

When the Local Minimum is not Enough: Incorporating Lexical Selection into Harmonic Serialism

Miranda K. McCarvel
University of Utah

1 Introduction

This paper argues for the inclusion of Lexical Selection (LS; Mascaró 2007) in Harmonic Serialism (HS; McCarthy 2000; Prince & Smolensky 1993) in order to account for phonologically conditioned allomorphy. Using data from Jersey Norman French (Jèrriais), I show that HS cannot account for allomorphy that does not result in the emergence of the unmarked (TETU). In order to account for non-TETU allomorphy, HS must include the assumption that allomorphs are lexically listed, which is the underlying premise of LS.

This paper is organized as follows. Section 2 introduces the relevant Jèrriais data. Section 3 details the issues an HS analysis encounters with Jèrriais non-TETU allomorphy. Section 4 presents my solution to the problem, a Harmonic Serialism/Lexical Selection (HS/LS) analysis. Section 5 discusses other possible approaches, including economy constraints and an alternative approach to morphology in phonology – Harmonic Serialism/Optimal Interleaving (HS/OI; McCarthy 2012). In Section 6, the paper concludes and discusses further areas of research.

2 Jèrriais Plural Definite Article Allomorphy

Jèrriais exhibits allomorphic variation in many parts of speech including verbs, adjectives, prepositions, pronouns, and articles. There are three allomorphs of the plural definite article, [lei], [leiz], and [lz].¹ Liddicoat (1994) describes the distribution as [lei] occurring before consonants, shown in (1), and [lz] occurring prevocally, shown in (2).² 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) and in Jones (2012). This third allomorph appears prevocally, 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 (3), while [lz] only occurs when the preceding word ends in an open syllable.

- (1) [lei] - __C(C)
- | | | |
|----|-----------------|---------------------|
| a. | vãdr lei patat | ‘sell the potatoes’ |
| b. | dã lei kjo: | ‘in the fields’ |
| c. | fi:s lei travø: | ‘do the work’ |
| d. | #lei kawã | ‘the owls’ |
- (2) [lz] - V__V
- | | | |
|----|----------------|---------------------|
| a. | parmi lz ãgjei | ‘among the English’ |
| b. | pa lz almã | ‘by the Germans’ |
| c. | #lz almã:z | ‘the Germans’ |
| d. | ε lz epijɲ | ‘and the thorns’ |

* This work was supported, in part, by the Steffensen Cannon Scholarship fund. I would like to thank my adviser, Aaron Kaplan, and the reviewers and participants of the Phonology 2014 conference.

¹ The quality of the vowel in the plural definite article varies depending on the dialect of the speaker. The plural definite article’s vowel can be [e], [ei], or [e:]. For simplicity all vowels are represented as [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].

² All data come from Liddicoat (1994).

- (3) [leiz] - C__V
 a. oprei k **leiz** almã ‘after the Germans’
 b. ʃ teim **leiz** ãgjei ‘we were English’

The distribution of any one allomorph, in isolation, does not present an issue for an analysis using a single underlying representation. The distribution of [lei] is limited to preconsonantal positions as it is penalized prevocally by NOHIATUS. The use of [leiz] or [lz] is motivated prevocally by ONSET. Accounting for the variation between [lz] and [leiz] is difficult. Both [lz] and [leiz] occur prevocally and markedness constraints would favor the use of [leiz] over [lz] in this environment. The use of [lz] requires that the [l] be syllabified as either a coda or along with the [z] as a complex onset, as in (4a).³ The use of [leiz] in this position would not create a coda or complex onset. After the resyllabification of [z] as an onset, the remaining segments, [lei], form a CV syllable, an unmarked syllable structure, as seen in (4b).

- (4) a. pa.lzal.mã or pa.lzal.mã ‘by the Germans’
 b. *pa.lei.zalmã

In this case markedness constraints, such as *COMPLEX or NOCODA, would favor [leiz] over [lz]. Yet, [lz] is the attested form, regardless of surface markedness, and this proves problematic for HS.

