 unique instances of masculine singular definite article. Of those, [l] occurred 164 times (78%) and [le] 47 times (22%). For the plural, there were 23 unique instances of the prevocalic allomorphs [lz] and [leiz]. Of those, [lz] occurred 17 times (74%) and [leiz] 6 times (26%). In both cases, the default allomorphs ([l] and [lz]) occur most often. It is worth examining corpora of other languages for which a default allomorph has been proposed, such as the plural allomorph [-s] in Catalan, to determine if there is a correlation between frequency and default status.

5.3 Concluding Remarks

In this dissertation I have attempted to show that the lexical listing and ordering of allomorphs is a robust property of the grammar. The fact that LS is required within both classic OT and HS supports the idea that LS captures something fundamental about languages. Without lexical listing, accounting for cases of PCSA is quite difficult in some cases without resorting to external principles (principles of economy) or modifications to the theories (output-output, subcategorization frames). As noted in the introduction, PCSA is a common phenomenon that has challenged analyses for decades. One common solution within OT is the use of multiple underlying representations, which this dissertation makes use of. But this dissertation takes this premise a step further proposing that some languages have a default allomorph. While ordering of allomorphs is a property LS, LS allows for potentially unlimited ordering. I modify this, making it more palatable to linguists, by limiting the ordering to a binary distinction. This binary distinction aligns with the binary nature of much of phonology (features, markedness, bilateral opposition of segments, etc.) and is, I believe, an inherent property of the phonology.

In addition, the analyses herein made specific assumptions about the type of operations GEN can apply, specifically assuming GEN can apply morphological operations. Previously only phonological operations were allowed under HS. But as this dissertation and Wolf (2008) show, GEN must be allowed to apply morphological operations in order to account for PCSA. As morphological operations in and of themselves do not violate any faithfulness constraints, this implies that change in GEN is not linked to faithfulness violations. This supports the approach advocated in Elfner (2009, 2016).

Overall, this dissertation raises interesting questions regarding the nature of HS and GEN and provides some answers. HS is a relatively young theory. This dissertation contributes to the growing literature on HS and phonologically conditioned allomorphy.

REFERENCES

ALDERETE, JOHN. 2001. *Morphologically governed accent in Optimality Theory*. New York & London: Routledge.

ANTTILA, ARTO. 1997. Deriving variation from grammar. *Variation, change, and phonological theory*, ed. by Frans Hinskens, Roeland Van Hout & W. Leo Wetzels, 35-68. Amsterdam: John Benjamins.

ANTTILA, ARTO. 2002. Morphologically conditioned phonological alternations. *Natural Language & Linguistic Theory* 20.1-42.

ANTTILA, ARTO. 2007. Variation and optionality. *The Cambridge handbook of phonology*, ed. by Paul de Lacy, 519-36. Cambridge: Cambridge University Press.

BAKOVIĆ, ERIC. 2007. A revised typology of opaque generalisations. *Phonology* 24.217-59.

BENUA, LAURA. 1995. Identity effects in morphological truncation. *University of Massachusetts occasional papers in linguistics* 18.77-136.

BENUA, LAURA. 1997/2000. *Phonological relations between words*. New York: Garland Publishing, Inc. (original dissertation published 1997).

BIRT, PAUL. 1985. *Lé Jèrriais pour tous: A complete course on the Jersey language*. Jersey, Channel Islands: Le Don Balleine.

BOERSMA, PAUL. 1997. How we learn variation, optionality, and probability. *Proceedings of the Institute of Phonetic Science*, Amsterdam, 43-58.

BOERSMA, PAUL. 1998. *Functional phonology: Formalizing the interactions between articulatory and perceptual drives*. The Hague: University of Amsterdam dissertation.

BONET, EULÀLIA. 2004. Morph insertion and allomorphy in Optimality Theory. *International Journal of English Studies* 4.73-104.

BONET, EULÀLIA. 2007. Gender allomorphy and epenthesis in Spanish. *Optimality-Theoretic studies in Spanish phonology*, ed. by Fernando Martinez-Gil & Sonia Colina, 312-38. Amsterdam: John Benjamins.

BONET, EULÀLIA. 2013. A challenge for Harmonic Serialism with Optimal Interleaving. *Phonology* 30.399-421.

BONET, EULÀLIA & MARIA LLORET. 2002. OCP effects in Catalan cliticization. *Catalan Journal of Linguistics* 1.19-39.

BONET, EULÀLIA, MARIA LLORET & JOAN MASCARÓ. 2007. Allomorph selection and lexical preferences: Two case studies. *Lingua* 117.903-27.

BONET, EULÀLIA, MARIA LLORET & JOAN MASCARÓ (eds.) 2015. *Understanding allomorphy: Perspectives from Optimality Theory*. Bristol, CT: Equinox Publishing Ltd.

