Stress Domain Effects in French Phonology
and Phonological Development[*]

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Abstract

In this paper, we discuss two distinct data sets. The first relates to the so-called allophonic process of closed-syllable laxing in Québec French, which targets final (stressed) vowels even though these vowels are arguably syllabified in open syllables in lexical representations. The second is found in the forms produced by a first language learner of European French, who displays an asymmetry in her production of CVC versus CVCV target (adult) forms. The former display full preservation (with concomitant manner harmony) of both consonants. The latter undergoes deletion of the initial syllable if the consonants are not manner-harmonic in the input. We argue that both patterns can be explained through a phonological process of prosodic strengthening targeting the head of the prosodic domain which, in the contexts described above, yields the incorporation of final consonants into the coda of the stressed syllable.

1. *Introduction*

Within the field of modern phonological theory (e.g. Chomsky & Halle, 1968), the relationship between surface (phonetic) and deeper (phonological) levels of representation has constantly been subject to fierce controversy. While the 1980's mainstream literature generally favoured a clear separation of the two levels, the rise of output-driven approaches (e.g. Prince & Smolensky 1993) contributed to a reversal of

this trend. In this context, some phonologists have even proposed versions of phonological theory that directly incorporate phonetics within phonology (e.g. Steriade 1999). In this paper, we take a position against this view. We argue for the need to approach systematic phonological phenomena, as opposed to variable and/or gradient phonetic effects, through a formal distinction between phonological and phonetic levels of analysis.

Our argument is based on data from two different sources. The first is the process of closed-syllable laxing in Québec French; the second relates to a number of asymmetries in the productions of a first language learner of European French. As we will see, both patterns, which have different expressions in surface forms, can share the same analysis if one considers both formal aspects of prosodic representations and general properties of domain-final stress systems. We begin by introducing the relevant data, in the next section.

2. *The Data*

2.1 *Closed-syllable laxing in Québec French*

As documented in much of the literature on Québec (or Canadian) French, this dialect of French displays an allophonic process typically referred to as closed-syllable laxing (e.g. Walker 1984; Charette 1991), which targets underlying high, tense vowels in phonetically closed syllables. This

process takes place in both unstressed (non-final) and stressed (final) syllables, as exemplified in (1).[1]

(1) Closed-syllable laxing*

	Unstressed syllables	Stressed syllables
a. Open syllables	*pitance* [pi̲.ˈtɑ̃s]	*petit* [pə.ˈtsi̲ː]
	lunette [ly̲.ˈnɛt]	*vue* [ˈvy̲ː]
	toucher [tu̲.ˈʃe]	*beaucoup* [bo.ˈku̲ː]
b. Closed syllables	*pistache* [pɪ̲s.ˈtaʃ]	*petite* [pə.ˈtsɪ̲t]
	pulpeux [pʏ̲l.ˈpø]	*lune* [ˈlʏ̲n]
	rumba [ʁʊ̲m.ˈba]	*roucoule* [ʁu.ˈkʊ̲l]

* Here and elsewhere, words are presented in citation forms, with accent on the final syllable; as we will see later, this accent, however, is not lexical but only occurs in phrase-final position, where vowels in open syllables display increased duration.

Closed-syllable laxing in stressed syllables has however a systematic exception to it: in final, stressed syllables, if the high vowel is followed by a voiced fricative ([v], [z], [ʒ], or [ʁ][2]), it undergoes lengthening instead of laxing, as in (2). Note also the difference between the lengthening effect of voiced fricatives in stressed but not in unstressed syllables.

(2) Stressed high vowel lengthening before voiced fricatives

a. Open σ: no process	b. Closed σ (stressed): lengthening
virer [vi̲.ˈʁeː]	*vire* [ˈvi̲ːʁ], *désire* [de.ˈzi̲ːʁ]
gruger [gʁy̲.ˈʒeː]	*gruge* [ˈgʁy̲ːʒ], *refuge* [ʁə.ˈfy̲ːʒ]
viser [vi̲.ˈzeː]	*vise* [ˈvi̲ːz], *devise* [də.ˈvi̲ːz]
cuver [ky̲.ˈveː]	*cuve* [ˈky̲ːv], *effluve* [ɛ.ˈfly̲ːv]

Of the four 'lengthening' consonants, only [ʁ] can appear in what can be uncontroversially analysed as word-medial codas. The other voiced

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1 Laxed vowels in stressed syllables also yield optional regressive laxing harmony on preceding vowels. This independent process, irrelevant for the argument proposed in this paper, will be ignored. See, e.g., Poliquin (2007) and references therein for related discussion.