3 Issues for an HS Analysis

TETU is argued to be a motivating factor in allomorphy (Kager 1996; Lapointe 2001; Mascaró 1996a, 2004, 2007; Perlmutter 1998; Tranel 1996b). Allomorphy of this nature is well suited for HS as HS requires that each step be harmonically improving, with the local minimum resulting in an allomorph that is unmarked. In cases such as Jèrriais plural definite article allomorphy, the attested allomorph sometimes results in a marked configuration, even when an unmarked alternative is possible, as illustrated in (4) above. For HS this is problematic as the derivation will often converge on the unmarked alternative. This is seen in the comparative tableau in (5). If /leiz/ is underlying, at some point in the derivation the ranking and candidates in (5) will occur and [leiz] will harmonically bound [lz].

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

One way to overcome this is to posit that /lz/ is underlying. This unfortunately results in a constraint ranking that is inconsistent with Jèrriais. In order to derive [lei] from /lz/, NOCODA must outrank MAX-C, as in (6). This predicts that there are no codas in the language, which is incorrect as evinced by the data in (1a), (1c), (2c), (2d), and (3b).

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

Using /lei/ underlyingly also results in harmonic bounding of [lz] by [leiz], as illustrated in (7) below.⁴ In order to derive [lz] from [lei], [z] must be epenthesis. This is easy to motivate through a high ranking NOHIATUS, but then deletion of the vowel is unmotivated. Deleting the vowel in [lei] first to resolve hiatus is possible, but then epenthesis of [z] is unmotivated.

³ Like other Romance languages, Jèrriais lacks syllabic consonants, thus [lz] must be syllabified into adjacent syllables.

⁴ *COMPLEX has been removed due to space. It does not favor any candidate in (7).

(7)

/parmi lei ãgjei/	NOHIATUS	MAX-V	NOCODA	DEP-C
par.mil.zã.gjei ~ par.mi.lei.ã.gjei	W	L	L	L
par.mil.zã.gjei ~ par.mi.lei.zã.gjei		L	L	

Regardless of how the derivation proceeds, it is impossible to move from unmarked to marked in HS. The requirement of harmonic improvement and resultant local minimum will cause the derivation to converge on [leiz] prevocally. Instead, I propose that HS needs to be modified to include the lexical listing of allomorphs. The use of multiple underlying representations for suppletive allomorphy is not new (Hargus 1995; Hargus & Tuttle 1997; Mascaró 1996b; Mester 1994; Perlmutter 1998; Tranel 1993, 1996a, 1996b, 1998). Jones (2012) proposes that definite articles in Jèrriais be treated as suppletive. LS is the appropriate framework for this.

4 HS/LS Analysis

4.1 Lexical Selection LS has as its main premise the lexical listing of allomorphs. 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 under which they surface. The appeal of lexically listed allomorphs is that faithfulness constraints hold between each unique allomorph, instead of between an allomorph and an underlying morpheme. This correspondence is defined in (8). Corresponding allomorphs are co-indexed in the input and the output.⁵

- (8)
- The set of allomorphs of a morpheme M (m_1, m_2, \dots, m_n) can be represented as a partially ordered set.
 - For $M = /m_1, m_2, \dots, m_n/$, $\text{GEN}(/m_1, m_2, \dots, m_n/) = \text{GEN}(m_1) \cup \text{GEN}(m_2) \dots \cup \text{GEN}(m_n)$. (Given a set of allomorphs, the candidate set is the collection of the individual candidate sets of each allomorph.)
 - Each candidate morph in b. stands in a correspondence relation to one of the underlying allomorphs (i.e., if $\text{cand}_i \in \text{GEN}(/m_j/)$, then $\text{cand}_i \mathfrak{R} m_j$).
 - Under input allomorphy, candidate faithfulness violations are computed with respect to the candidate's corresponding underlying allomorph. (Mascaró 2007: 718)

