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

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1. Introduction

Goals

- A syntax-prosody mapping hypothesis is proposed within a Multiple Spell-Out (MSO) model (Uriagereka 1999; Chomsky 2000, 2001, 2004, 2005) that uniquely maps Spelled-Out mid-derivational objects in syntactic derivation to prosodic domains at the PF interface.

  Taiwanese Tone Sandhi, French Liaison
  Gilyak Lenition, Kinyamboo High Deletion
  Welsh Consonant Mutation

- A derivational system of syntactic computation that combines Uriagereka's and Chomsky's dynamic models is necessary for the proper access to phonology from syntax.

Roadmap

Section 2: Uriagereka's MSO Model, Syntax-Prosody Mapping Hypothesis
Section 3: Taiwanese Tone Sandhi
Section 4: French Liaison
Section 5: Gilyak Lenition and Kinyamboo High Deletion
Section 6: Welsh Consonant Mutation, Chomsky's Phase Theory
Section 7: Conclusions and Future Investigations

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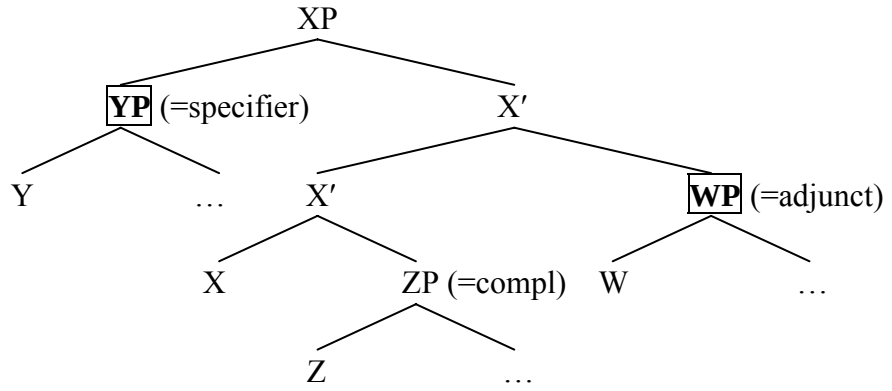
2. Uriagereka's 1999 Multiple Spell-Out Model

- Uriagereka's 1999 MSO model originates from the minimalist desire to keep the Base Step and dispense with the Induction Step of the Linear Correspondence Axiom proposed by Kayne 1994.

(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)

- "Spelling-Out more than once" allows us to dispense with the step in (1b) (cf. Bresnan 1972).

(2)



- Relative order of the elements within a complex specifiier or adjunct cannot be fixed by (1a).

Uriagereka's Solution

Before WP or YP merges with the rest of the tree, they undergo Spell-Out and get flattened into an ordered sequence of strings by (1a); they reenter the derivation as a 'frozen giant lexical compound" like *state-representative-proposal* (Lasnik, Uriagereka and Boeckx 2005: 50; Johnson 2002, 2004).[1]

(3) Condition on Extraction Domain (Huang 1982)
   a. * Which book did [$_{DP}$ a critic of *t*] meet you at the conference?
   b. * Which book did Kathy go to class [$_{PP}$ after she read *t*]?

(4) Extraction out of a compound (cf. Postal 1969)
   a. * Which light did you see [$_{DP}$ a traffic *t*] when you bumped Bob's bicycle?
   b. * Which light did you see a man when you saw [$_{DP}$ a traffic *t*]?

[1] Another consequence of Uriagereka's 1999 dynamic model is that it derives the effects of the *Freezing Principle* proposed by Wexler and Culicover 1980 on the ground of language acquisition, which prohibits movement of an element out of non-base positions such as derived subject position.

Summary so far:

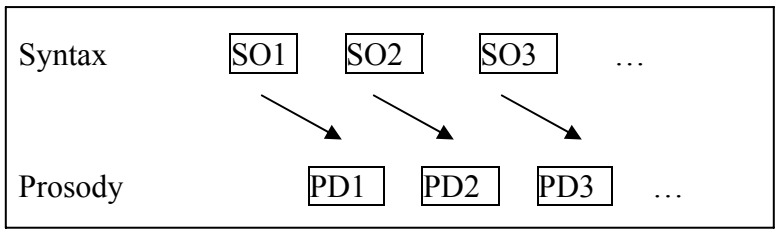
i) Linearization procedure functions with particularly simplex, right-branching structures.

ii) Left-branching structures in specifier and adjunct positions are Spelled-Out before they merge with the "main" derivational cascade.