2 [ʁ] is phonologically a rhotic but phonetically a fricative in Québec French.

fricatives can only appear in surface codas in contexts where the vowel following them in lexical representations is a lexical schwa that underwent elision. Because schwa elision is an optional and variable process, we argue that it is phonetic in its very nature.[3] Interestingly, as we can see in (3), while laxing is obligatory before a true (lexical) coda [ʁ], in (3a), it is forbidden when the voiced fricative (including [ʁ]) appears in surface coda as the result of (phonetic) schwa elision, in (3b). High vowels in this latter context pattern similar to the vowels in phonetically open, unstressed syllables in (1a) and (2a): they fail to undergo either laxing or lengthening.[4]

(3)   High vowels before non-final voiced fricatives*

a. Before lexical coda [ʁ]	b. Before derived voiced fricative codas
virtuel [vɪʁ.tsyˈɛl]	*déguisement* [de.gizə̸.ˈmɑ̃ː]
fournée [fuʁ.ˈneː]	*revirement* [ʁə.viʁə̸.ˈmɑ̃ː]
écourter [e.kuʁ.te]	*mouvementé* [muvə̸.mɑ̃.teː]
absurde [ap.syʁ.d]	*jugement* [ʒyʒə̸.mɑ̃ː]

   * [ə̸] indicates the location of the elided schwa in underlying representations.

2.2 *CVC versus CVCV forms in European French acquisition data*

The second data set comes from the longitudinal, naturalistic study of a child code-named Marilyn, a learner of European French, documented in dos Santos (2007). Of interest is a systematic pattern observed between the ages 1;10.17 and 2;00.25, a period during which Marilyn showed different behaviours in her productions of CVC versus CVCV target (adult) forms. First, as exemplified in (4), Marilyn preserved both consonants of target

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3   See Klausenburger (1994) and Eychenne (2006) for summaries of the literature on schwa elision in French.

4   An exception to this generalization occurs in word-initial position when the word is produced with emphasis, which also triggers laxing. Emphasis laxing typically targets initial syllables, both open and closed (see, e.g., Déchaîne 1991; cf. Poliquin 2007).

CVC in her productions, which also display manner (continuancy) harmony.[5]

(4)   CVC targets: Consonant preservation and harmony forms

Orthography	IPA Target	IPA Actual	Age
bottes	['bɔt]	['bɔt]	2;00.12
berk	['bɛʁk]	['bɛk]	1;11.13
coupe	['kup]	['kup]	2;00.25
couettes	['kwɛt]	['kɛk]	1;11.28
passe	['pas]	['pat]	1;11.13
case	['kaz]	['kak]	1;10.17
triche	['tʁiʃ]	['tit]	1;11.13
soupe	['sup]	['pup]	2;00.25

As opposed to this, CVCV forms showed two distinct behaviours. On the one hand, target forms whose consonants have the same manner features, in (5a), were produced with full preservation of both consonants. On the other hand, target forms containing consonants with different manner features underwent deletion of the first syllable, in (5b).

(5)   Multisyllabic target forms
      a.   Manner-harmonic: full preservation of the two syllables

appétit	[ape'ti]	[pi'ti]	2;00.12
biquet	[bi'kɛ]	[be'kɛ]	1;11.13
escargot	[ɛskaʁ'go]	[ka'ko]	1;11.13
chaussure	[ʃo'syʁ]	[ly'ly]*	1;11.28

      * Coronal fricatives were independently realized as laterals in onsets.