BOOIJ, GEERT. 1996. Cliticization as prosodic integration: the case of Dutch. *The Linguistic Review* 13.219-42.

BRADLEY, TRAVIS G. 2007. Morphological derived-environment effects in gestural coordination: A case study of Norwegian clusters. *Lingua* 117.950-85.

BRADLEY, TRAVIS G. & JASON SMITH. 2011. The phonology-morphology interface in Judeo-Spanish diminutive formation: A lexical ordering and subcategorization approach. *Studies in Hispanic & Lusophone Linguistics* 4.247-300.

BRETELER, JEROEN. 2015. Deriving bounded tone with layered feet in Harmonic Serialism: The case of Saghala. Amsterdam: University of Amsterdam, MS.

BURZIO, LUIGI. 2011. Derived environment effects. *The Blackwell companion to phonology*, ed. by Marc Van Oostendorp, Colin J. Ewen, Elizabeth V. Hume & Keren Rice, 2089-114. Oxford: Wiley-Blackwell.

BYE, PATRIK. 2006. Allomorphy: Selection, not optimization. *Freedom of analysis*, ed. by Sylvia Blaho, Patrik Bye & Martin Krämer, 63-91. Berlin: Mouton de Gruyter.

BYE, PATRIK. 2007. Allomorphy—selection, not optimization. *Freedom of analysis*, ed. by Sylvia Blaho, Patrik Bye & Martin Krämer, 63-91. Berlin: Mouton de Gruyter.

CARO REINA, JAVIER. 2014. Central Catalan in the framework of the typology of syllable and word languages. *Syllable and word languages*, ed. by Javier Caro Reina & Renata Szczepaniak, 349-90. Berlin, Boston: Mouton de Gruyter.

CARSTAIRS, ANDREW. 1981. *Notes on affixes, clitics, and paradigms*. Bloomington: Indiana University Linguistics Club.

CLEMENTS, GEORGE N. 1990. The role of the sonority cycle in core syllabification. *Papers in laboratory phonology I: Between the grammar and physics of speech*, ed. by John Kingston & Mary E. Beckman, 283-333. Cambridge, MA: Cambridge University Press.

CROSSWHITE, KATHERINE MARGARET. 1999. *Vowel reduction in Optimality Theory*. Los Angeles, CA: University of California, Los Angeles dissertation.

DIXON, R. M. W. 1972. *The Dyirbal language of North Queensland*. Cambridge: Cambridge University Press.

DRACHMAN, GABERELL, RENÉ KAGER & ANGELIKI MALIKOUTI-DRACHMAN. 1996. Greek allomorphy: An optimality account. *Papers from the first conference on formal approaches to south Slavic languages*, ed. by Mila Dimitrova-Vulchanova & Lars Hellan, 345-61: University of Trondheim Working Papers in Linguistics 28.

ELFNER, EMILY. 2009. Syllabification and stress-epenthesis interactions in Harmonic Serialism. Amherst, MA: University of Massachusetts, Amherst, MS.

ELFNER, EMILY. 2016. Stress-epenthesis interactions in Harmonic Serialism. *Harmonic Grammar and Harmonic Serialism*, ed. by John McCarthy & Joe Pater. Bristol/Sheffield: Equinox, to appear.

ELSMAN, MINTA. 2016. Parallelism vs. serialism, or constraints vs. rules? Tongan stress and syllabification revisited. *Harmonic Grammar and Harmonic Serialism*, ed. by John McCarthy & Joe Pater. Sheffield/Bristol: Equinox, to appear.

GOLDSMITH, JOHN. 1976. *Autosegmental phonology*. Cambridge, MA: Massachusetts Institute of Technology dissertation.

GOUSKOVA, MARIA. 2003. *Deriving economy: Syncope in Optimality Theory*. Amherst, MA: University of Massachusetts, Amherst dissertation.

GREEN, ANTONY DUBACH. 2000. The prosodic representation of clitics in Irish. *Clitics from different perspectives*, ed. by Janet Grijzenhout & Birgit Gerlach, 181-218. Amsterdam: John Benjamins.

GRIMSHAW, JANE. 2003. Economy of structure in OT. *Papers in Optimality Theory II. University of Massachusetts occasional papers 26*, ed. by Angela Carpenter, Andries Coetzee & Paul de Lacy. Amherst, MA: Graduate Linguistic Student Association.

GUSSMANN, EDMUND. 1980. *Studies in abstract phonology*. Cambridge, MA: The MIT Press.

HALL, T. A. 2006. Derived environment blocking effects in Optimality Theory. *Natural Language & Linguistic Theory* 24.803-56.

HAMMOND, MICHAEL. 1984. *Constraining metrical theory: A modular theory of rhythm and destressing*. Los Angeles, CA: University of California, Los Angeles dissertation.