Central idea:

This dynamic system should have repercussions for the domain of prosodic rule application under (a certain conception of) the minimalist design. Mid-derivational syntactic objects defined in this system correspond to separate derivational chunks that reach the interface in their own lives.

(5) The Syntax-Prosody Mapping Hypothesis[2]
The Spelled-Out domains are mapped to prosodic domains at PF.



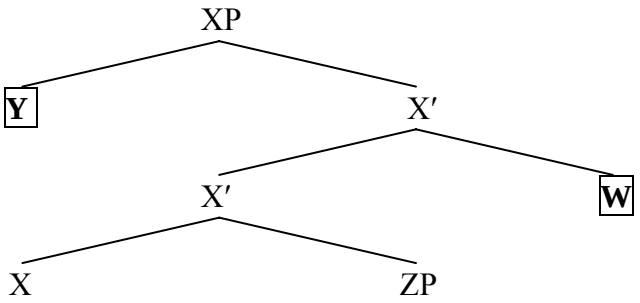
(6) Three Predictions of the Mapping Hypothesis under Uriagereka's Model

a. A head and its complement form a single P-domain.

b. A complex specifier/adjunct configuration forms an independent P-domain without a head/comp.

c. A simplex specifier/adjunct configuration forms a P-domain that also includes a head/comp.

(7)



[2] This hypothesis is proposed by Sato 2006a, b, c. It is shown that this hypothesis provides a unified account of nuclear sentence stress placement both within English and across languages, the core properties of English cliticization (*wanna*-contraction, auxiliary reduction and pronominal cliticization) and possible sites for standard fillers (*you know, I mean, I've heard*, etc.) and intonational pauses. Dobashi 2003 proposes a similar hypothesis for phonological phrasing within Chomsky's Phase Theory. Uriagereka 1999: 262-265 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.

3. Taiwanese Tone Sandhi [3]

Tone Sandhi = the lexical tone of a syllable changes into some other tone when followed by another syllable with some other lexically listed tone (8) (Chen 1987: 113).

(8) *Tone Sandhi Rule*
T → T′ / ___ within a tone group
Key: T=base tone, T′=sandhi tone

(9) Tone Sandhi Change in Taiwanese
(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

- A syllable with tone 1, for example, changes into the one with tone 7 when it is followed by any syllable with some lexical tone, not just by the neutral tone.[4]

(10) **khi3** pak8kiang1 → **khi2** pak8kiang1 (Tone Sandhi)
go Beijing
'go to Beijing'

(11) **zau2** a-NT → **zau2** a-NT (no Tone Sandhi)
run already
'already run'

[3] 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.

[4] 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.

- There are three syntactically definable domains in which tonal change is found and possible.

(12) Head-Complement Configuration

a. V-NP$_{object}$

be• [lng•pun• chhe•]
buy two-CL books
'buy two books'

b. P-NP

tui• [goan• lau•pe•]
to my father
'to my father'

(13) Head-Complement Configuration

a. Aux/I-VP

e• lai
will come
'will come'

b. Comp/C-IP

na•**si•** [A•sin m• lai]
if A-sin Neg come
'if Asin is not coming'

(14) Head-Specifier Configuration

[A•**sin**] u• lng• chhing• kho•
A-sin have two thousand dollar
'Asin has two thousand dollars.'

(15) Head-Specifier Configuration

A•sin [tai•oan•**oe**] be• hiao• kong•
Asin Taiwanese Neg know speak
'Taiwanese, Asin can't speak.'

(16) Head-Adjunct Configuration

[na•si A•sin m• **khi**], A•hui ma• be• khi.
If A-sin Neg go A-hui also Neg go
'If Asin is not going, Ahui will not go.'

- Head-complement as a single derivational unit, complex specifiers/adjuncts undergo early S-O

What if a specifier or adjunct configuration is simplex? We have sandhi in this particular case.

