

Spelling-Out Prosodic Domains: A Multiple Spell-Out Account *

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1. Introduction

This paper proposes a general syntax-prosody mapping hypothesis couched within the recent derivational model of syntactic computation known as the Multiple Spell-Out Model (MSO; Chomsky 2000, 2001, 2004, 2005; Uriagereka 1999; see also Epstein et al. 1998). This hypothesis, which uniquely maps mid-derivational complex objects in syntax to prosodic domains at the PF component, correctly demarcates a set of structural domains within which a variety of prosodic alternations across languages are found and possible. Specifically, the proposed syntax-prosody hypothesis, couched within Uriagereka's 1999 version of the MSO model, makes correct predictions about possible domains within which Taiwanese tone sandhi, French liaison, Gilyak lenition, and Kinyambo high tone deletion are found. However, a certain pattern of soft consonant mutation across CP vs. TP boundaries in Welsh poses an apparent problem to the proposed analysis because Uriagereka's 1999 system would not be able to draw a distinction pertinent to the Spell-Out operation between these two categorial nodes. I argue that this problem receives a straightforward explanation once the proposed hypothesis is expanded to incorporate another version of the MSO model known as Phase Theory (Chomsky 2000, 2001, 2004, 2005), in particular the notion of CP phase. I also argue for the necessity to incorporate the notion of vP phase into the proposed

analysis based on the interaction of *wh*-traces with consonant mutation in Welsh and the lack of consonant mutation across *vP* boundaries in Irish. These results therefore suggest that a derivational system of syntax that combines Uriagereka's and Chomsky's dynamic models would be in need for the proper access to phonology from syntax and vice versa.

This paper is organized as follows. In section 2, I outline the MSO model proposed by Uriagereka 1999. In section 3, I propose a general syntax-prosody mapping hypothesis within the model which maps a Spelled-Out domain to a prosodic domain. This hypothesis yields three universal predictions concerning in what domains phonological alternations are possible. I show that these predictions are indeed borne out by a wide range of phonological alternations across languages such as tone sandhi in Taiwanese, liaison in French, lenition in Gilyak, and high tone deletion in Kinyamboo. In section 4, I turn to soft consonant mutation in Welsh and point out that the present analysis couched within Uriagereka's 1999 MSO system cannot derive the TP/CP difference with respect to mutation in this language. I claim that this difference naturally falls out once Chomsky's 2000, 2001, 2004, 2005 notion of CP phase is incorporated into the mapping hypothesis. I also show that a certain interaction of *wh*-traces with consonant mutation in Welsh as well as the absence of the mutation across *vP* boundaries in Irish can be construed as supporting the existence of *vP* phase if the present analysis is correct.

2. Uriagereka's 1999 Multiple Spell-Out Model

Uriagereka's 1999 MSO model originates from the minimalist desire to keep the so-called 'Base Step' and dispense with the 'Induction Step' of the Linear

Correspondence Axiom proposed by Kayne 1994, as defined in (1a) and (1b), respectively.

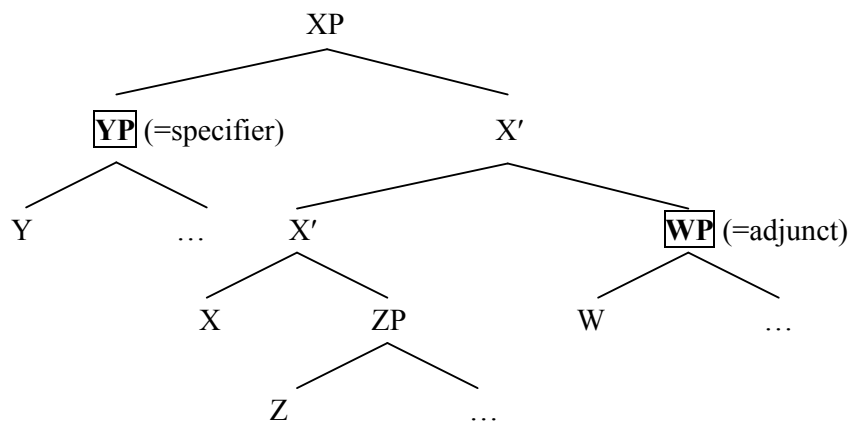
(1) Linear Correspondence Axiom

- a. Base Step: If α asymmetrically c-commands β , α precedes β .
- b. Induction Step: If γ precedes β and γ dominates α , α precedes β .

(Uriagereka 1999: 252)

This theoretical stance leads to the claim that the linearization procedure as in (1a) can function only with uniformly right-branching structures in syntactic derivation. In other words, the procedure will not suffice when two internally complex, left-branching structures are merged. Consider a hypothetical configuration in (2).

(2) Complex Specifiers and Adjuncts



In this configuration, the head X merges with the uniformly right-branching structure ZP to form a larger syntactic object X' (or XP in the Bare Phrase Structure Theory of Chomsky 1995). The Base Step in (1a) suffices to determine that the terminal X precedes the terminal Z (and those contained within its sister). A problem arises when the X' merges with another internally complex, left-branching phrase such as WP and YP in (2). The Base Step in (1a) will not suffice to determine linear ordering of the terminals within the lower X' (i.e., X, Z, and those contained within ...) relative to those contained within WP (i.e., W and those contained within ...) because there is no asymmetrical c-command relation between the terminals contained within the two phrases. The same problem arises when the higher X' merges with another left-branching phrase YP.

To avoid this conceptual problem, Uriagereka 1999 proposes that at the point when two internally complex, left-branching structures are merged, syntactic derivation Spells-Out one of the complex structures to the PF component. After this Spell-Out, the complex object reenters the derivation as a kind of 'frozen giant lexical compound' whose phrase structure status is as simplex as words like *book*, *chair*, and *desk*. In other words, all specifiers and adjunct phrases must be Spelled-Out early in this derivational system for the purposes of linearization if they contain left-branching structures. Let us illustrate this system with the configuration in (2). Before WP or YP merges with the rest of the tree, it undergoes early Spell-Out and gets flattened into an ordered sequence of strings in accordance with the Base Step in (1a). After the relative ordering between the terminals within WP and YP is fixed, the two structures are

reintroduced into the syntactic derivation as a simplex numeration item so that the Base Step can determine the relative order of this word with respect to the terminal elements contained within the other complex phrase. See also Johnson 2002, 2004, who proposes a related version of Uriagereka's idea that adjuncts and specifiers, both analyzed as adjoined elements, undergo early Spell-Out for the PF component and get renumerated into the syntactic derivation as a derived numeration item.

This MSO model straightforwardly derives left branch conditions such as the Condition on Extraction Domains (Huang 1982), as illustrated in (3a, b).

(3) Condition on Extraction Domains

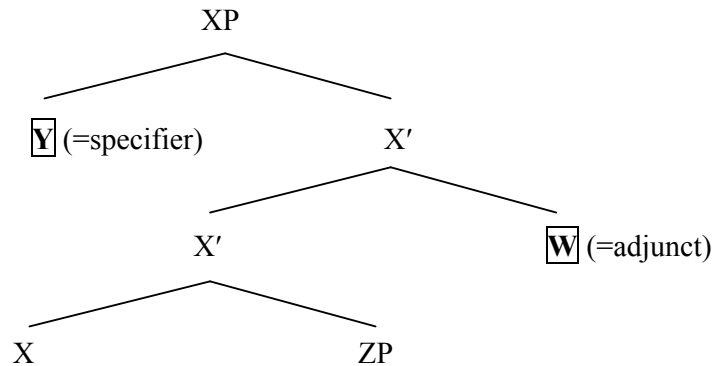
- a. * Which book did [_{DP} a critic of *t*] meet you at the conference?
- b. * Which book did you go to class [_{PP} before she read *t*]?