HARGUS, SHARON. 1995. The first person plural prefix in Babine-Witsuwit'en. Seattle, WA: University of Washington, MS.

HARGUS, SHARON & SIRI G. TUTTLE. 1997. Augmentation as affixation in Athabaskan languages. *Phonology* 14.177-220.

HARTKEMEYER, DALE C. 2000. **V: An optimality-theoretic examination of vowel loss phenomena, with special reference to Latin, early Western Romance, and Basque*. Urbana-Champaign, IL: University of Illinois at Urbana-Champaign dissertation.

HAUSER, IVY, CORAL HUGHTO & MEGAN SOMERDAY. 2016. Faith-UO: Counterfeeding in Harmonic Serialism. *Proceedings of the AMP 2014, to appear*.

HAYES, BRUCE, BRUCE TESAR & KIE ZURAW. 2013. OTSoft 2.3.2.

HERRICK, DYLAN. 2002. Catalan phonology: Cluster simplification and nasal place assimilation. *Romance phonology and variation*, ed. by Caroline R. Wiltshire & Joaquim Camps, 69-83. Amsterdam/Philadelphia: John Benjamins Publishing Co.

HUALDE, JOSE IGNACIO. 1992. *Catalan: Descriptive grammar*. London: Routledge.

INKELAS, SHARON. 1998a. Phonotactic blocking through structure immunity. Berkeley, CA: Berkeley University of California, MS.

INKELAS, SHARON. 1998b. The theoretical status of morphologically conditioned phonology: A case study from dominance. *Yearbook of morphology 1997*, ed. by Geert Booij & Jaap Van Marle, 121-55. Amsterdam: Springer.

INKELAS, SHARON & CHERYL ZOLL. 2005. *Reduplication: Doubling in morphology*. Cambridge: Cambridge University Press.

INKELAS, SHARON & CHERYL ZOLL. 2007. Is grammar dependence real? A comparison between cophonological and indexed constraint approaches to morphologically conditioned phonology. *Linguistics* 45.133-71.

ITÔ, JUNKO & ARMIN MESTER. 1999. The phonological lexicon. *The handbook of Japanese linguistics*, ed. by Natsuko Tsujimura, 62-100. Malden, MA: Blackwell.

ITÔ, JUNKO & ARMIN MESTER. 2004. Morphological contrast and merger: Ranuki in Japanese. *Journal of Japanese Linguistics* 20.1-17.

JERSIAISE, SOCIÉTÉ. 2005. Dictionnaithe Jèrriais-Angliais: Jèrriais-English dictionary. St. Helier, Jersey: Société Jersiaise.

JERSIAISE, SOCIÉTÉ. 2008. Dictionnaithe Angliais-Jèrriais : English-Jèrriais dictionary. Jèrri: Don Balleine Trust.

JESNEY, KAREN. 2011. Positional faithfulness, non-locality, and the Harmonic Serialism solution. *NELS 39: Proceedings of the 39th Annual Meeting of the North East Linguistic Society*, ed. by Suzi Lima, Kevin Mullin & Brian Smith, 429-40. Amherst, MA: GLSA.

JOHNSON, HENRY. 2008. Localising Jersey through song. *Shima: The International Journal of Research into Island Cultures* 2.73-98.

JONES, MARI C. 2000a. Ambiguity and unpredictability: Linguistic change in modern Jèrriais. *Vebum* 22.203-22.

JONES, MARI C. 2000b. Swimming against the tide: Language planning on Jersey. *Language Problems and Language Planning* 24.167-96.

JONES, MARI C. 2001. *Jersey Norman French: A linguistic study of an obsolescent dialect*. Oxford: Blackwell.

JONES, MARI C. 2003. *Jèrriais: Jersey's native tongue*. Jersey: Le Don Balleine.

JONES, MARI C. 2005a. Some structural and social correlates of single word intrasentential codeswitching in Jersey Norman French. *Journal of French Language Studies* 15.1-23.

JONES, MARI C. 2005b. Transfer and changing linguistic norms in Jersey Norman French. *Bilingualism: Language and Cognition* 8.159-75.

JONES, MARI C. 2007. Channel Island French. *Language in the British Isles* ed. by D. Britain. Cambridge: Cambridge University Press.

JONES, MARI C. 2009. Identity planning in an obsolescent variety: The case of Jersey Norman French. *Anthropological Linguistics* 50.1-17.

JONES, MARI C. 2010. Comment déterminer la syntaxe de l'oral: Une étude de cas des îles anglo-normandes. *La syntaxe de l'oral dans les variétés non-hexagonales du français*, ed. by Martina Drescher & Ingrid Neumann-Holzschuh, 137-48. Stauffenburg: Tubingen.