(17) Simplex (Monosyllabic) Subject Pronouns

Wa•/Li•/Yi•/Wun•/Lin•/Yin• jim• ji-jia• kao.
I/You (sg)/He (She)/We/You/They kiss this-CL dog
'I/You (sg)/He (She)/We/You/They kiss this dog.'

(18) Simplex (Monosyllabic) Adverbials

Wa•-e pe•bu **za•** kun.
I-GEN parents early sleep.
'My parents sleep early.'

Simplex subjects and adverbs do not undergo Spell-Out; they form a domain with the following head.[5]

[5] If this line of reasoning is correct, then it should be the case that *Asin* and *Taioanoe* in (14-15) are internally complex for the purposes of Spell-Out; otherwise, we would expect tone sandhi on its final syllable *sin*, contrary to

4. French Liaison

Liaison = a normally silent consonant of a word is pronounced before a vowel-initial consonant.[6]

(19) a. des‿ennuis 'troubles'
b. des/problèmes 'problems'

(20) [-sonorant] → φ/____ # { [+consonant] / # }

Selkirk's 1972, 1974 Generalization [7]

(21) A liaison context exists between an inflected X and its complement both dominated by X′.

- This generalization can be maintained essentially in the same form under the recent phrase structure theory such as Larson 1990/Stroik 1990 and Chomsky 1995.

(22) Head-Complement Configuration

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

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facts. I assume that *A-sin* is a compound sufficiently complex to undergo early Spell-Out. I leave careful examination of this issue for another occasion. Thanks to Heidi Harley (personal communication) for raising this question.

[6] The symbol‿ indicates that a consonant followed by that symbol has undergone liaison while the symbol / indicates that a consonant followed by that symbol has not undergone this alternation. The symbol # in (20) denotes a word boundary.

[7] 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 place only when conversations become formal, as in elevated speech style, and liaison is never found in the relevant environments in normal conversation. For this purpose, she proposes an adjustment rule which converts the sequence double ## into single # to account for a number of otherwise exceptional cases of liaison observed in an elevated speech. The purpose of this section is to see whether the proposed analysis can correctly demarcate the possible and impossible domains of French liaison. Accordingly, I put aside this issue aside. See Selkirk 1972 for detailed discussion on this issue.

(23) Correlation of Liaison with Semantic Interpretation

a. un marchand de **draps/anglais**
'A merchant of English sheets' OR 'An English merchant of sheets'

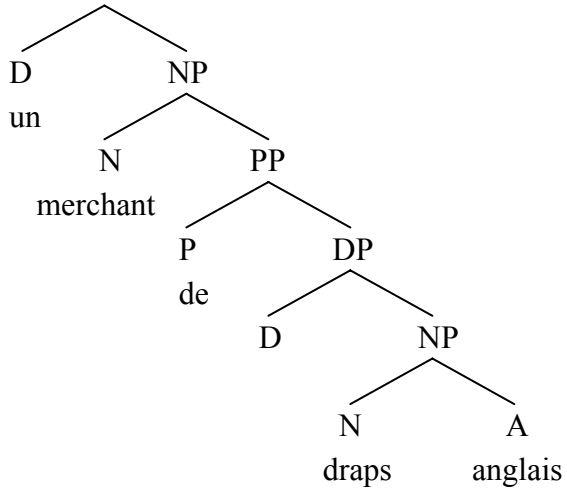
b. un marchand de **drapsˆanglais**
'A merchant of English sheets' BUT'*An English merchant of sheets'

(24) Correlation of Liaison with Semantic Interpretation

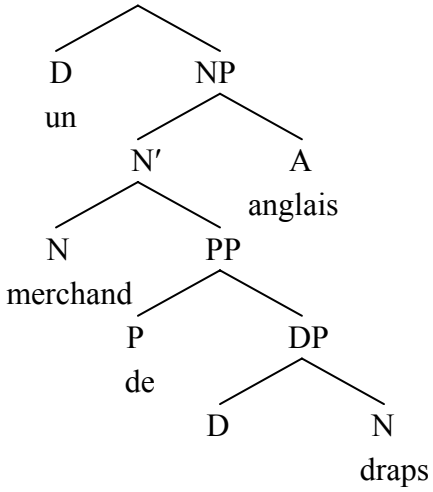
a. Les masses sont **fidèles/à Rome**.
'The masses are faithful to Rome.' OR 'The masses are faithful in Rome.'

b. Les masses sont **fidèlesˆà Rome**.
'The masses are faithful to Rome.' BUT '*The masses are faithful in Rome.'