Another benefit of lexically listing allomorphs is that the idiosyncratic shape does not have to be accounted for through constraints on the output or through subcategorization frames. This allows for the capturing of the generalization that allomorphy is not allophony. Allophony is predictable and conditioned by phonology and accounted for through markedness and faithfulness constraints, the ranking of which hold language wide. Allomorphy differs from allophony as the phonological shape of the allomorph cannot be accounted for using language wide rankings of constraints, i.e. no constraint ranking can produce epenthetic [z] for the Jèrriais definite plural allomorphs. With lexical listing of allomorphs there is no need to posit that the shape of the allomorph is due to epenthesis or deletion and there is no need to specify the epenthetic segment for each morpheme. Treating allomorphy as cases of epenthesis or deletion is problematic as the patterns displayed by allomorphs are not generalizable language wide.

In many cases of allomorphy there are predictable configurations in which a specific allomorph surfaces to create an unmarked structure. In these cases, the allomorphic variation can be accounted for by listing allomorphs and allowing constraint interaction to choose between them. In cases where allomorphy does not result in TETU, constraint interaction alone is unable to dictate which allomorph will surface. In cases like these, Mascaró (2007) argues that there is actually competition between unmarked surface structure and a default allomorph that is preferred by the language. To reflect a language's preference for a default allomorph, Mascaró (2007) proposes that allomorphs be ordered in the input. With ordering (full or partial), the default allomorph is ordered above other allomorphs, which is indicated by numerical ranking. Ordering can be determined by examining the markedness of the structures created through allomorphic variation. 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. Mascaró

⁵ Co-indices are not indicated in this paper but are assumed to hold between allomorphs.

(2007) uses the faithfulness constraint PRIORITY, defined in (9), to penalize the use of any allomorph that is not the dominant allomorph.

- (9) PRIORITY - respect lexical priority (ordering) of allomorphs.
 Given an input containing allomorphs m_1, m_2, \dots, m_n , and a candidate m_i , where m_i is in correspondence with m_i , PRIORITY assigns as many violation 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. In the tableau in (10a), a nonce language exhibits a preference for the allomorph [a] over that of [la] despite the fact that using [la] would avoid vowel hiatus. Here PRIORITY assigns one violation to candidate ii. for the use of [la], the non-default allomorph. While candidate i. is more marked, it is preferred by higher ranking PRIORITY and surfaces as a result. Thus PRIORITY can capture the preference of a grammar to utilize the default allomorph even when it creates a more marked surface structure.⁶ PRIORITY can be overridden by other constraints to account for allomorphic variation. For example, this nonce language prefers the right edge of a stem to align with the right edge of a syllable, which is captured with ALIGN(STEM, R, σ , R). In the tableau in (10b), this ALIGN constraint outranks PRIORITY to account for the preference of [la] after closed syllables.

(10) Illustrations of LS and PRIORITY

a.	/tata {a ₁ , la ₂ }/	ALIGN(STEM, R, σ , R)	PRIORITY	NOHIATUS
	i. ta.ta.a			*
	ii. ta.ta.la		*!	
b.	/tat {a ₁ , la ₂ }/	ALIGN (STEM, R, σ , R)	PRIORITY	NOHIATUS
	i. ta.ta	*!		
	ii. tat.la		*	

In Jèrriais there appears to be a preference for the use of the allomorph [lz] over that of coda avoidance, which would be achieved by use of [leiz]. By including LS within HS and ordering [lz] over [leiz], the pattern can be accounted for.