JONES, MARI C. 2012. Liaison Patterns and Usage in Jersey Norman French. *Probus* 24.197-232.

JONES, MARI C. 2015. *Variation and change in mainland and insular Norman: A study of superstrate influence*. Leiden: Brill.

KAGER, RENÉ. 1996. On affix allomorphy and syllable counting. *Interfaces in phonology*, ed. by Ursula Kleinhenz, 155-71. Berlin: Akademie Verlag.

KAGER, RENÉ. 2010. *Optimality Theory*. New York: Cambridge University Press.

KAPLAN, AARON. 2011a. Harmonic improvement without candidate chains in Chamorro. *Linguistic Inquiry* 42.631-50.

KAPLAN, AARON. 2011b. Variation through markedness suppression. *Phonology* 28.331-70.

KENSTOWICZ, MICHAEL. 2005. Paradigmatic uniformity and contrast. *Paradigms in phonological theory*, ed. by Laura Downing, Alan T. Hall & Renate Rafflesiefen, 145-69. Oxford: Oxford University Press.

KIKUCHI, SEIICHIRO. 2006. On Galician definite article allomorphy. *On'in Kenkyu (Phonological Studies)* 9.41-48.

KIMPER, WENDELL. 2008. Local optionality and Harmonic Serialism. Amherst, MA: University of Massachusetts, Amherst, MS.

KIMPER, WENDELL. 2009. Constraints on what's not there: The role of serial derivations in subtractive truncation. Paper presented at the HUMDRUM 2009, University of Massachusetts, Amherst.

KIMPER, WENDELL. 2011. Locality and globality in phonological variation. *Natural Language & Linguistic Theory* 29.423-65.

KIMPER, WENDELL. 2016. Positive constraints and finite goodness in Harmonic Serialism. *Harmonic Grammar and Harmonic Serialism*, ed. by John McCarthy & Joe Pater. Sheffield/Bristol: Equinox, to appear.

KIPARSKY, PAUL. 1973. Phonological representations. *Three dimensions of linguistic theory*, ed. by Osamu Fujimura, 3-136. Tokyo: TEC.

KIPARSKY, PAUL. 1976. Abstractness, opacity, and global rules. *The application and ordering of grammatical rules*, ed. by Andreas Koutsoudas, 160-84. The Hague: Mouton de Gruyter.

KIPARSKY, PAUL. 1982a. *Explanation in phonology*. Dordrecht: Foris.

KIPARSKY, PAUL. 1982b. From cyclic phonology to lexical phonology. *The structure of phonological representations*, ed. by H. Van der Hulst & Norval Smith, 131-75. Dordrecht: Foris.

KIPARSKY, PAUL. 1982c. Lexical phonology and morphology. *Linguistics in the morning calm*, ed. by In-Seok Yang, 3-91. Seoul: Hanshin Publishing Company.

KIPARSKY, PAUL. 1985. Some consequences of lexical phonology. *Phonology Yearbook* 2.85-138.

KIPARSKY, PAUL. 1993a. Blocking in non-derived environments. *Studies in Lexical Phonology*, ed. by Sharon Hargus & Ellen M Kaisse, 277-313. San Diego, CA: Academic Press.

KIPARSKY, PAUL. 1993b. An OT perspective on phonological variation. Paper presented at the Rutgers Optimality Workshop and at NWAV 1994, Stanford University.

KIPARSKY, PAUL. 1998. Paradigm effects and opacity. Stanford, CA: Stanford University, MS.

KIPARSKY, PAUL. 2000. Opacity and cyclicity. *Linguistic Review* 17.351-66.

KISSEBERTH, CHARLES W. 1970a. On the functional unity of phonological rules. *Linguistic Inquiry* 1.291-306.

KISSEBERTH, CHARLES W. 1970b. Vowel elision in Tonkawa and derivational constraints. *Studies presented to Robert B. Lees by his students*, ed. by Jerrold M. Sadock & Anthony L. Vanek, 109-37. Edmonton, AB and Champaign, IL: Linguistic Research.

KURISU, KAZUTAKA. 2001. *The phonology of morpheme realization*. Santa Cruz, CA: University of California, Santa Cruz dissertation.

LAPOINTE, STEVEN G. 2001. Stem selection and OT. *Yearbook of morphology 1999*, ed. by Geert Booij & Jaap van Marle, 263-97. Dordrecht: Kluwer.

LEBEN, WILLIAM R. 1973. The role of tone in segmental phonology. *Consonant type and tone*, ed. by Larry M. Hyman, 117-49. Los Angeles: University of Southern California.

LEMAISTRE, FRANK. 1979. The Jersey language = La langue Normande de Jersey. St. Helier, Jersey: Le Don Balleine.

LEMAISTRE, FRANK & ALBERT LUCIEN CARRÉ. 1966. Le dictionnaire Jersiais-Français. Jersey: Don Balleine Trust.