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5   We also observe place harmonies in some forms; these harmony processes, which are irrelevant for the present discussion, are discussed further in dos Santos (2007).

b. Manner-disharmonic: truncation of the initial syllable

cassé	[kaˈse]	[ˈle]	1;11.13
tennis	[teˈnis]	[ˈni]	1;11.02
château	[ʃaˈto]	[ˈto]	1;11.02
Lego	[leˈgo]	[ˈko]	1;11.02
morceau	[mɔʁˈso]	[ˈlo]	2;00.25
jumeaux	[ʒyˈmo]	[ˈmo]	1;11.28
lunette	[lyˈnɛt]	[ˈnɛ]	2;00.12

2.3 *Interim summary*

The processes observed primarily refer to the location of the stressed syllable, although not entirely. As discussed in section 2.1, the distribution of derived high lax vowels in Québec French is also dependent on conditions which cannot directly relate to surface properties. For example, the fact that laxing does not occur in phonetically-closed syllables when the surface coda is an onset in lexical (underlying) form in (3) points to conditioning at a more abstract level. In a similar way, any account of Marilyn's production patterns requires a consideration of input (target) representations. Finally, formal issues about the syllabification of final consonants in both French and acquisition also offer a series of analytical challenges, which we address in the next section.

3. *Theoretical issues*

On the face of it, the patterns observed above point to some basic syllabification and stress related processes in Québec French and in Marilyn's phonology. However, hastily reaching this conclusion would

elude important issues documented in the formal literature on the syllabification of word-final consonants both in French and in phonological development.

3.1 *Word-final consonants as onset of empty-headed syllables*

Focussing first on French, several analyses proposed for syllabification in this language argue for the status of word-final consonants as onsets of empty-headed syllables (e.g. Kaye, Lowenstamm & Vergnaud 1990; Charette 1991; Dell 1995). This hypothesis is supported by both distributional and phonetic arguments. Starting with distributional evidence, we first observe that the rhyme in French is maximally binary. For example, in Québec French, a dialect that maintains a lexical contrast of duration among non-high vowels (e.g. *faite* [fɛt] ~ *fête* [fɛːt]), with mid long vowels being more or less diphthongized across sub-dialects (e.g. *fête* [fɛːt/faʲt]), only short vowels can appear before (word-medial) codas, as exemplified in (6a). As opposed to this, such long/diphthongized vowels are allowed before word-final consonants, in (6b), similar to those lengthened high tense vowels before word-final voiced fricatives in (2b). In light of rhyme binarity, the examples in (2b) and (6b) strongly suggest a syllabification of final consonants outside of the rhyme.

(6) Maximally binary rhymes: no branching nuclei before codas*

a. Before codas	b. Before word-final consonants
verte [vɛʁ.t] / *[vaʲʁ.t]	*vert* [vɛː.ʁ] / [vaʲ.ʁ]
fierté [fjɛʁ.te] / *[fjaʲʁ.te]	*fier* [fjɛː.ʁ] / [fjaʲ.ʁ]

  * For the sake of clarity and consistency, the syllabification expressed in the
   examples here and below reflect the analysis maintained throughout the paper.

Another distributional argument comes from the fact that word-final consonant clusters can display either falling, flat, or rising sonority. Representative examples are provided in (7).

(7)   Sonority profile of word-final consonant clusters

a. Falling sonority	b. Flat sonority	c. Rising sonority
verte [vɛʁ.t]	*veste* [vɛs.t]	*cadre* [ka.dʁ]
carte [kaʁ.t]	*caste* [kas.t]	*rectangle* [ʁɛk.tɑ̃.gl]

First, an analysis of the falling sonority clusters in (7a) as branching codas would violate rhymal binarity. Second, even though a branching coda analysis could accommodate the examples in (7a), any principled, sonority-based approached to syllabification would have difficulty accommodating the flat-sonority clusters in (7b), and would entirely preclude the attested rising sonority profiles in (7c) or else tri-consonantal final clusters with various sonority profiles such as in words like *castre* [kas.tʁ̥][6] or *arbre* [aʁ.bʁ]. As opposed to this, an analysis assuming rhymal binarity and allowing for the syllabification of word-final consonants as onsets of empty-headed syllables (with branching onsets also allowed in this position) readily accounts for all the attested data. Another distributional argument comes from the fact noted in section 2.1 that some consonants such as the voiced fricatives [v], [z] and [ʒ] cannot appear in word-medial phonetically closed syllables unless these syllables are derived from the elision of a lexical schwa. No such distributional restriction exists in word-final position (e.g. words in (2b)) which, just like the word-medial onset position, displays a larger consonantal inventory, the onset being typically a better licenser of segmental contrasts than the