4.2 HS/LS As shown above, HS cannot account for the variation seen in the plural definite article. The incorporation of LS into HS is similar to that of LS in OT. In HS/LS, allomorphs are lexically listed and, if need be, ordered in the input. With ordered allomorphs, the default allomorph dominates other allomorphs and use of non-default allomorphs is penalized by PRIORITY and motivated by markedness constraints that outrank PRIORITY. It is important to note that PRIORITY is a faithfulness constraint. Within HS, in order for something to be considered a change it must violate a faithfulness constraint. As the use of an allomorph violates PRIORITY, a faithfulness constraint, the use of a lexically listed allomorph is considered a change. PRIORITY is only in effect in a derivation until an allomorph is chosen; after that the input of subsequent steps is the output of the previous step and contains only one allomorph, so the correspondence relationships are lost. Implementation of HS/LS is shown in the derivation illustrated in (11). In Step 1, the allomorphs are inserted. NOHIATUS penalizes [lei] prevocally and PRIORITY makes the choice between [leiz] and [lz].⁷ [lz] becomes the input for Step 2 even though it has more gratuitous markedness violations than [leiz]. In this way the derivation can choose a more marked allomorph and still be harmonically improving.

⁶ While PRIORITY appears at first glance to be a gradient constraint, Mascaró (2007) argues that it is a categorical constraint. For his argument see Footnote 13 of Mascaró (2007).

⁷ The use of [lei] does not violate any faithfulness constraint while the use of [leiz] incurs two violations of a faithfulness constraint. For present purposes I am allowing multiple PRIORITY violations. These issues need to be explored further.

(11) HS/LS Derivation of [parmi lz ãgjei]⁸

a. Step 1 of [parmi lz ãgjei]

/parmi {lei ₁ , lz ₂ , leiz ₃ } ãgjei/	NOHIATUS	*COMPLEX	MAX	DEP	PRIORITY	NOCODA
i. par.mi. lei .ã.gjei	*!					
ii. par.mi. lei.zã .gjei					**!	
☞ iii. par.mil. zã .gjei					*	*

b. Step 2 [parmi lz ãgjei] (Convergence)

par.mil. zã .gjei	NOHIATUS	*COMPLEX	MAX	DEP	PRIORITY	NOCODA
☞ i. par.mil. zã .gjei						*
ii. par.mi. lei.zã .gjei				*!		

The derivation then converges in Step 2, where the attempt to “improve” the definite article through epenthesis of [ei] is prevented by the violation of DEP, and [lz] surfaces as it does not violate any higher ranking constraint(s).

In addition to successfully deriving [lz], [leiz] can also surface, as shown in (12). In the tableau in (12a), PRIORITY is not the determining constraint. In this case, *COMPLEX eliminates [lz] as the definite article creates a complex coda.⁹ In Step 2, the deletion of the vowel or consonant to derive the other allomorphs does not improve performance and the derivation converges on [leiz].

(12) HS/LS Derivation of [oprei k leiz almã]¹⁰

a. Step 1 of [oprei k leiz almã]

/oprei k {lei ₁ , lz ₂ , leiz ₃ } almã/	NOHIATUS	*COMPLEX	MAX	DEP	PRIORITY
i. o.preik. lei .al.mã	*!				
☞ ii. o.preik. lei.zal .mã					**
iii. o.preikl. zal .mã		*!			*

b. Step 2 of [oprei k leiz almã] (Convergence)

o.preik. lei.zal .mã	NOHIATUS	*COMPLEX	MAX	DEP	PRIORITY
i. o.preik. lei .al.mã	*!		*		
☞ ii. o.preik. lei.zal .mã					
iii. o.preikl. zal .mã		*!	*		

Using HS/LS also allows for an analysis of [lei] without resorting to the problematic ranking of NOCODA over MAX. In the tableau in (13a), PRIORITY penalizes the use of [leiz], while *COMPLEX eliminates [lz] due to the creation of a complex coda. In Step 2, epenthesis of [z] is unmotivated and the derivation converges.

(13) HS/LS Derivation of [dã lei kjo:]

a. Step 1 of [dã lei kjo:]

/dã {lei ₁ , lz ₂ , leiz ₃ } kjo:/	NOHIATUS	*COMPLEX	MAX	DEP	PRIORITY
☞ i. dã. lei .kjo:					
ii. dã. leiz .kjo:					*!*
iii. dã lz .kjo:		*!			*

⁸ I only indicate violations whose loci involve the plural definite article.