The DP in (3a) and the PP in (3b) correspond to YP and WP in the configuration in (2), respectively. Since the DP and PP here are left-branching specifier and adjunct phrases respectively, they undergo early Spell-Out to the PF component and reenter the syntactic derivation as a frozen renumerated item. Accordingly, extraction out of this frozen item into another derivational cascade becomes impossible in the same way that *k* cannot be extracted out of the word *book*.¹

It is to be noted at this point that, in Uriagereka's 1999 MSO model, the status of a syntactic object as specifier or adjunct does not entail that it is subject to early Spell-Out. Given the natural minimalist assumption that Spell-Out is a costly, last-resort operation, as are other computational steps, that

only applies to an otherwise unlinearizable syntactic object (Uriagereka 1999: 256), a simplex specifier or adjunct *cannot* be Spelled-Out to the PF component. To illustrate, consider a hypothetical configuration in (4).

(4) Simplex Specifiers and Adjuncts



In this configuration, the specifier Y and the adjunct W, each being a terminal node, need not, hence cannot be Spelled-Out due to the Last Resort nature of the operation Spell-Out because both Y and W can enter into asymmetric c-command relation with the rest of the configuration for the purposes of the linearization based on the Base Step in (1a) without being Spelled-Out. This “loophole” correctly derives the fact that a simplex subject or adjunct itself can be a target of extraction as in (5a, b), in contrast to (3a, b).²

(5) Simplex Subjects and Adjuncts

- a. Who do you think [_{DP} *t*] loves Tom?
- b. How do you think Mary solved this math problem [_{Adv} *t*]?

The movement of the subject *who* and the adjunct *how* is licit in these examples because their simplex composition prohibits them from undergoing early Spell-Out, thereby keeping them in the syntactic derivation so that the required movement operations can ensue.

To summarize, Uriagereka's 1999 MSO model assumes that all left-branching structures, including specifiers and adjuncts, must undergo early Spell-Out to the PF component for the purposes of linearization. This model correctly derives several well-known constraints on movement as in Huang's 1982 Condition on Extraction Domains as an automatic consequence of its derivational system. I have also noted that a simplex specifier and adjunct structure is immune from early Spell-Out due to the Last Resort nature of the Spell-Out operation.

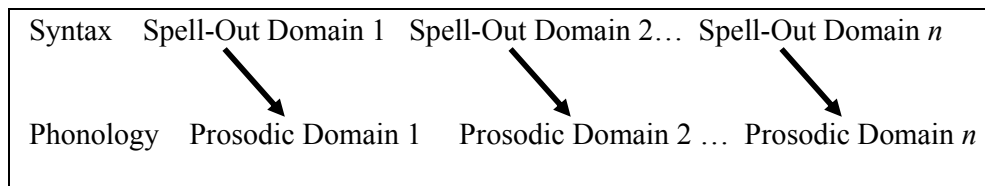
3. The Syntax-Prosody Mapping Hypothesis

The central idea pursued in this paper is that dynamically split derivational models of syntax as in Uriagereka's 1999 MSO Model should have well-defined repercussions in constraining possible domains of phonological rule application under a certain conception of the Minimalist design of language. Given the Strong Minimalist Thesis (Chomsky 2000, 2001, 2004, 2005) that language is an optimal solution to interface conditions, it is natural to expect that independent mid-derivational syntactic objects defined in a derivational model of syntactic computation should correspond to separate derivational cascades that reach the PF component independently. Under this view, the

maximally general hypothesis about the interface of syntax with the PF component will take the following form.

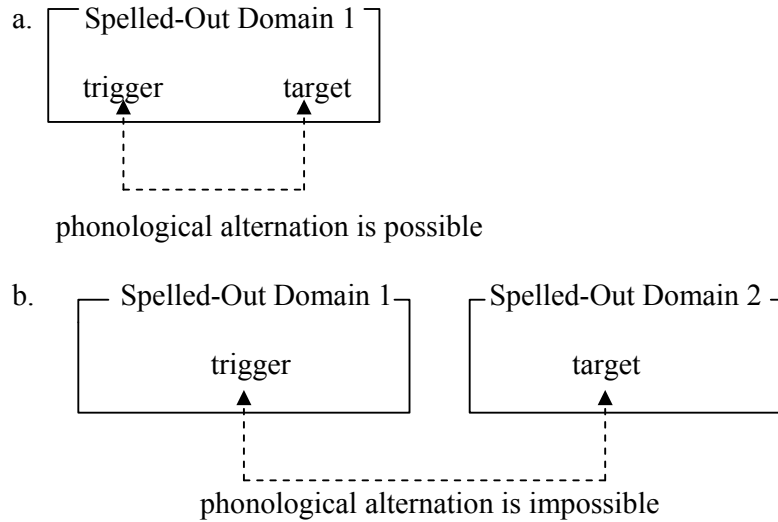
(6) The Syntax-Prosody Mapping Hypothesis

The Spelled-Out domains are mapped to prosodic domains at PF.



This hypothesis states that a Spelled-Out domain in syntax corresponds to a prosodic domain at PF within which phonological alternations are possible in natural languages. Suppose that a phonological alternation exists between two elements, trigger and target, in a language. The proposed hypothesis predicts that this alternation should be found between the two elements only if they are within the same prosodic domain; in other words, this alternation cannot happen across two different prosodic domains. This is illustrated in (7a, b).

(7) Possible Domains for Phonological Alternations



In (7a), the target of a phonological alternation is contained within the same Spelled-Out Domain as the trigger of the alternation; hence the alternation should be possible between the trigger and the target. By contrast, the same alternation should not be able to apply between the two elements in (7b) because they are contained within two different Spelled-Out Domains.³

Consider now what predictions Uriagereka's 1999 MSO Model makes regarding possible prosodic domains in human language. Recall that all and only left-branching syntactic objects, including complex specifiers and adjuncts, undergo early Spell-Out. This means that the two mid-derivational objects are mapped to prosodic domains at PF in accordance with the mapping hypothesis in (6). Thus, we have three universal predictions in (8a-c).

(8) Predictions of the Mapping Hypothesis under Uriagereka's MSO Model

- a. A head and its complement form a single prosodic domain.
- b. A left-branching specifier/adjunct structure forms an independent prosodic domain from the head and complement to which it is adjoined.
- c. A simplex specifier/adjunct structure is included in the same prosodic domain as the head and complement to which it is adjoined.

In the following section, I demonstrate that these three predictions are borne out by a wide variety of facts concerning tone sandhi in Taiwanese, liaison in French, lenition in Gilyak, and high tone deletion in Kinyamboo.

4. Tone Sandhi, Liaison, Lenition, and High Tone Deletion

In this section, I demonstrate that the three predictions made above in (8a-c) are indeed borne out by facts concerning tone sandhi in Taiwanese, liaison in French, lenition in Gilyak and high tone deletion in Kinyamboo.

*4.1. Tone Sandhi in Taiwanese*⁴

Tone sandhi refers to the phonological alternation in which the citation tone of a syllable changes into some other tone when followed by another syllable with a different lexically listed tone. This alternation can be formulated in a rule-based format as in (9) (Chen 1987: 113).

(9) Tone Sandhi Rule

$T \rightarrow T' / __$ within a tone group

Key: T = base tone, T' = sandhi tone

Tone sandhi in Taiwanese is governed by the set of fully productive rules shown in (10) (Simpson and Wu, 2002: 72).

(10) Tone Sandhi Change in Taiwanese⁵

(tone... changes to tone...)