LIDDICOAT, ANTHONY. 1986. Lé patouais, lé bouon Français et l'Angliaichinn'nie: Dialect French, and the Anglicization of Jersey and Sark. *Working papers in linguistics, University of Melbourne* 12.27-39.

LIDDICOAT, ANTHONY. 1990. Some structural features of language obsolescence in the dialect of Jersey. *Language Sciences* 12.197-208.

LIDDICOAT, ANTHONY. 1994. *A grammar of the Norman French of the Channel Islands: The dialects of Jersey and Sark*. Berlin: Mouton de Gruyter.

LIDDICOAT, ANTHONY. 2008. The ecological impact of a dictionary. *Language planning and policy: Language planning in local contexts*, ed. by Anthony Liddicoat & Richard B. Baldauf, 113-19. Tonawanda, NY: Multilingual Matters.

LOMBARDI, LINDA. 1998. Evidence for MaxFeature constraints from Japanese. College Park, MD: University of Maryland, College Park, MS.

LOMBARDI, LINDA. 2001. Why place and voice are different: Constraint interactions and featural faithfulness in Optimality Theory. *Segmental phonology Optimality Theory: Constraints and representations*, ed. by Linda Lombardi, 13-45. Cambridge: Cambridge University Press.

ŁUBOWICZ, ANNA. 2002. Derived environment effects in Optimality Theory. *Lingua* 112.243-80.

ŁUBOWICZ, ANNA. 2006. Opaque allomorphy in OT. *Proceedings of the 25th West Coast Conference on Formal Linguistics* 261-69.

ŁUBOWICZ, ANNA. 2007. Paradigmatic contrast in Polish. *Journal of the Slavic Linguistics Society* 15.229-62.

MAHANTA, SHAKUNTALA. 2007. *Directionality and locality in vowel harmony with special reference to vowel harmony in Assamese*. Utrecht: Utrecht University dissertation.

MASCARÓ, JOAN. 1976. *Catalan phonology and the phonological cycle*. Cambridge, MA: MIT dissertation.

MASCARÓ, JOAN. 1987. *Morfologia*. Barcelona: Enciclopèdia Catalana.

MASCARÓ, JOAN. 1996a. External allomorphy and contractions in Romance. *Probus* 8.181-205.

MASCARÓ, JOAN. 1996b. External allomorphy as emergence of the unmarked. *Current trends in phonology. Models and methods*, ed. by Jacques Durand & Bernard Laks, 473-83. Salford: University of Salford, European Studies Research Institute.

MASCARÓ, JOAN. 2004. External allomorphy as emergence of the unmarked. *Optimality Theory in phonology: A reader*, ed. by John McCarthy, 513-21. Malden, MA: Blackwell Publishing.

MASCARÓ, JOAN. 2007. External allomorphy and lexical representation. *Linguistic Inquiry* 38.715-35.

MCCARTHY, JOHN. 1986. OCP effects: Gemination and antigemination. *Linguistic Inquiry* 17.207-63.

McCarthy, John. 1999a. Sympathy and phonological opacity. *Phonology* 16.331-99.

McCarthy, John. 1999b. Sympathy, cumulativity, and the Duke of York gambit. Amherst, MA: University of Massachusetts, Amherst, ms.

McCarthy, John. 2000. Harmonic Serialism and parallelism. *Proceedings of the North East Linguistic Society*, Amherst, MA, 501-24.

McCarthy, John. 2002. *A thematic guide to Optimality Theory*. Cambridge: Cambridge University Press.

McCarthy, John. 2003. OT constraints are categorical. *Phonology* 20.75-138.

McCarthy, John. 2004. Headed spans and autosegmental spreading. Amherst, MA: University of Massachusetts, Amherst, ms.

McCarthy, John. 2006. Restraint of analysis. *Wondering at the natural fecundity of things: Essays in honor of Alan Prince*, ed. by Eric Baković, Junko Ito & John McCarthy, 195-219. Santa Cruz, CA: Linguistics Research Center, UC Santa Cruz.

McCarthy, John. 2007. *Hidden generalizations: Phonological opacity in Optimality Theory*. London: Equinox.

McCarthy, John. 2008a. The gradual path to cluster simplification. *Phonology* 25.271-319.

McCarthy, John. 2008b. The serial interaction of stress and syncope. *Natural Language & Linguistic Theory* 26.499-546.

McCarthy, John. 2009a. Harmony in Harmonic Serialism. Amherst, MA: University of Massachusetts, Amherst, ms.

McCarthy, John. 2009b. The P-map in Harmonic Serialism. Amherst, MA: University of Massachusetts, Amherst, ms.

McCarthy, John. 2010a. Harmonic Serialism supplement to doing Optimality Theory. Amherst, MA: University of Massachusetts, Amherst, ms.