⁹ The definite article could be syllabified as a complex onset and the result would be the same.

¹⁰ NOCODA is assumed to be ranked below PRIORITY but is not shown due to space limitations.

b. Step 2 of [dã lei kjo:] (Convergence)

dã.lei.kjo:	NOHIATUS	*COMPLEX	MAX	DEP	PRIORITY
i. dã.lei.kjo:					
ii. dã.leiz.kjo:				*!	

4.2 Conclusion The preference for a more marked prevocalic plural definite article allomorph in Jèrriais is problematic for HS. Instead, using multiple underlying representations within HS and ordering allomorphs to reflect a preference for a prevocalic default allomorph allows for an accounting of the data. The full implementation of HS/LS is discussed further in Section 6.

5 Alternative approaches

There are alternative approaches to the data that need to be considered. These options include the use of economy constraints and application of HS/OI.

5.1 Economy constraints An important difference between [leiz] and [lz] is that [leiz] contributes an additional syllable, while [lz] must be syllabified into adjacent codas and onsets. Under the assumption of a single underlying representation, instances of vowel syncope result in smaller structures and they are often 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 (*STRUC) constraints, has been proposed (Prince & Smolensky 1993; Zoll 1993, 1996). *STRUC can be specified so as to restrict certain types of structures, such as, in this case, syllables (Zoll 1996). Ranking an economy constraint, such as *STRUC_σ, under *COMPLEX would allow [lz] to surface intervocally and [leiz] to surface after closed syllables.

Yet, there are several reasons to reject *STRUC_σ and economy constraints in general. Gouskova (2003) argues that the presence of economy constraints within CON predicts that unmarked structures, features, or segments can be the target of deletion. For example, *STRUC_σ targets all syllables, regardless of their markedness. This is not typologically sound as targets of deletion are those structures or features that are marked in some sense, i.e. voiced obstruents, codas, extra-metrical syllables. The fact that *STRUC targets structures that are unmarked is inconsistent with the fact that markedness is relative. Gouskova (2003) notes that *STRUC 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. Instead, Gouskova (2003) proposes using lenient constraints and argues that economy effects fall out of the interaction of lenient constraints, making economy constraints and principles superfluous. Given these arguments, I reject the use of *STRUC constraints in preference for Gouskova's lenient constraints (for more discussion on lenient constraints and reasons for rejecting economy constraints, see Gouskova (2003)).

5.2 HS/OI An alternative approach to morphology in HS is that of HS/OI. HS/OI is a modification of Optimal Interleaving (OI; Wolf 2008). OI was designed within the framework of OT-Candidate Chains (OT-CC; McCarthy 2007) and was adapted by McCarthy (2011, 2012) for HS to create HS/OI. In HS/OI morphological spell-out occurs in the phonology, with morphemes represented as abstract morphs present in the derivation. The strong suit of HS/OI is that morpheme spell-out constraints, such as MAX-M(F), (14), can be interleaved with phonological constraints to manipulate the surrounding phonological environment in order to feed or bleed certain processes.

- (14) 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 $\phi \mathfrak{R} \phi'$ (Wolf 2008: 26).

Despite the ability to manipulate the phonological environment and the order of spell-out, HS/OI encounters the same issues as an HS analysis of the Jèrriais plural definite article. Assuming that the plural definite article has two relevant features of definiteness and number, the phonological realization of which are [lei] and [z] respectively, the input for [parmi lz ùgjei] ‘among the English’ is /AMONG DEF-PL

ENGLISH.¹¹ The benefit of HS/OI is that [lei] can be inserted without [z], thus opening up the possibility of deleting [ei] via NOHIATUS and deriving [lz].