1 → 7

2 → 1

3 → 2

4 → 8 when the syllable ends in p/t/k;
→ 2 when the syllable ends in a glottal stop

5 → 7(southern Taiwan)
3 (northern Taiwan)

6 → 1

7 → 3

8 → 4 when the syllable ends in p/t/k;
→ 3 when the syllable ends in a glottal stop

For example, the contrast between (11a) and (11b) shows that a syllable with tone 3 changes into the one with tone 2 when it is followed by any syllable with some lexical tone, not just by the neutral tone.

(11) Examples of Tone Sandhi in Taiwanese

- a. **khi3** pak8kiang1 → **khi2** pak8kiang1 (Tone sandhi)
 go Beijing go Beijing
 ‘go to Beijing’
- b. **zau2** a-NT → **zau2** a-NT (No tone sandhi)
 run already run already
 ‘already run’ (Simpson and Wu, 2002: 72)

The observation made by Simpson and Wu 2002 and Wu 2004 that is crucial to the present paper is that there are three syntactically definable domains in which tonal change is found and possible. First, the head-complement configuration licenses tone sandhi, as shown in (12a, b).⁶

(12) Head-Complement Configuration

- a. V-NP_{object} b. P-NP
- be•** [lng•pun• chhe•] **tui•**[goan• lau•pe•]
 buy two-CL book to my father
 ‘buy two books’ ‘to my father’ (Simpson and Wu, 2002: 73)

Second, tone sandhi does not occur between a head and its internally complex specifier, as shown in (13). In this example, the final syllable of the word *goan•lau•pe* ‘my father’ does not undergo tone sandhi when followed by the verb *u•* ‘have’. In the same way, tone sandhi is not possible between a head and its internally complex adjunct, as shown in (14); the last word *khi* ‘go’

does not change its tone despite its being followed by *A●hui* ‘A-hui’, a word with non-neutral tone.

(13) Head-Specifier Configuration

[_{DP} goan● lau●pe] u● lng● chhing● kho●
 my father have two thousand dollar
 ‘My father has two thousand dollars.’
 (Charles Lin, personal communication)

(14) Head-Adjunct Configuration

[_{CP} na●si A●sin m● khi], A●hui ma● be● khi.
 If Asin Neg go A-hui also Neg go
 ‘If Asin is not going, Ahui will not go.’ (Simpson and Wu, 2002: 74)

Finally, when a specifier or adjunct element is a simplex, non-branching lexical item, we have tone sandhi between the element and its following head. This is shown in (15-16).

(15) Simplex Specifier (Subject Pronouns)

Wa●/Li●/Yi●/Wun●/Lin●/Yin● jim● ji-jia● kao.
 I/You (sg)/He (She)/We/You (pl)/They kiss this-CL dog
 ‘I/You (sg)/He (She)/We/You (pl)/They kiss this dog.’
 (Shiao-hui Chan, personal communication)

(16) Simplex Adjunct (Adverbs)⁷

Wa●-e pe●bu za● kun.

I-Gen parent early sleep

‘My parents sleep early.’ (Shiao-hui Chan, personal communication)

In these examples, the subject pronoun and manner adverb undergo tone sandhi when followed by a word with non-neutral tone even though they occupy specifier and adjunct positions.

Importantly, the three structural configurations noted above exactly correspond to the Spelled-Out domains under Uriagereka’s 1999 MSO Model. The head-complement configuration licenses tone sandhi between a head and its complement because they are contained within the same Spelled-Out domain. A tone sandhi cannot occur between a head and its internally complex specifier or adjunct element because the two objects are contained within two different Spelled-Out domains. The fact that a specifier and adjunct *can* undergo tone sandhi with its following head only when they are simplex also naturally falls out; as we have seen in section 4, the Last-Resort nature of Spell-Out as a computational process prevents them from undergoing Spell-Out. As a result, they are contained within the same Spelled-Out domain as the head. In this way, the three predictions of the hypothesis in (6) are fully borne out by facts concerning Taiwanese tone sandhi.

4.2. *Liaison in French*

French liaison is another sandhi phenomenon in which a normally silent consonant is pronounced before a vowel-initial element in certain structurally definable configurations. For example, the normally silent consonant /z/ of the first word *des* ‘some’ is pronounced when it is immediately followed by the vowel-initial word *ennuis* ‘troubles’. This liaison does not occur when the same word is followed by the consonant-initial word *problèmes* ‘problems’.⁸

(17) French Liaison

- a. *des* ∩ *ennuis* ‘(some) problems’
- b. *des/problèmes* ‘(some) problems’

French liaison can be stated in a rule-based format as in (18).

(18) French Liaison

$$[-\text{sonorant}] \rightarrow \emptyset / ___ \# \left\{ \begin{array}{c} [+ \text{consonant}] \\ \# \end{array} \right\} \quad (\text{Selkirk 1974: 579})$$

This is a rule of final obstruent deletion. This rule states that a consonant is deleted before the sequence of ## (two word boundaries) or of # followed by a consonant-initial word. To illustrate, consider the following examples.

- (19) a. *des* ∩ *ennuis* ‘(some) problems’
 b. *dans* ∩ *une sale* ‘in a room’
 c. *Paul nous* ∩ *appelle.* ‘Paul is calling us.’
 d. *Les garçons/enragent.* ‘The boys are getting mad.’
 e. *Les immigrants/envoyaient/des lettres/à leurs familles.*
 ‘The immigrants were sending letters to their families.’
 (Selkirk 1974: 580)

In the examples in (19a-c), liaison is found between a determiner/preposition/clitic pronoun and a major category item. The rule maintains the final consonant because liaison in each example is found before a single word boundary as in *des #ennuis*, *dans #une #salle*, and *nous #appelle* according to the conventions outlined in Chomsky and Halle 1968. In the examples in (19d, e), on the other hand, there is no liaison between the subject DP and the verb or between the verb and the first object DP or between the first DP object and the second PP object. The rule in (18) deletes the final consonant in these examples even if it precedes a vowel at the beginning of the following word because in each example the final word of the lefthand category is separated from the first word of the righthand one by a sequence of double word boundaries as in *## Les #garçons ##enragent ##* and *## Les #immigrés ##envoyaient ## des #lettres ## à #leurs #familles ##* according to Chomsky and Halle’s formalism. For the same reason, the rule in (18) also accommodates the fact that sentence-final consonants are never pronounced in none of the above

examples because of the existence of double word boundaries, as in ## *Les* # *garçons* ## *enragent* ## for (19d).

Selkirk 1972, 1974 proposes the following generalization on this sandhi phenomenon.

(20) Selkirk's 1974 Generalization

‘A liaison context exists between an inflected X and its complement, both dominated by X’. (Selkirk, 1974: 581)

This generalization states that the target word can undergo liaison when it is followed by its complement. Thus, the determiner *des* ‘some’ in (17a) enters in a liaison context with its following word *ennuis* ‘troubles’ because this structure instantiates the head-complement structure. In this subsection, I show that the generalization in (20) can be maintained in its slightly revised form under the more recent conception of phrase structure known as Bare Phrase Structure of Chomsky 1995.⁹

Consider first the head-complement configuration. This configuration creates a liaison context, as shown in (21a-e). To take (21b), for example, the verb *mangeait* ‘was eating’ undergoes liaison when it is followed by the indefinite article *une* ‘a’.