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6   The devoicing of the final liquid in this context matches that observed in branching onsets in other positions (e.g. *train* [tʁ̥ɛ̃]).

coda (e.g. Itô 1986; Piggott 1999). Finally, another peculiarity of Québec French is that consonants that are part of a word-final consonant cluster tend to undergo reduction, sometimes with only the leftmost consonant of the final cluster being produced in the most extreme cases of erosion at the right edge (e.g. *ministre* [mɪnɪstʁ]/[mɪnɪst]/[mɪnɪs]/*[mɪnɪ]; *quatre* [katʁ]/[kat]/*[ka]). This fact is predicted in our analysis below, in which the consonant immediately following a stressed vowel phonologically interacts with this vowel to prosodically strengthen the stress domain and, as such, cannot be subject to deletion.

Turning now to word-final consonants in child language, because we are interested in patterns from the acquisition of French, we are already in a position to argue that the child, attending to the distributional evidence of the language, should attain word-final onset syllabification during the course of development (e.g. Goad & Rose 2004 for a similar view). This argument is further reinforced by the fact that several authors have argued in favour of an analysis of early consonants as onsets of empty-headed syllables, across a number of target languages. First, final consonants generally emerge long before word-medial codas[7] (this is the case for Marilyn, as documented in dos Santos 2007; see also Fikkert 1994 on Dutch; Freitas 1997 and Fikkert & Freitas 1997 on European Portuguese; Rose 2000 on Québec French; Barlow 2003 on disordered Spanish). Second, at the phonetic level, these final consonants display onset-like behaviours, as they are often strongly aspirated or else released into epenthetic vocoids or nasals (e.g. Goad & Brannen 2003). Finally, the same position has been argued for on structural grounds, as word-final

7 Except in languages with clear coda profiles for word-final consonants such as Spanish or Japanese, in which final consonants can be analysed as true codas. In such languages, word-medial and final codas are typically acquired within the same developmental period (see Rose 2003 for further discussion).

onsets do not require a complex rhyme allowing for a consonantal position (Rose 2000), and may represent the default option in the face of typological evidence (e.g. Piggott 1999; cf. Rose 2003).

3.2 *Representational implications*

Following the arguments above, one must then consider all final consonants in the data explored in section 2 to be onsets of empty-headed syllables. These consonants are thus syllabified outside of the syllable within which the final, phonetically-realized and stress vowel is located. This conjecture is further complicated by another property of French, namely that it displays domain-final stress, with stress itself assigned at the phrasal level (e.g. Dell 1984; Walker 1984).[8] Within prosodic phonology, the stress domain in French is standardly represented as a right-headed Foot, as in (8).[9]

(8)   Stress Foot in French
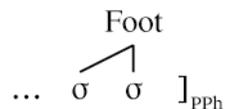
$$\text{Foot}$$
$$\ldots \quad \sigma \quad \sigma \quad]_{\text{PPh}}$$

When we combine the domain-final property of the Foot head with the fact that final consonants must be analysed as onsets of empty-headed syllables, one consequence is that these final consonants must be

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8 Stress patterns are however different in southern France French (e.g., Durand 1976).

9 Following Prince (1985) and Kager (1993), we assume that the foot is binary at the lexical level and that all syllables within the domain are incorporated into it through stray adjunction at the surface level (see also Charette 1991; Rose 2000; Goad & Buckley 2006 for further discussion).

prosodified outside of the Foot, with the empty-headed syllable directly anchored on the higher prosodic constituent, as illustrated in (9).

(9)   Prosodification of onsets of empty-headed syllables in French

$$
\begin{array}{c}
\text{PhP} \\
\text{Foot} \\
\sigma \qquad \sigma \\
\text{C V C } \varnothing
\end{array}
$$
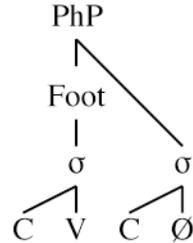
Finally, at the phonetic level, stressed vowels are up to twice as long as unstressed vowels (e.g. O'Shaughnessy 1981, Morasse 1995), with the notable exception of Québec French high lax vowels derived through closed-syllable laxing (in (1)), which remain short in stressed syllables (except in emphatic contexts, where they are stylistically lengthened). The same observations apply to Marilyn's data; measurement of 22 randomly-selected CVCV productions from the period studied show that her stressed vowels are systematically longer, with an average of 1.94 times the duration of the unstressed vowel.