To motivate the spell-out of the definite article features, MAX-M(PLURAL) and MAX-M(DEFINITE) are used. I assume a general MAX-M constraint, following McCarthy (2011, 2012) and Bonet (2013), to motivate the spell-out of morphs in general. Bonet (2013) assumes a constraint MAX-M(ROOT) to motivate the spell-out of roots. This is necessary, as otherwise there would be no way to spell-out the root prior to other morphs.

In Step 1 of (15) 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 and becomes the input for Step 2, wherein the spell-out of the preposition occurs. The surrounding words must be spelled-out prior to allomorph insertion as the shape of the allomorph is dictated by those words. For this reason, MAX-M(ROOT) outranks MAX-M(DEFINITE). In Step 3, the definite feature is spelled out before the plural feature due to the ranking of MAX-M(DEFINITE) over MAX-M(PLURAL). 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. NOHIATUS should motivate the deletion of [ei] prior to the insertion of [z], but insertion of [z] simultaneously solves the NOHIATUS issue and satisfies MAX-M(PLURAL). 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, outside the rejected *STRUC_σ, that favors [lz] over [leiz] and the faithfulness constraints also favor [leiz].

(15) HS/OI Derivation of [parmi lz ãgjei]

a. Step 1 of [parmi lz ãgjei]

/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 lei-PL ENGLISH	**!				*	
☞ iv. par.mi DEF-PL ENGLISH	*	*			*	

b. Step 2 of [parmi lz ãgjei]

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 lei-PL ã.gjei	*!			*	*	

c. Step 3 of [parmi lz ãgjei]

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 zã.gjei		*!				
☞ iii. par.mi lei-PL ã.gjei				*	*	

d. Step 4 of [parmi lz ãgjei]

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

¹¹ Unrealized or underlying morphs are indicated with small caps.

e. Step 5 of [parmi lz ãgjei] Convergence

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

Using HS/LS to account for allomorphic variation provides many avenues for further inquiry. In the next section I discuss a few of the areas that warrant further investigation.

6 Future Research and Conclusion

6.1 Future research The inclusion of LS in HS raises some important issues that will need to be explored further. Most importantly, a full-fledged theory of HS/LS needs to be explicated. Some of the issues that need to be examined as part of this are: determining if allomorph selection is a step, how to incorporate PRIORITY into HS, determination of which allomorphs are lexically listed, and how allomorph selection and other phonological processes interact in HS/LS.

Inclusion of PRIORITY as a faithfulness constraint in HS raises questions as to what constitutes a change. This question is currently a source of much debate. For example, McCarthy (2003) notes that any process that is not contrastive in a language, which includes syllabification, is not subject to faithfulness constraints. Therefore, syllabification does not constitute a change. Yet, others, such as Elfner (2009), argue that this is incorrect and that syllabification constitutes a change. It is thus necessary to determine whether allomorph selection is a step.

In HS, it has been assumed that one change results in a single violation of a faithfulness constraint. Assuming that allomorph selection is a step, how PRIORITY is violated by allomorph insertion needs to be examined more closely. PRIORITY is a faithfulness constraint that is violated by the use of lower ordered allomorphs. When an allomorph that is ordered third or lower is used, it incurs two or more violations of PRIORITY, yet insertion of an allomorph is most likely not two changes. In addition, use of the default allomorph incurs no violations of PRIORITY (reference candidates i. in the tableaux in Step 1 of (11), (12), and (13)). This would suggest that use of a default allomorph is not a change, though it most likely is. In this case, PRIORITY would need to be modified or another faithfulness constraint regulating the insertion of allomorphs needs to be included in the analysis.

Along these lines, there is the question of which morphemes have their allomorphs lexically listed. If all morphemes that exhibit allomorphic variation have their allomorphs listed, this creates an increased burden on the lexicon. This leads to a further question as to whether this is better than current approaches to allomorphic variation, which include indexed constraints (Indexed Constraint Theory; Alderete 2001; Itô & Mester 1999; McCarthy & Prince 1995; Pater 2000, 2007, 2010; Smith 1997) and subcategorization frames. Indexed Constraint Theory holds that a strict constraint ranking applies to the language, but that these constraints can be riven and indexed to specific morphemes. This shifts the burden from the lexicon but has consequences for CON. Subcategorization frames, similar to those seen in syntax and morphology for verbal conjugation, places another burden on the lexicon.