(21) Head-Complement Configuration

- | | | | |
|----|---------------------------------------|--------------------------------|------|
| a. | des \cap ennuis | ‘(some) problems’ | D-NP |
| b. | mangeait \cap une pomme | ‘was eating an apple’ | V-DP |
| c. | des mois féconds \cap en événements | ‘(some) months full of events’ | A-PP |
| d. | dans \cap une sale | ‘in a room’ | P-DP |
| e. | prêt \cap à partir | ‘ready to leave’ | A-CP |

(Selkirk 1974: 580, 582, 584)

One crucial argument for the generalization comes from examples like (22a, b) and (23a, b), which show a curious correlation of the presence/absence of liaison with a particular semantic interpretation.

(22) Correlation of Liaison with Semantic Interpretation

- a. un marchand de draps/anglais
‘A merchant of English sheets’ OR ‘An English merchant of sheets’
- b. un marchand de draps \cap anglais
‘A merchant of English sheets’ NOT ‘An English merchant of sheets’

(Selkirk 1974: 583)

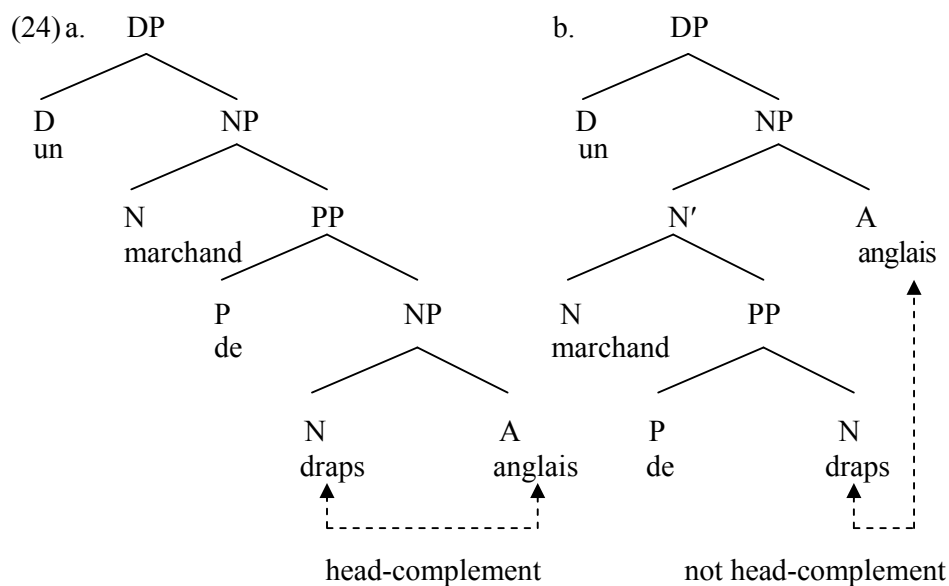
(23) Correlation of Liaison with Semantic Interpretation

- a. Les masses sont fidèles/à Rome.
‘The masses are faithful to Rome.’ OR ‘The masses are faithful in Rome.’
- b. Les masses sont fidèles \cap à Rome
‘The masses are faithful to Rome.’ NOT ‘The masses are faithful in Rome.’

(Selkirk 1974: 585)

In (22a), where liaison is not found between *draps* ‘sheets’ and *anglais* ‘English’, two interpretations are available. In one interpretation, the sentence-final adjective *anglais* ‘English’ modifies *draps* ‘sheets’ and yields the reading ‘A merchant of English sheets’. In the other interpretation, the adjective modifies the non-adjacent noun *marchand* ‘merchant’ and yields the reading ‘An English merchant of sheets’. This semantic ambiguity disappears when liaison occurs between *draps* and *anglais*, as shown in (22b). In this sentence, the only interpretation available is ‘A merchant of English sheets’ where *anglais* modifies its immediately preceding nominal *draps*. The same correlation between the presence/absence of liaison and semantic interpretation is also observed in the examples in (23a, b). In (23a), which does not have liaison between *fidèles* ‘faithful’ and *à* ‘to, in,’ the PP *à Rome* can be interpreted as either the complement or the adjunct of the adjective, yielding the two readings noted. In (23b), on the other hand, liaison takes place between the verb and the preposition. In this case, the only interpretation available is ‘The masses are faithful to Rome’, where the preposition *à* is interpreted as the complement of the adjective *fidèles* ‘faithful’.

This correlation between phonology and semantics is predictable by the generalization such as the one in (20) under the Bare Phrase Structure Theory of Chomsky 1995. Specifically, the example in (22a) without liaison is associated with either the structure in (24a) or the structure in (24b) whereas the example in (22b) with liaison is associated only with the structure in (24a).



In the example in (22a), the optionality of liaison between *draps* ‘sheets’ and *anglais* ‘English’ suggests that the two words may or may not stand in the head-complement relation. Thus, the example is either associated with (24a) or (24b). This structural ambiguity yields the semantic ambiguity. In the example in (22b), the occurrence of liaison between the two words suggests that they must stand in the head-complement relation, and (24b) is the only structure that satisfies this structural requirement. Thus, the example has the unambiguous reading ‘A merchant of English sheets.’ The same story holds for the similar pair of examples in (23a, b).

Note that this account crucially rests on the Bare Phrase Structure Theory. It has been widely assumed before the advent of this theory that modifier expressions like *anglais* ‘English’ are the sister of the N’ that dominates *draps* ‘sheets’. In this pre-minimalist conception, then, the two elements would not stand in the head-complement relation. In other words, the head-complement

relation that is relevant to determining liaison contexts is purely structural, not selectional in any way as in the X' Theory. Only in the Bare Phrase Structure Theory that does not recognize bar levels as a primitive notion in phrase structure do *anglais* and *draps* occur within the purely structural head-complement configuration. The proposed account for the correlation of liaison with semantic ambiguity thus provides indirect support for the Bare Phrase Structure Theory.

The following examples of liaison might be a problem for the generalization in (20) because the verb, the target of liaison, does not appear to stand in the head-complement configuration with its following manner adverb, the trigger of liaison, under the standard conception of phrase structure.

- (25) a. Gramsci correspondait \cap assidûment avec sa belle-soeur.

‘Gramsci corresponded assiduously with his sister-in-law.’

- b. Marie caressait \cap affectuesement sa fille.

‘Marie affectionately caressed her daughter.’

(Selkirk 1974: 587)

- (26) a. Il regardait \cap avec plaisir cette emission.

‘He watched that program with pleasure.’

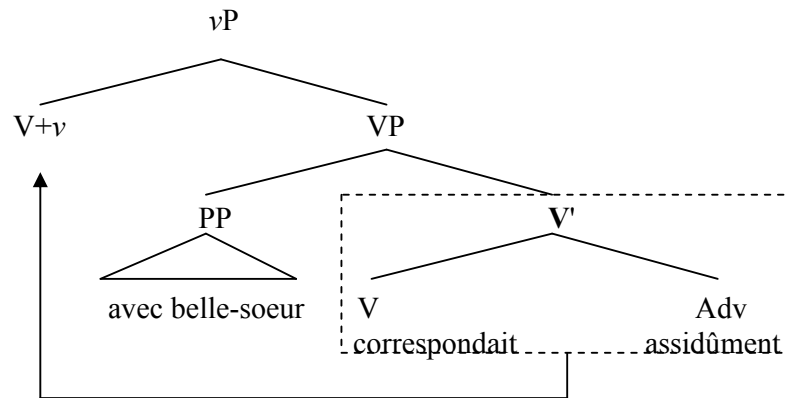
- b. Il parlait \cap avec hesitation de leur fallite.

‘They spoke of their failure with hesitation.’