McCarthy, John. 2010b. An introduction to Harmonic Serialism. Amherst, MA: University of Massachusetts, Amherst, ms.

McCarthy, John. 2010c. Studying Gen. *Journal of the Phonetic Society of Japan* 13.3-12.

McCarthy, John. 2011. Autosegmental spreading in Optimality Theory. *Tones and features (Clements memorial volume)*, ed. by John Goldsmith, Elizabeth V. Hume & W. Leo Wetzels. Berlin: Mouton de Gruyter.

McCarthy, John. 2012. Pausal phonology and morpheme realization. *Prosody matters: Essays in honor of Lisa Selkirk*, ed. by Toni Borowsky, Shigeto Kawahara, Takahito Shinya & Mariko Sugahara, 341-73. London: Equinox Publishing.

McCarthy, John. 2016. The theory and practice of Harmonic Serialism. *Harmonic Grammar and Harmonic Serialism*, ed. by John McCarthy & Joe Pater. Sheffield/Bristol: Equinox, to appear.

McCarthy, John J., Wendell Kimper & Kevin Mullin. 2012a. Reduplication in Harmonic Serialism. *Morphology* 22.173-232.

McCarthy, John, Kevin Mullin & Brian Smith. 2012b. Implications of Harmonic Serialism for lexical tone association. *Phonological explorations. Empirical, theoretical, and diachronic issues*, ed. by Bert Botma & Roland Noske, 265-97. Berlin/Boston: Mouton de Gruyter.

McCarthy, John, Joe Pater & Kathryn Pruitt. 2016. Cross-level interactions in Harmonic Serialism. *Harmonic Grammar and Harmonic Serialism*, ed. by John McCarthy & Joe Pater. Sheffield/Bristol: Equinox, to appear.

McCarthy, John & Alan Prince. 1993a. Generalized alignment. *Yearbook of morphology*, ed. by Geert Booij & Jaap Van Marle, 79-153. Dordrecht: Kluwer.

McCarthy, John & Alan Prince. 1993b. Prosodic morphology: Constraint interaction and satisfaction. Amherst, MA: University of Massachusetts, Amherst & Rutgers University, ms.

McCarthy, John & Alan Prince. 1994. The emergence of the unmarked: Optimality in prosodic morphology. *The proceedings of the NELS 24*, ed. by John J McCarthy, Alan Prince & Mercè Gonzàlez, 333-79. Amherst: GLSA.

McCarthy, John & Alan Prince. 1995. Faithfulness and reduplicative identity. *University of Massachusetts occasional papers in linguistics 18: Papers in Optimality Theory*, ed. by Jill Beckman, Laura Dickey & Suzanne Urbanczyk, 249-384. Amherst, MA: GLSA.

McCarvel, Miranda K. 2010. *Allomorphic variation of definite articles in Jersey: A sonority based account*. Missoula, MT: University of Montana thesis.

McCarvel, Miranda K. 2016. When the local minimum is not enough: Incorporating Lexical Selection into Harmonic Serialism. *Proceedings of the AMP14, to appear.*

Mester, R. Armin. 1994. The quantitative trochee in Latin. *Natural Language & Linguistic Theory* 12.1-61.

MOORE-CANTWELL, CLAIRE. 2016. Contexts for epenthesis in Harmonic Serialism. *Harmonic Grammar and Harmonic Serialism*, ed. by John McCarthy & Joe Pater. Sheffield/Bristol: Equinox, to appear.

NAGY, NAOMI & WILLIAM T. REYNOLDS. 1997. Optimality Theory and variable word final deletion in Faetar. *Language Variation and Change* 9.37-55.

NGUNGA, ARMINDO. 2000. *Phonology and morphology of the Ciyao verb*. Stanford: CSLI Publications.

ORGUN, CEMIL ORHAN. 1996. *Sign-based morphology and phonology: With special attention to Optimality Theory*. Berkeley, CA: University of California Berkeley dissertation.

ORGUN, CEMIL ORHAN. 1998. Cyclic and noncyclic effects in a declarative grammar. *Yearbook of morphology 1997*, ed. by Geert Booij & Jaap Van Marle, 179-218. Amsterdam: Springer.

ORGUN, CEMIL ORHAN. 1999. Sign-based morphology: A declarative theory of phonology-morphology interleaving. *The derivational residue in phonological Optimality Theory*, ed. by Ben Hermans & Marc van Oostendorp, 247-67. Amsterdam: John Benjamins.

ORGUN, CEMIL ORHAN & SHARON INKELAS. 2002. Reconsidering bracket erasure. *Yearbook of morphology 2001*, ed. by Geert Booij & Jaap Van Marle, 115-46. Amsterdam: Springer.