There is also the issue of how allomorph selection and other phonological processes interact within HS/LS. This is illustrated with the case of /r/ deletion in Jèrriais. In Jèrriais, there is sometimes simplification of word final obstruent+[r] (Cr) clusters. In general, word final Cr clusters are allowed, as shown in (16). In cases where the cluster precedes a complex consonant cluster, simplification of the Cr cluster occurs, as shown in (17).

- (16) Word Final Cr Clusters
- | | | |
|----|---------------------------------------|--|
| a. | ʒ avõz a vãdr lei patat | ‘We are going to have to sell the potatoes’ |
| b. | i krwɛ:ði:dr | ‘they crossed’ |
| c. | ɛ i le: le:si:dr sã rẽn a mãzi | ‘and they left them without anything to eat’ |
| d. | j ãn a katr | ‘there are four’ |
| e. | ɛ lz epɨj vẽ:dr a kre:tr ɛ l ɛtufi:dr | ‘and the thorns had grown up and smothered them’ |
- (17) Word Final Cr Cluster Simplification
- | | | |
|----|------------------|-------------------|
| a. | /kõtr/ ‘against’ | |
| i. | [kõt l fosɛ] | ‘by the hedgerow’ |
| b. | /prãdr/ | ‘to take’ |
| i. | [prãd l bAs] | ‘to take the bus’ |

In each case in (17), the masculine singular definite article follows the word undergoing final Cr cluster simplification creating the environment for simplification. But there are cases where the cluster is simplified when it is not followed by a complex consonant cluster, as in (18).

- (18) [kõt le prõgrɛ:] ‘against progress’

Here /kõtr/ is followed by the masculine singular allomorph [le]. At some point in the derivation a cluster must be present in the environment to trigger simplification. This data needs to be examined to determine how adjacent morphemes’ allomorphs affect one another and whether they are all lexically listed.

These are only a few of the issues that need to be examined and the creation of a new framework within HS needs to be fleshed out in its entirety and its parameters defined.

6.2 Conclusion Due to HS’s requirement of harmonic improvement and the resultant local minimum, HS can only account for allomorphy that results in TETU. In circumstances where allomorphy does not result in TETU, HS fails to account for the variation. Instead, HS, like OT, must be modified to include LS. LS reflects the idiosyncratic nature of allomorphy by lexically listing allomorphs and accounts for a language’s preference for a default allomorph by ordering allomorphs and using PRIORITY to enforce this preference. This preference can, however, be overridden by other phonological considerations when necessary. LS 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. Instead, LS captures a robust property of phonological grammars and is an essential theoretical tool regardless of the larger theory – OT or HS – adopted.

References

- ALDERETE, JOHN. 2001. Morphologically governed accent in Optimality Theory New York & London: Routledge.
- BONET, EULÀLIA. 2013. A challenge for Harmonic Serialism with Optimal Interleaving. *Phonology* 30.399-421.
- ELFNER, EMILY. 2009. Syllabification and stress-epenthesis interactions in Harmonic Serialism. Amherst, MA: University of Massachusetts, Amherst, MS.
- GOUSKOVA, MARIA. 2003. *Deriving economy: Syncope in Optimality Theory*. Amherst, MA: University of Massachusetts, Amherst dissertation.
- HAMMOND, MICHAEL. 1984. *Constraining metrical theory: A modular theory of rhythm and destressing*. Los Angeles, CA: UCLA dissertation.
- HARGUS, SHARON. 1995. The first person plural prefix in Babine–Witsuwit’en. University of Washington.
- 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.
- ITÔ, JUNKO & ARMIN MESTER. 1999. The phonological lexicon. *The handbook of Japanese linguistics*, ed. by J. Tsujimura, 62-100. Malden, MA: Blackwell.
- JONES, MARI C. 2012. Liaison Patterns and Usage in Jersey Norman French.
- KAGER, RENÉ. 1996. On affix allomorphy and syllable counting. *Interfaces in phonology*, ed. by Ursula Kleinhenz, 155-71. Berlin: Akademie Verlag.