(Selkirk 1974: 587)

There are a number of recent analyses that allow us to maintain the generalization (20) in face of these examples. I mention one possible analysis here. Larson 1990 and Stroik 1990 propose that manner adverbs are base-generated as sisters of the verb. I maintain, following Larson 1988: 347-50 (see also Carnie 1995, 2000), that the V' dominating the main verb and the adverb undergoes reanalysis as V, which in turns moves into the *v* head. Under this analysis, the relevant part of the structure of (25a) will be as in (27).¹⁰

(27) The Structure of (25a)



In this structure, the verb *correspondait* ‘corresponded’ stand in the head-complement relation with the manner adverb *assidûment* ‘assiduously.’ The same analysis applies to (25b) and (26a, b).¹¹

So far, we have seen that the head-complement relation provides a liaison context in French, consistent with the original generalization made by Selkirk 1972, 1974. This result is exactly what is predicted by the syntax-prosody mapping hypothesis couched within Uriagereka’s 1999 MSO Model, which

claims that the head and its complement are contained within the same Spelled-Out domain. Consider now whether liaison occurs between a head and its specifier/adjunct. Some constructions that instantiate the specifier-head relation are given in (28a, b).

(28) Specifier-Head Configuration

a. Donnez ces lunettes/à Marcel.

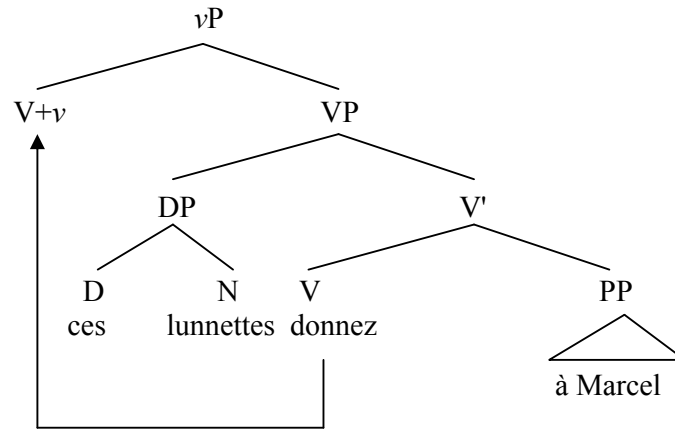
‘Give these glasses to Marcel.’

b. Ils voulaient changer des métaux/en or.

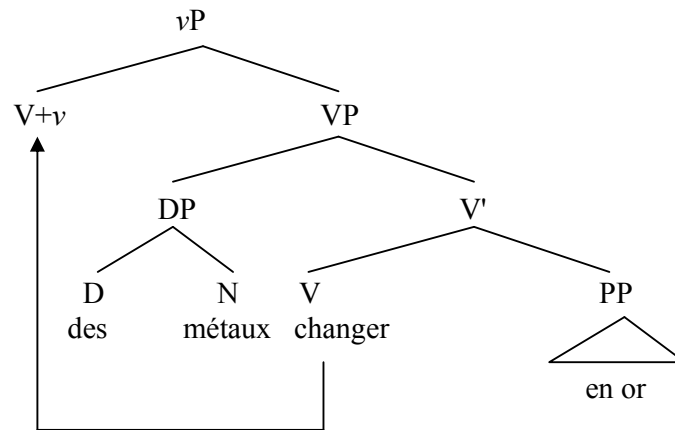
‘They wanted to change metals into gold.’ (Selkirk 1974: 584)

(28a) is a double object construction, which is analyzed as having the v -V configuration with the first and second objects base-generated in the specifier and complement of the lower V under recent analyses, as shown in (29) (see Larson 1988; Pesetsky 1995; Harley 1995, 2003). (28b) is a resultative construction that can be analyzed as having a similar structure as the double object construction with the direct object base-generated in the specifier of the PP headed by the secondary resultative predicate, as shown in (30) (see Carrier and Randall 1992; Radford 1997).

(29) The Structure of (28a)



(30) The Structure of (28b)



In (29), *lunettes* ‘glasses’ cannot undergo liaison before *à* ‘to’ since the two words are not in the head-specifier configuration. In the same way, in (30), the trigger (*changer* ‘change’) and the target (*métaux* ‘metals’) are not in the head-complement relation, which blocks liaison between these two elements. Notice here that the trigger and target of liaison in the examples in (28a, b) instantiate the head-complex specifier configuration. This configuration is what the proposed mapping hypothesis in (6) predicts not to be a possible liaison

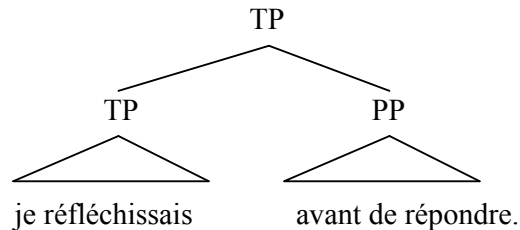
context because a complex specifier undergoes early Spell-Out and is processed at the PF component separately from the rest of the derivation. The proposed analysis also predicts that liaison should be impossible between a head and the last word of a complex adjunct since the latter forms an independent prosodic domain from the domain that contains the head. This prediction is also borne out by examples as in (31), whose rough syntactic representation is shown in (32).

(31) Head-Adjunct Configuration

Je réfléchissais/avant de répondre.

‘I was reflecting before answering.’ (Selkirk 1974: 588)

(32) The Structure of (31)



In this structure, liaison is not observed between *réfléchissais* ‘was reflecting’ and *avant* ‘before’ because the latter is contained within the Spelled-Out domain (PP) that is processed separately from another Spelled-Out domain (TP) that contains the main clause *je réfléchissais* ‘I was reflecting’.

Finally, the proposed mapping hypothesis makes a prediction that liaison should be possible between a head and its specifier or adjunct only when the latter is simplex. Interestingly, this prediction is also indeed borne out by

examples as in (33-35). The examples here are provided by native consultants of Summaya Racy (personal communication).

(33) Complex vs. Simplex Subjects

a. Les garçons/étaient grands.

‘The boys were big.’

b. Nouns \cap allons. Vous \cap allez.

‘We go./You go.’

(34) Complex vs. Simplex Indirect Objects

a. Donnez/un gateau à Marcel.

‘Give a cake to Marcel.’

b. Donnez \cap en à Marcel.

‘Give some of it to Marcel.’

(35) Complex vs. Simplex Adjuncts

a. Marie le caressait/aussitôt qu’elle le voyait.

‘Marie caressed it as soon as she saw it.’

b. Marie les caressait \cap aussi.

‘Marie caressed it too.’

The examples in (33a, b) show that the subject undergoes liaison before the verb only when it is a simplex, non-left-branching element. The same effect of the simplex vs. complex composition of the target onto the presence/absence of its liaison is also observed in the contrast between (34a) and (35a), on the one hand, and (34b) and (35b), on the other.¹²

To recap, I have demonstrated that the three predictions of the proposed syntax-prosody mapping hypothesis couched within Uriagereka’s 1999 MSO Model are confirmed by a range of data concerning French liaison. In the next two subsections, I further show that facts regarding lenition in Gilyak and high tone deletion in Kinyambo provide additional preliminary support for the proposed analysis.^{13, 14}

4.3. *Lenition in Gilyak*

Kenstowicz and Kisseberth 1979: 436-7 point out that in Gilyak, the initial obstruent of a word is voiced after nasals and spirantized after vowels, as shown in (36a-d) (see Krejnovich 1937 for the original source of data).