Given the above considerations, it would be difficult to argue that because they are phonetically post-vocalic, final consonants in either Québec French or in Marilyn's data are phonological codas. This issue however clashes with the behaviour of final syllables as forming consistent domains for both closed-syllable laxing in Québec French, albeit only in words where the final consonant is not a voiced fricative, in (1b), and consonant preservation in Marilyn's data, in (4). In the analysis proposed below, we argue that facts and theory can be reconciled if we take the position that while final consonants are truly onsets of empty-

headed syllables phonologically, their behaviours with regard to closed-syllable laxing and in Marilyn's data can be predicted from a general property of stress-final prosodic domains, whose head constituent typically undergo strengthening, both cross-linguistically (e.g. Hayes 1985, 1995) and, we argue, in phonological development.

3.3 *Proposal*

Our proposal is in line with a vast literature within the framework of Prosodic Phonology (e.g. Selkirk 1984; McCarthy & Prince 1986). One of the tenets of this framework is that the surface effects we observe in segmental patterning are phonologically conditioned at a deeper level by prosodic representations (see Harris 2004 for a summary of some of the relevant literature). As discussed most prominently in Jensen (2000) and Harris (2004), variable and/or gradient surface behaviours such as those of consonants which in the literature on ambisyllabicity (e.g. Kahn 1976, Giegerich 1992) show various degrees of lenition (e.g. flapping; glottalization) stem from the fact that these consonants are prosodified in prosodically weak (dependent) positions. In contrast to this, in head positions, which are inherently strong prosodic domains, lexical contrasts are generally preserved and/or augmented, also following various rules of phonetic implementation (e.g. increased duration; stronger aspiration).

While the literature on the topic primarily focuses on trochaic languages, that is, languages with strong-weak prosodic domains, similar effects are expected in languages with weak-strong prosodic domains. As argued for by, e.g., Hayes (1985, 1995), the latter languages typically display heavy syllables in prosodic heads, even in languages which do not

have vowel duration contrasts at the lexical level (Hayes 1995:269). This phonological process, which we refer to as iambic strengthening, is defined in (10), where the syllable in the head of the prosodic domain is underlined.

(10) Iambic strengthening (adapted from Hayes 1985ff)

$$(\sigma_\mu \underline{\sigma}_\mu) \rightarrow (\sigma_\mu \underline{\sigma}_{\mu\mu})$$

Still according to Hayes, across languages, phonological iambic strengthening can be express itself in many ways at the phonetic level, through processes such as vowel lengthening, gemination of the following onset (with the first half of the geminate incorporated in the coda of the stressed syllable) or, alternatively, weakening of the preceding, unstressed syllable, which effectively provides relative prominence to the stressed syllable. Explicit to this analysis is a formal distinction between underlying and surface levels of representation. This distinction finds independent motivation in the formal literature on rhythmic and stress-related segmental phenomena within prosodic phonology (see, e.g., Prince 1985 and Kager 1993 for further discussion). While iambic strengthening is typically discussed in the context of languages with alternating stress patterns, we hypothesize that it also applies to non-alternating stress systems such as that of French. Based on this hypothesis, we argue that all of the patterns discussed in section 2 can be accounted for following the same logic: while word-final syllables are open in French (and Marilyn's) lexical representations, these syllables undergo phonological strengthening, which can take one of two different forms on the surface: vowel lengthening or final consonant incorporation into the stressed

syllable, the choice of which is driven by independent, principled considerations.