- KIPARSKY, PAUL. 1998. Paradigm effects and opacity. Stanford, CA: Stanford University, MS.
- KISSEBERTH, CHARLES W. 1970a. On the functional unity of phonological rules. *Linguistic Inquiry* 1.291-306.
- . 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.
- LAPOINTE, STEVEN G. 2001. Stem selection and OT. *Yearbook of morphology 1999*, ed. by Geert Booij & Jaap van Marle, 263-97. Dordrecht: Kluwer.
- LIDDICOAT, ANTHONY. 1994. A grammar of the Norman French of the Channel Islands: The dialects of Jersey and Sark. Berlin: Mouton de Gruyter.
- MASCARÓ, JOAN. 1996a. External allomorphy and contractions in Romance. *Probus* 8.181-205.
- . 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.
- . 2004. External allomorphy as emergence of the unmarked. *Optimality Theory in phonology: a reader*, ed. by John McCarthy, 513-21. Malden, MA: Blackwell Publishing.
- . 2007. External allomorphy and lexical representation. *Linguistic Inquiry* 38.715-35.
- MCCARTHY, JOHN. 1986. OCP effects: Gemination and antigemination. *Linguistic Inquiry* 17.207-63.
- . 2000. Harmonic serialism and parallelism. *Proceedings of the North East Linguistic Society*, Amherst, MA, 501-24.
- . 2003. Sympathy, cumulativity, and the Duke-of-York gambit. *The syllable in optimality theory*, ed. by Caroline Féry & Ruben van de Vijver, 23-76. Cambridge: Cambridge University Press.
- . 2007. Hidden generalizations: Phonological opacity in Optimality Theory. London: Equinox.
- . 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.
- . 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 & 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.
- MESTER, ARMIN. 1994. The quantitative trochee in Latin. *Natural Language & Linguistic Theory* 12.1-61.
- PATER, JOE. 2000. Non-uniformity in English secondary stress: The role of ranked and lexically specific constraints. *Phonology* 17.237-74.
- . 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.
- . 2010. Morpheme-specific phonology: Constraint indexation and inconsistency resolution. *Phonological argumentation: Essays on evidence and motivation*, ed. by Steven Parker, 123-54. London: Equinox.
- 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.
- PRINCE, ALAN S. & PAUL SMOLENSKY. 1993. *Optimality Theory: Constraint interaction in Generative Grammar*. Technical report TR-2, Rutgers Center for Cognitive Science, Rutgers University, New Brunswick, NJ.
- 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.
- TAYLOR, MOIRA. 1994. *The interaction of vowel deletion and syllable structure constraints*. Burnaby, BC: Simon Fraser University dissertation.
- TRANSEL, BERNARD. 1993. On suppletion and French liaison. *Amsterdam Studies in the Theory and History of Linguistic Science Series 4*.269-308.
- . 1996a. Exceptionality in Optimality Theory and final consonants in French. *Grammatical Theory and Romance Languages*, ed. by Karen Zagona, 275-91. Amsterdam: John Benjamins.
- . 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.
- . 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.
- . 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.
- WOLF, MATTHEW ADAM. 2008. *Optimal interleaving: Serial phonology-morphology interaction in a constraint-based model*. Amherst, MA: University of Massachusetts, Amherst dissertation.
- ZOLL, CHERYL. 1993. Directionless syllabification and ghosts in Yawelmani. Berkley, CA: UC-Berkley, MS.
- . 1996. *Parsing below the segment in a constraint based framework*: University of California dissertation.