(36) Gilyak Lenition

| | |
|--|--|
| a. noun + noun | b. adjective-noun |
| q ^h os ‘neck’ | t↔f ‘house’ |
| Ne xos ‘otter neck’ | pilan t↔f ‘big house’ |
| ves q ^h os ‘crow neck’ | |
| c. pronoun + noun | d. direct object + verb |
| p↔x ‘paint’ | v↔kz-d ^j ‘throw away’ |
| N↔N-bex ‘our paint’ | ki v↔kz-d ^j ‘throw away shoes’ |
| | Nas p↔kz- d ^j ‘throw away belt’ |

Kenstowicz and Kisseberth observe that these four configurations exhaust the contexts in which lenition is found in Gilyak. Importantly, all of these

structures instantiate the head-complement relation between the trigger and target of lenition under the Bare Phrase Structure Theory (recall related discussion in section 4.2.). Thus, the observed pattern of lenition in Gilyak provides additional preliminary support for the proposed mapping hypothesis.

4.4. *High Tone Deletion in Kinyamboo*

Bickmore 1990 observes that a high tone in a word is deleted when followed by another word with the same tone within certain structural configurations.¹⁵ One example of high tone deletion in this language is given in (37).

(37) Kinyamboo High Deletion

o-mu-kama mukázi (cf. omukáma ‘chief’ (in isolation))
 chief old
 ‘old chief’ (Bickmore 1990: 9)

In this example, the high tone of the citation form of the word *omukáma* ‘chief’ is deleted before another word *mukázi* ‘old’ whose second syllable contains high tone.

What is interesting for us about high tone deletion in Kinyamboo is Bickmore’s observation that the simplex vs. complex composition of subject and indirect object is correlated with the presence vs. absence of high tone deletion in them. Consider examples in (38a, b) and (39a, b).

(38) Simplex vs. Complex Subject in High Tone Deletion

- a. abakozi bákajúna (cf. abakózi ‘workers’ (in isolation))

workers they helped

‘The workers helped.’

- b. abakozi bakúru bákajúna (cf. bakúru ‘mature’ (in isolation))

workers mature they helped

‘The mature workers helped.’ (Bickmore 1990: 14)

(39) Simplex vs. Complex Indirect Objects in High Tone Deletion

- a. Nejakworech’ á bakoz’ émbwa (cf. nejakwórecha ‘he-will-show’ (in isolation))

he-will-show workers dog

‘He will show the workers the dog.’

- b. Nejakworech’ ómukama w’ábakozi émbwa (cf. abakózi ‘workers’ (in isolation))

he-will-show chief of workers dog

‘He will show the chief of the workers the dog.’ (Bickmore 1990: 15)

These examples show that when a specifier element such as subject and indirect object is simplex, its high tone is deleted; when it is complex, its high tone is maintained. Thus, the high tone deletion pattern in Kinyambo provides evidence for the proposed mapping hypothesis.^{16, 17}

5. Consonant Mutation in Welsh and Irish and Phase Theory¹⁸

Consonant mutation refers to the phenomenon in which the initial consonant of the citation form of a word undergoes phonological replacements under certain syntactically definable configurations. The phonological effects of consonant mutation in Welsh are shown in (40), with one example given in (41).

(40) Welsh Consonant Mutation

| | | | |
|--------|----------|--------|--------------------|
| p → b | b → f | m → f | |
| t- → d | d → dd | rh → r | |
| c → g | g → NULL | ll → l | (Harlow 1989: 289) |

(41) Welsh Consonant Mutation

Gwenlodd y dyn **gi** (citation form = *ci* ‘dog’)
 saw-Past-3S the man dog
 ‘The man saw a dog.’ (Harlow 1989: 289)

In (41), the citation form of the word *ci* ‘dog’ undergoes consonant mutation into *gi*. I assume, somewhat controversially, that the trigger for consonant mutation in Welsh is an XP that immediately precedes the target (see Harlow 1989, Tallerman 1990, 1993, 2006 and Roberts 1997, 2005 for detailed discussion on the possible trigger for consonant mutation in Irish). In this section, I examine several cases in which syntactic derivation crucially affects the presence vs. absence of consonant mutation in this language.

One case concerns the observation made by Tallerman 1990: 405-6 (cf. U.I.G.C. 1976, Jones and Thomas 1977, and Harlow 1989) that CP clauses,

not TP clauses, constitute barriers for consonant mutation. Consider the following example.

(42) Lack of Consonant Mutation across the CP Boundary

Dyweddodd [_{NP} hi][_{CP} (y) [_{IP} bydd hi'n prynu car newydd]]
 said-3s she COMP will-be-3s she-PROG buy car new
 'She said (that) she will be buying a new car.' (Tallerman 1990: 405)

In (42), we have an optional complementizer *y*. Irrespective of whether this complementizer is omitted or not, the finite verb in the embedded clause does not mutate even though it follows the potential trigger NP *hi* 'she' in the matrix clause (Tallerman 1990: 405). This absence of consonant mutation suggests that CP clauses serve as barriers to mutation. This conclusion receives further confirmation from examples as in (43a, b). The embedded clauses in these examples are CPs, as shown by the occurrence of the complementizers *tan* 'until' and *pan* 'when'.

(43) Lack of Consonant Mutation across the CP Boundary

a. Mi wnei di aros [_{NP} yma] [_{CP} tan/*dan ddo i yn ol]
 prt will-do-2s you stay here until will-come-1s I back
 'You'll stay here until I come back'

(Jones and Thomas 1977: 139, cited in Tallerman 1990: 404)

b. Mi welais i [_{NP} Huw] [_{CP} pan/*ban gyrraeddais i]
 prt saw-1s I Huw when arrived-1s I
 'I saw Huw when I arrived.' (Tallerman 1990: 405)

In these examples, the embedded complementizers do not undergo mutation even when preceded by the NP, which otherwise serves as trigger for consonant mutation.

Now, compare these examples with those in (44) and (45).

(44) Consonant Mutation across the IP Boundary

Dywedodd [_{NP} yr anthro] [_{IP} **fod** Gareth wedi colli'r bws] (citation form = *bod* 'be')

said-3s the teacher be Gareth PERF lose-the bus

'The teacher said Gareth had missed the bus.'

(U.I.G.C. 1976: 92, cited in Tallerman 1990: 405)

(45) Lack of Consonant Mutation across the CP Boundary

* Dywedodd [_{NP} yr athro] [_{CP} y [_{IP} **bod** Gareth wedi collo'r bws]]

said-3s the teacher COMP be Gareth PERF lose-the bus

'The teacher said Gareth had missed the bus.'

(Tallerman 1990: 406)

The data in (44) shows that consonant mutation can be triggered across the IP boundaries when there is no position for complementizers. That there is no complementizer position in the complement of the verb 'say' is supported by the fact that the complementizer *y* cannot occur with the nonfinite form *bod*, as the ungrammaticality of (45) indicates. Based on these examples, it seems safe to conclude, following Tallerman 1990, that CPs, but not TPs, are barriers to consonant mutation in Welsh.

A natural question to ask at this point, of course, is what it is about CPs that makes them blockers for mutation. It is important to notice that Uriagereka's 1999 MSO Model, which we have assumed so far, cannot answer this question because it does not draw any distinction between the two specific categorical nodes CP and TP that would be pertinent to Spell-Out. As we have seen in section 2, Uriagereka's 1999 framework assumes that Spell-Out is a costly, Last-Resort operation that is triggered for the purposes of linearization as in the Base Step in (1a), not in a way that is sensitive to the label of mid-derivational objects that syntactic computation will create along its way.