4. *Analysis*

4.1 *Québec French*

In Québec French, iambic strengthening yields different exponents at the surface level, which are themselves governed by the word-final segmental context. In vowel-final words, the stressed vowel undergoes lengthening (as in (1a)), which effectively makes the syllable heavy, without any further complication. When stressed vowels are followed by consonants, one of three possibilities can occur. First, if the consonant is a true coda, itself followed by the onset of an empty-headed syllable, for example in words like *caste* [kas.t(ə)] or *perdre* [pɛʁ.dʁ(ə)], then the stressed syllable is already heavy and does not undergo any further modification (except of course from laxing among high vowels; e.g. *piste* [pɪs.t(ə)]). Second, if the consonant is a voiced fricative syllabified in the onset of an empty-headed syllable, the vowel undergoes lengthening (and/or concomitant diphthongization, as in (6)), for example in *pige* [piː.ʒ], *cave* [kaː.v] or *faire* [fɛː.ʁ]/[faʲ.ʁ]. This is illustrated in (11a). In this context, the final consonant remains outside of the stressed syllable. Third, if the consonant following the stressed vowel is not a voiced fricative, this consonant is incorporated into the coda of the stressed syllable, thereby yielding the context for closed-syllable laxing, as illustrated in (11b).

(11) Iambic strengthening before voiced versus voiceless obstruents
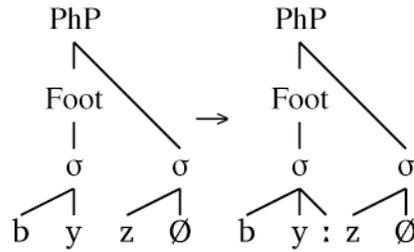
a) *buse*:   b) *butte*:
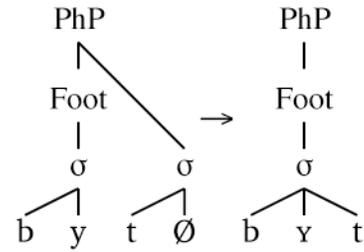
At this point in the analysis, one may wonder why iambic strengthening takes two different forms in the context of voiced fricatives versus other word-final consonants. While the explanation to this obviously relates to the socio-historical evolution of this dialect of French, we claim that it has foundations in acoustic properties of post-vocalic obstruents, a context where laryngeal contrasts are often weakened or neutralized across languages. As pointed out by, e.g., Blevins (2004), in languages where obstruents codas are allowed, voiceless codas are often favoured over voiced codas. This typological tendency actually makes sense from the perspectives of both perceptual and articulatory phonetics. Indeed, post-vocalic voicing contrasts among obstruents are relatively difficult to perceive (e.g. Steriade 2001). Also, when maintained in production, the implementation of such contrasts is often enhanced through a lengthening of the preceding vowel (e.g. Borden, Harris & Lawrence 2003). We suggest that, in the context of iambic strengthening, vowel lengthening has been phonologized in Québec French as a means to preserve and enhance voicing contrast among fricatives. Because vowel lengthening before voiced fricatives yields a heavy rhyme, no further iambic strengthening is needed in this context. Vowel lengthening thus effectively neutralizes

closed-syllable laxing since high vowels followed by a voiced fricative remain in a phonologically open syllable.

4.2 *Marilyn*

Turning now to Marilyn's data, we argue that phonological iambic strengthening also applies to her outputs in the same manner, which enables a preservation of her word-final consonants, as illustrated in (12).

(12) Marilyn's CVC forms: coda incorporation and harmony

passe:

$$p_i \; a \; s_j \; \emptyset \rightarrow p_i \; a \; t_i \quad (i = [-\text{cont.}]; j = [+\text{cont.}])$$
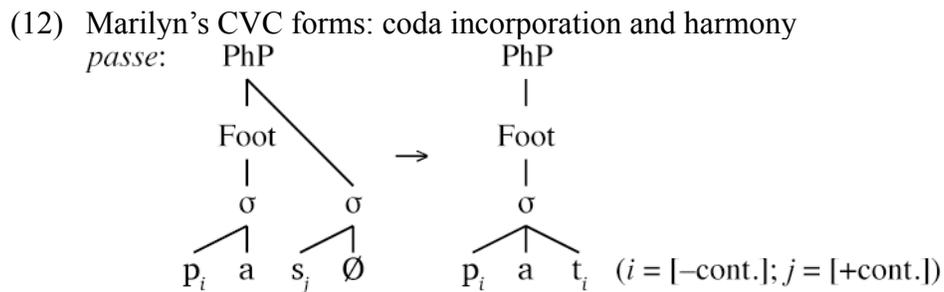
We further argue that these consonants undergo manner harmony in this context because Marilyn can only maintain one continuancy feature per word in her outputs. Phonologically, this feature needs to be licensed by the prosodic head. This analysis follows proposals by, e.g., Rose (2000) and Goad (2001), who argue that harmony can emerge as a surface exponent of prosodic licensing in child language.