PADGETT, JAYE. 1995. Partial class behavior and nasal place assimilation. *Proceedings of the Arizona Phonology Conference: Workshop on Features in Optimality Theory*, Tuscson, AZ, 145-83.

PARKER, STEPHEN. 2002. *Quantifying the sonority hierarchy*. Amherst, MA: University of Massachusetts, Amherst dissertation.

PASTER, MARY. 2005. Subcategorization vs. output optimization in syllable-counting allomorphy. *Proceedings of the Twenty-Fourth West Coast Conference on Formal Linguistics*, ed. by John Alderete, Chunghye Han & Alexei Kochetov, 326-33. Sommerville, MA: Cascadilla Proceedings Project.

PASTER, MARY. 2006. *Phonological conditions on affixation*: University of California, Berkeley dissertation.

PASTER, MARY. 2015. Phonologically conditioned suppletive allomorphy: Crosslinguistic results and theoretical consequences. *Understanding allomorphy: Perspectives from Optimality Theory*, ed. by Eulàlia Bonet, Maria Lloret & Joan Mascaró. Bristol, CT: Equinox Publishing Ltd.

PATER, JOE. 1997. Minimal violation and phonological development. *Language Acquisition* 6.201-53.

PATER, JOE. 2000. Non-uniformity in English secondary stress: The role of ranked and lexically specific constraints. *Phonology* 17.237-74.

PATER, JOE. 2004. Austronesian nasal substitution and other NC effects. *Optimality Theory in phonology: A reader* 14.271-89.

PATER, JOE. 2007. The locus of exceptionality: Morpheme-specific phonology as constraint indexation. *University of Massachusetts occasional papers 32: Papers in Optimality Theory III*, ed. by Leah Bateman, Michael O'Keefe, Ehren Reilly & Adam Werl, 259-96. Amherst, MA.

PATER, JOE. 2010. Morpheme-specific phonology: Constraint indexation and inconsistency resolution. *Phonological argumentation: Essays on evidence and motivation*, ed. by Steven Parker, 123-54. London: Equinox.

PATER, JOE. 2012. Serial Harmonic Grammar and Berber syllabification. *Prosody matters: Essays in honor of Elisabeth Selkirk.*, ed. by Toni Borowsky, Shigeto Kawahara, Takahito Shinya & Mariko Sugahara, 43-72. London: Equinox Press.

PERLMUTTER, DAVID. 1998. Interfaces: Explanations of allomorphy and the architecture of grammars. *Morphology and its relation to phonology and syntax*, ed. by Steven G. Lapointe, Diane Brentari & Patrick Farrell, 307-38. Stanford, CA: CSLI Publications.

PESCARU, GEORGE-MICHAEL. 2015. *Coordination and interaction in markedness suppression*. Salt Lake City, UT: University of Utah thesis.

PLAG, INGO. 1998. Morphological haplology in a constraint-based morpho-phonology. *Phonology and morphology of the Germanic languages*, ed. by Wolfgang Kehrein & Richard Wiese, 199-215. Tübingen: Niemeyer.

PLAG, INGO. 1999. *Morphological productivity: Structural constraints in English derivation*. Berlin & New York: Muton de Gruyter.

PRINCE, ALAN S. & PAUL SMOLENSKY. 1993/2004. *Optimality Theory: Constraint interaction in Generative Grammar*. Malden, MA: Blackwell Publishing.

PRUITT, KATHRYN. 2008. Iterative foot optimization and locality in stress systems. Amherst, MA: University of Massachusetts, Amherst, MS.

PRUITT, KATHRYN. 2010. Serialism and locality in constraint-based metrical parsing. *Phonology* 27.481-526.

PULLEYBLANK, DOUGLAS. 2003. Yoruba vowel patterns: Asymmetries through phonological competition. Vancouver, B.C.: University of British Columbia, MS.

PULLUM, GEOFFREY K. 1976. The Duke of York Gambit. *Journal of Linguistics* 12.83-102.

REYNOLDS, WILLIAM T. 1994. *Variation and phonological theory*: University of Pennsylvania dissertation.

RUBACH, J. & GEERT BOOIJ. 2001. Allomorphy in optimality theory: Polish iotation. *Language* 77.26-60.

RUBACH, JERZY. 1984. Cyclic and Lexical Phonology: The structure of Polish. *Lingua* 113.197-237.

RUBACH, JERZY. 2003. Polish palatalization in derivational Optimality Theory. *Lingua* 113.197-237.

SAMKO, BERN. 2011. Compensatory lengthening in Harmonic Serialism. University of California, Santa Cruz, MS.

SEMILOFF-ZELASKO, HOLLY. 1973. Syncope and pseudo-syncope. *Proceedings of the CLS 9*, Chicago, IL, 603-14.