A straightforward explanation for this syntactic effect on the presence vs. absence of consonant mutation is readily available under another version of the MSO model known as Phase Theory, as outlined in Chomsky 2000, 2001, 2004, 2005. Like Uriagereka 1999, Chomsky adopts the assumption that syntactic objects are sent off to the PF and LF components for phonological and semantic interpretation in a piecemeal fashion. The derivational points at which this transfer takes place are defined as phases, mid-derivational syntactic objects that contain an instance of ν or C.¹⁹ More concretely, once the ν P and CP structures have been constructed, they undergo Spell-Out to PF and LF. Under the mapping hypothesis proposed in section 3, which uniquely maps Spelled-Out domains to prosodic domains at PF, this means that CPs and ν P should constitute domains at PF within which phonological alternations are possible. This expanded mapping theory therefore provides a principled explanation for the effect of the distinction between CP and TP on consonant mutation in Welsh. Consonant mutation does not occur in (42), (43a, b) or (45)

because the trigger is separated from the target of the alternation by the CP boundary. This mutation does happen between the embedded auxiliary and the matrix NP in (44) because there is no CP boundary that separates the two.²⁰

Furthermore, there is one argument of a different sort in Welsh that *vP* also plays a crucial role in defining a structural configuration for consonant mutation. Consider the following example of Welsh from Tallerman 1993 (as cited by Radford 2004: 405).

(46) Traces in [Spec, *vP*] as Trigger for Consonant Mutation

Beth wyt ti 'n **feddwyl** oedd gen I? (citation form = *meddwyl* 'think')

What are you PROG thinking was with me

'What do you think I had?'

Tallerman 1993 provides independent evidence that *wh*-traces trigger consonant mutation. In the example in (46), the embedded verb has undergone mutation so that the mutated form *feddwyl* 'think' is used instead of its citation form *meddwyl* 'think'. Given her assumption that *wh*-traces work as a trigger for mutation, a natural account for (46) is to suppose that movement of *beth* 'what' leaves its trace in the specifier position of the *vP* in the embedded clause (see also Willis 2000 for a different account). Thus, examples like (46) constitute one clear case of the syntax-phonology mapping in which consonant mutation confirms the existence of *vP* phase in Welsh (cf. footnote 22).

As an anonymous reviewer points out, one might wonder whether there is any piece of independent evidence that *vP* also serves as blocker for consonant

mutation just like CP does in Welsh. This question is reasonable given that Chomsky assumes that *v*Ps as well as CPs form strong phases. Though I could not come up with any data that bears on this question from Welsh itself, facts concerning consonant mutation in Irish, a related Celtic language, provide evidence that *v*P indeed serves as blocker for this phonological process.²¹ Consider first examples in (47a, b).

(47) Irish Consonant Mutation

- a. an Bheán **bhocht** (cf. citation form = bocht ‘poor’)
 Def.fem woman poor
 ‘the poor woman’
- b. Tá an bheán **bocht**
 is Def.fem woman poor
 ‘The woman is poor.’ (Andrew Carnie, personal communication)

In the example in (47a), the adjective undergoes lenition from its citation form *bocht* to *bhocht* after the word *bheán* ‘woman.’ In the example in (47b), however, this mutation does not happen to the same adjective despite the fact that it is immediately preceded by the same trigger. We can account for this apparent mysterious contrast between (47a) and (47b) once we assume that a *v*P boundary exists between the trigger and the target of lenition in (47b), not in (47a), as shown in (48).²² This assumption is independently motivated by the observation that *v*P-adverbs such as *igconai* ‘always’ can be inserted between *bheán* ‘woman’ and *bocht* ‘poor’, as shown in (49) (see McCloskey 1996).

(48) Lack of Irish Consonant Mutation across vP Boundaries

Tá [FP an bheán ...[vP **bocht**]]
↓
blocker for mutation

(49) The position of vP-adverbs

Tá an bheán i gcónaí bocht.

Is Def.Fem woman always poor

‘The woman is always poor.’ (Andrew Carnie, personal communication)

A similar argument can be made on the basis of the contrast between (50a) and (50b) in Irish.

(50) Irish Consonant Mutation

a. dha phingin **dheas** (cf. citation form = *deas* ‘poor’)

two penny poor

‘two poor pennies’

b. Tá dha phingin **deas**.


Is two penny poor

‘Two pennies are poor.’ (Andrew Carnie, personal communication)

As is well-known in the literature on Irish (Stump 1988; see also Green 2005 and Wolff 2006), the word *dha* ‘two’ is peculiar in that it serves as a trigger for mutation to a non-adjacent element such as *dheas* ‘poor’ in (50a). This mutation does not apply between the same pair of target and trigger in the example in (50b). Again, this absence of mutation is naturally accounted for if

we assume that the ν P boundary exists between the two elements and blocks the mutation as a phase boundary, as shown in (51).

(51) Lack of Irish Consonant Mutation across ν P Boundaries

Tá [FP dha phingin ... [ν P **dheas**]]

blocker for mutation

To summarize, I have argued on the basis of the absence of the consonant mutation across CP and ν P boundaries in Welsh and Irish that Chomsky's version of the MSO Model known as Phase Theory should be integrated into the proposed syntax-prosody mapping hypothesis.

6. Conclusions

This paper has proposed a general syntax-prosody mapping hypothesis within a recent derivational theory of syntax espoused by Chomsky 2000, 2001, 2004, 2005 and Uriagereka 1999. This hypothesis, which maps mid-derivational Spelled-Out domains to prosodic domains at the PF component, yields a number of universal predictions that have been indeed borne out by a variety of phonological alternations including tone sandhi in Taiwanese, liaison in French, lenition in Gilyak, high tone deletion in Kinyambo, and consonant mutation in Welsh and Irish. The overall result of this paper strongly argues for the position that a derivational system of syntax that combines both Uriagereka's and Chomsky's models would be in need for the proper access to phonology from syntax and vice versa.

Footnotes

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¹ Richard Kayne (personal communication) points out the qualitative difference in unacceptability between subject island cases as in (3a) and adjunct island cases as in (3b), stating that the former is felt to be ten times as bad as the latter. Uriagereka's MSO model, which derives subject and adjunct islands in exactly the same way as a consequence of early Spell-Out, has little to say in accounting for this qualitative difference. One view suggested by this qualitative difference would be that attempts to unify the subject and adjunct conditions are empirically incorrect. This view is not necessarily correct. One could argue that subject extraction involves movement from a separate cascade while adjunct extraction involves this kind of movement plus late/post-cyclic merge in the sense of Lebeaux 1988. This additional operation would incur a more severe violation in the computational component.

Another potential problem with Uriagereka's 1999 model comes from the observation that extraction from within an adjunct is universally ill-formed whereas languages like Japanese allow extraction from within a subject. Recent work as in Stepanov 2001, for example, claims that the subject and adjunct conditions should be dissociated, suggesting that adjuncts form closed domains due to their late/post-cyclic merge while subjects become opaque for extraction due to their derived position as proposed in the Freezing Principle of Wexler and Culicover 1980. Strictly speaking, however, in Uriagereka's model, subject extraction could be only apparent in that it does not involve movement like adjunct extraction. For example, it could be created by a bound null pronoun that fills the subject position in languages like Japanese which allow this option. If so, the difference in acceptability between subject and adjunct extraction in languages like Japanese might be attributable to some other independent factors.