This analysis is further supported by the contrast observed in Marilyn's CVCV forms in (5), in which preservation of the first syllable is conditional on its onset being manner-harmonic with the onset of the stressed syllable. Because Marilyn could only maintain phonological manner contrasts that were licensed in prosodically strong positions, and because the initial consonant in a CVCV word, by virtue of being in an

unstressed syllable, cannot be licensed directly by the head of the structure, only licensing at a distance, through harmony, can yield full preservation, as illustrated in (13).

(13) Marilyn's CVCV forms: preservation conditional on licensing

a) *biquet*:

$$PhP \qquad PhP$$
$$| \qquad |$$
$$Foot \qquad Foot$$
$$\sigma \quad \sigma \quad \rightarrow \quad \sigma \quad \sigma$$
$$b_i \; i \quad k_i \; \varepsilon \qquad b_i \; e \quad k_i \; \varepsilon$$

b) *château*:

$$PhP \qquad PhP$$
$$| \qquad |$$
$$Foot \qquad Foot$$
$$\sigma \quad \sigma \quad \rightarrow \quad \sigma$$
$$\int_j a \quad t_i \; o \qquad t_i \; o$$

$$(i = [-cont.]; j = [+cont.])$$
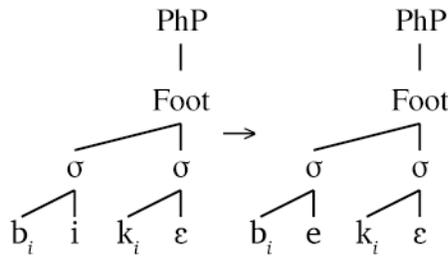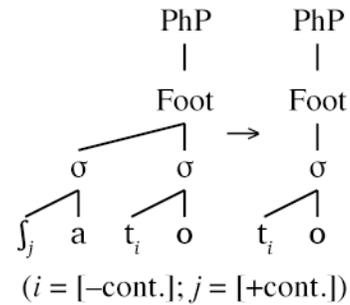
This analysis also implies that harmony is bound within the head of the foot and cannot dynamically extend outside of the head of the foot to yield preservation. Only CVCV forms that are manner-harmonized in the input can display full preservation of both syllables in the output.

5. *Discussion*

The analysis proposed above enables a unified account of the various patterns observed in both Québec French and Marilyn's productions. Starting with Québec French, this analysis first reconciles the data on closed-syllable laxing (and absence thereof) with the phonological analysis of word-final consonants as onsets of empty-headed syllables, thereby offering a solution to the long-standing controversy (since Charette 1991) as to why closed-syllable laxing should occur at all in the context of lexically open syllables. Under the current proposal, both

closed-syllable laxing and its alter-ego, stressed vowel lengthening before voiced fricatives, are triggered in this context by iambic strengthening, a general rule of phonological enhancement of the syllable located in the head of the stress domain.

Our proposal also offers an explanation for the observation that laxing does not occur in the context of voiced 'codas' that are derived through phonetic schwa elision but that are onsets at the lexical level in French. Since surface 'codas' before elided schwas are not phonological codas, no closed-syllable laxing can occur in this context. Such observations would be extremely difficult to capture under approaches focussing solely on the shape of output patterns.

In a similar way, the current analysis offers a consistent account of Marilyn's production patterns. Through iambic strengthening, onsets of empty-headed syllables are incorporated into the stressed syllable. This enables their preservation and manner harmony, analysed here as a phonetic exponent of prosodic licensing. In CVCV forms, however, word-initial consonants cannot be incorporated into the stressed syllable. Since manner harmony cannot dynamically apply beyond the stressed syllable, the preservation of unstressed onsets is conditional of their being manner-harmonic with the stressed onsets in the lexical representation.

Without a formal distinction between surface structures and deeper, lexical representation, it would be very difficult to explain such domain-related phenomena in a principled way while keeping with the larger literature on theoretical phonology and phonological development.

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