SMITH, JENNIFER L. 1997. Noun faithfulness: On the privileged status of nouns in phonology. *Rutgers Optimality Archive*.ROA# 242-1098.

SPENCE, N. C. W. 1960. *A glossary of Jersey-French*. Oxford: Blackwell.

SPENCE, N. C. W. 1993. *A brief history of Jèrriais*. St. Helier, Jersey: La Société Jersiaise.

STAUBS, ROBERT. 2016. Serial restrictions of features/stress interactions. *Harmonic Grammar and Harmonic Serialism*, ed. by John McCarthy & Joe Pater. Sheffield/Bristol: Equinox, to appear.

STERIADE, DONCA. 1999. Lexical conservatism in French adjectival liaison. *Proceedings of the 25th Linguistic Colloquium on the Romance Languages*, ed. by J.-Marc Authier, Barbara E. Bullock & Lisa A. Reed, 243-70. Amsterdam: John Benjamins.

STERIADE, DONCA & IGOR YANOVICH. 2015. Accentual allomorphs in East Slavic: An argument for inflection dependence. *Understanding allomorphy: Perspectives from Optimality Theory*, ed. by Eulàlia Bonet, Maria Lloret & Joan Mascaró, 254-314. Bristol, CT: Equinox Publishing Ltd.

STUMP, GREGORY T. 2001. *Inflectional morphology: A theory of paradigm structure*. Cambridge: Cambridge University Press.

TANNER, DARREN SCOTT. 2007. Context insensitive vowel hiatus resolution in Ciyao. Seattle, WA: University of Washington, MS.

TAYLOR, MOIRA. 1994. *The interaction of vowel deletion and syllable structure constraints*. Burnaby, BC: Simon Fraser University dissertation.

TORRES-TAMARIT, FRANCESC. 2012. *Syllabification and opacity in Harmonic Serialism*. Barcelona: Universitat Autònoma de Barcelona dissertation.

TORRES-TAMARIT, FRANCESC. 2016. Compensatory and opaque vowel lengthening in Harmonic Serialism. *Harmonic Grammar and Harmonic Serialism*, ed. by John McCarthy & Joe Pater. Sheffield/Bristol: Equinox, to appear.

TRANEL, BERNARD. 1993. On suppletion and French liaison. *Amsterdam Studies in the Theory and History of Linguistic Science Series 4*.269-308.

TRANEL, BERNARD. 1996a. Exceptionality in Optimality Theory and final consonants in French. *Grammatical Theory and Romance Languages*, ed. by Karen Zagona, 275-91. Amsterdam: John Benjamins.

TRANEL, BERNARD. 1996b. French liaison and elision revisited: A unified account within Optimality Theory. *Aspects of Romance linguistics*, ed. by Claudia Parodi, Carlos Quicoli, Mario Saltarelli & Maria-Luisa Zubizarreta, 433-55. Washington, DC: Georgetown University Press.

TRANEL, BERNARD. 1998. Suppletion and OT: On the issue of the syntax/phonology interaction. *The Proceedings of the West Coast Conference on Formal Linguistic*, ed. by Emily Curtis, James Lyle & Gabriel Webster, 415-29. Stanford, CA: CSLI Publications.

TRANEL, BERNARD. 1999. Optional schwa deletion: On syllable economy in French. *Formal perspectives on Romance linguistics*, ed. by J.-Marc Authier, Barbara E. Bullock & Lisa A. Reed, 271-88. Amsterdam: John Benjamins.

WHEELER, MAX. 1979. *Phonology of Catalan*. Oxford: Basil Blackwell.

WHEELER, MAX. 2005. *The Phonology of Catalan*. Oxford: Oxford University Press.

WOLF, MATTHEW ADAM. 2008. *Optimal Interleaving: Serial phonology-morphology interaction in a constraint-based model*. Amherst, MA: University of Massachusetts, Amherst dissertation.

WOLF, MATTHEW ADAM. 2015. Lexical insertion occurs in the phonological component. *Understanding allomorphy: Perspectives from Optimality Theory*, ed. by Eulàlia Bonet, Maria Lloret & Joan Mascaró, 361-407. Bristol, CT: Equinox Publishing, Ltd.

XU, ZHENG. 2007. *Inflectional morphology in Optimality Theory*. Stony Brook, NY: Stony Brook University dissertation.

YIP, MOIRA. 1998. Identity avoidance in phonology and morphology. *Morphology and its relation to phonology and syntax*, ed. by Steven G Lapointe, Diane Brentari & Patrick Farrell, 216-46. Palo Alto, CA: CSLI Publications.

ZOLL, CHERYL. 1993. Directionless syllabification and ghosts in Yawelmani. Berkeley: University of California, MS.

ZOLL, CHERYL. 1996. *Parsing below the segment in a constraint based framework*. University of California, Berkeley dissertation.