² The same point applies to cases where complex subjects and adjuncts are extracted wholes as in *which man that Bill likes left Tucson yesterday?* This movement is licit in this example under Uriagereka's system since it does not involve extraction *out of* a subject position

³ This hypothesis is proposed in Sato 2006a, b. There it is argued that it provides a unified account of nuclear sentence stress placement both within English and across languages as well as the core properties of English contraction (*wanna*-contraction, auxiliary contraction and pronominal cliticization). Other researches have independently come to similar

conclusions, applied to different data. Kahnemuyipour 2004 provides a derivational account of nuclear stress rules within Phase Theory of Chomsky 2000, 2001, 2004, 2005. See also Arregi 2002, 2003 for a related derivational account of nuclear sentence stress. Dobashi 2003 proposes a similar hypothesis for phonological phrasing within the Phase Theory. Uriagereka 1999: 262-5 himself points out that the interface hypothesis of this sort receives empirical support from focus spreading, pauses/parenthetical expressions, phonological association of certain function items to the lexical heads, and the cliticization of determiners to their preceding heads in Galician. Johnson 2002, 2004 develops a similar idea from focus spreading within a Multiple Spell-Out model similar to the one pursued in Uriagereka 1999.

⁴ This section owes a great deal to the pioneering work by Simpson and Wu 2002 and Wu 2004 on Taiwanese tone sandhi. All the data in this section are from these works unless otherwise noted.

⁵ Wu 2004: 84 characterizes the 8 tones in the following way: the 1st: high-level 3-5, the 2nd: high-falling 5-1, the 3rd: low-falling, the 4th: low-entering tone (a syllable with a final stop), the 5th: contour-tone 2-4, the 6th: high-falling 5-1, the 7th: mid-level 3-3, the 8th: high-entering. Tones 2 and 6 are phonologically identical.

⁶ From now on, I use the symbol ● to indicate the occurrence of tone sandhi. A syllable followed by this dot undergoes tone sandhi.

⁷ I assume that *za* ‘early’ is attached to the VP. This is an assumption that needs further empirical investigation. However, since the adverb is a simplex

word, the claim still holds that the simplex composition has a derivational role to play in calculation of tone sandhi at the PF component. Thanks to an anonymous reviewer for this question.

⁸ The symbol \cap indicates that a consonant followed by that symbol has undergone liaison while the slash / indicates that a consonant followed by that symbol has not undergone this alternation.

⁹ As Richard Kayne (personal communication) points out, syntactic environments on French liaison have been commonly held to be divided into three classes (obligatory, optional, or impossible). Selkirk 1974: 581 claims that the so-called ‘optional’ environments come into play only when conversations become formal, as in an elevated speech style, and, as a result, liaison is never found in the relevant environments in normal conversation. She proposes an adjustment rule which converts the sequence of a double ## into a single # to account for a number of otherwise exceptional cases of liaison observed in an elevated speech. The purpose of this paper is to see whether the proposed analysis can correctly demarcate the set of possible and impossible domains of French liaison, not to propose a theory of (non-syntactic) conditions on the alternation. Accordingly, I leave this important issue on the obligatoriness/optionality of French liaison aside. See Selkirk 1972 for more discussion on this issue. All the data in this subsection come from Selkirk 1974 unless otherwise noted.

¹⁰ Another account is PP/DP extraposition. I will not go into details of this alternative account in this paper.

¹¹ David Adger (personal communication) raises the question of how the present analysis could derive the order V + *pas* + the adverb in the negative counterparts to (26a, b) given in (ia, b).

(i) a. Il ne regardait pas avec plaisir cette émission.

‘He did not watch that program with pleasure.’

b. Il ne parlait pas avec hésitation de leur faille.

‘They did not speak of their failure with hesitation.’

However, these examples are judged to be awkward by French native consultants of Sumayya Racy (personal communication). They point out that the two examples above were at the very limits of acceptability. For them, it is somewhat distressing to put *pas* between the V and PP and the V + PP needs to be treated as a unit to the exclusion of the negative element. The reanalysis process proposed in the text is meant to capture this intuition.

¹² A natural question to address here is why the adverb *aussi* should not precede the VP *les caressait* in the example in (35b) by the Base Step in (1b), which dictates that the base order should be V + Adv + NP. In this particular example, the object clitic undergoes cliticization into the main verb. This PF cliticization then makes this amalgam count as a single terminal node for the purposes of the Linear Correspondence Axiom (Chomsky 1995, Sato 2006b). Alternatively, the VP remnant movement moves the V + DP across the adjunct adjoined to *v*/VP. The cliticization then derives to the correct word order clitic + DP + Adv in examples like (35b).

¹³ Guimaraes 1998 has counter evidence for the claim in this paper that only a simple specifier/adjunct element can stand in a liaison context with its following element. He provides several cases of liaison that can involve left-branching structures in limited conditions and proposes a similar analysis to the one proposed here within the top-down derivational model. The relevant work was not available to me when I completed this work. I leave careful examination of the data concerning this claim discussed in Guimaraes 1998 for another occasion. I thank Juan Uriagereka (personal communication) for pointing this out.

¹⁴ An anonymous reviewer raises the question of how different the proposed derivational analysis is from previous prosodically based analyses of the prosodic phenomena discussed so far. In other words, the set of data could be and might have been explained in representational terms, by referring to notions such as branchingness of constituents. I disagree. There have been few analyses in representational terms that attempt to incorporate structural notions such as complement, adjunct, and specifier for the exploration of the syntax-phonology interface and see how far we can go without relying on prosody-theoretic notions or some correspondence rules between syntax and phonology. The present analysis is just one attempt to see whether a systematic, purely syntactic explanation can be achieved. The valuable exception is Cinque 1993. Furthermore, as we will see in section 5, consonant mutation in Welsh is sensitive to the CP vs. TP boundaries and the presence/absence of the *v*P boundary blocks mutation in Irish. No representational analyses have been

proposed that map a particular syntactic category to a barrier to certain prosodic phenomena, and only the derivational analysis such as the one proposed here can accommodate the observed contrast.

¹⁵ Kinyambo has a total of three surface tones: High (á), Low (a), and Falling (áa). There is a maximum of one non-Low tone per noun. The non-Low tone never appears on the final syllable.

¹⁶ One remaining problem with this analysis, of course, is why the inflected verb *nejákworech* ‘he-will-show’ loses high tone in its third syllable in (39b). The present analysis would wrongly predict that it should not lose its high tone because the indirect object is Spelled-Out and mapped to a prosodic domain that excludes the inflected verb. I leave this problem for future study. Another surprising part in (39b) might be the lack of high tone deletion in *ómukama* ‘chief’, whose citation form is *omukáma*. I maintain for the purposes of discussion here that the high tone deletion occurs in this example because it stands in a sisterhood relation with its following argument *w’ábakózi* ‘of workers’.

¹⁷ Kaisse 1985: ch.7 examines a wide range of other sandhi rules—including syntactic doubling in Italian, tone sandhi in Mandarin Chinese and Ewe, and vowel shortening in Kimatuubi—and proposes a unified account of them that makes crucial reference to the structural notion of c-command. These alternations may be amenable to the proposed account. I leave careful examination of these facts for another occasion.

¹⁸ I thank Andrew Carnie (personal communication) and Heidi Harley

(personal communication) for directing my attention to the relevance of the present analysis to consonant mutation in Welsh and Irish.

¹⁹ Chomsky 2000, 2001, 2004 assumes that only those verbs with ‘full argument structure’, excluding passive and unaccusative verbs, have strong phase heads. However, I adopt the null assumption that every instance of *v* is a strong phase head. See Legate 2003, however, for several semantic and phonological arguments that all instances of *v*, unaccusative or passive, constitute a strong phase in the sense of Chomsky.

²⁰ Bošković 2001 and Bošković and Lasnik 2003 also provide independent evidence that the *C* head creates intonational boundaries and blocks PF-affixation.

²¹ I am very grateful to Andrew Carnie (personal communication) for providing the data and idea presented here. See Carnie in prep.

²² One hidden assumption here that needs independent support is that the A-movement trace of *an bheán* ‘the woman’ in [Spec, *v*P] would not trigger consonant mutation.