(25) a.



b.



-- The following examples of liaison might be a problem for the generalization in (21).

(26) a. Gramsci **correspondaitˆassidûment** avec sa belle-soeur.
'Gramsci corresponded assiduously with his sister-in-law.'

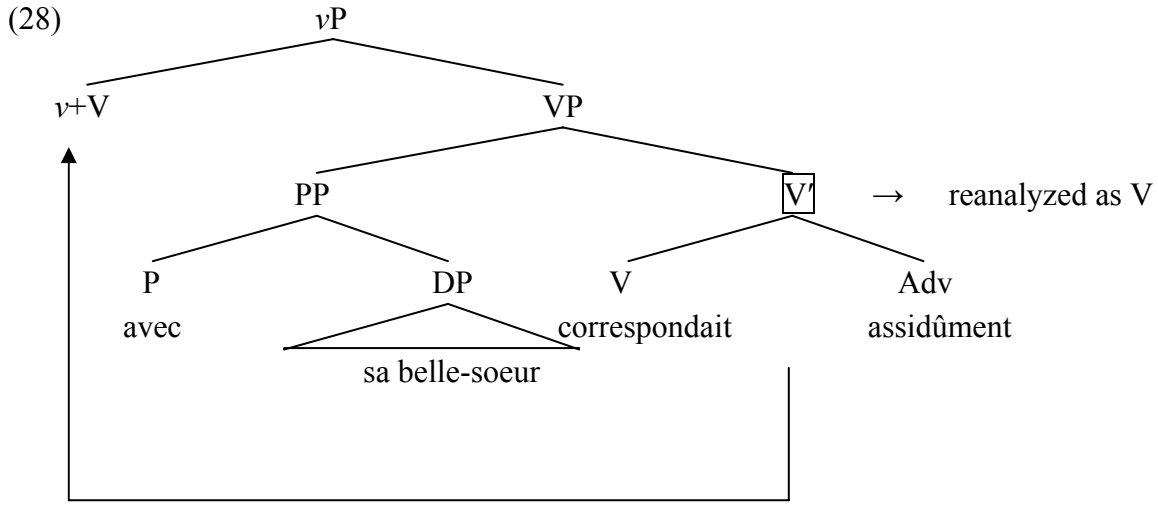
b. Marie **caressaitˆaffectuesement** sa fille.
'Marie affectionately caressed her daughter.'

(27) a. Il **regardaitˆavec** plasir cette emission.
'He watched that program with pleasure.'

b. Ils **parlaientˆavec** hesitation de leur fallite.
'They spoke of their failure with hesitation.'

-- Larson 1990/Stroik 1990-style recursive VP structure allows us to maintain (21).

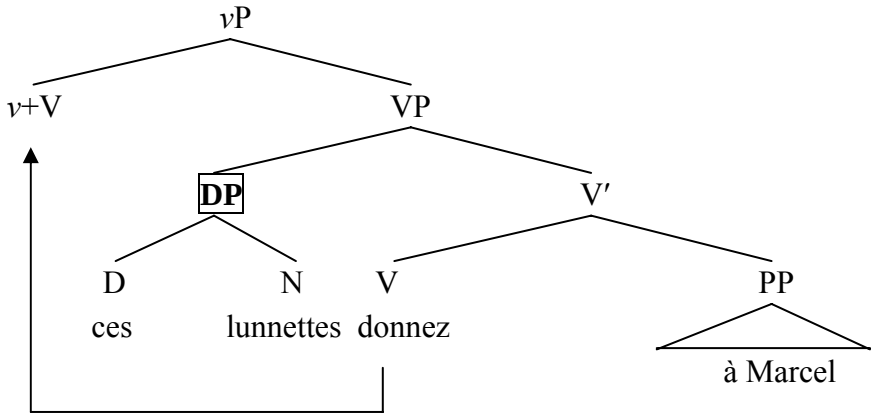
(28)



-- How about the following examples that do not have liaison?[8]

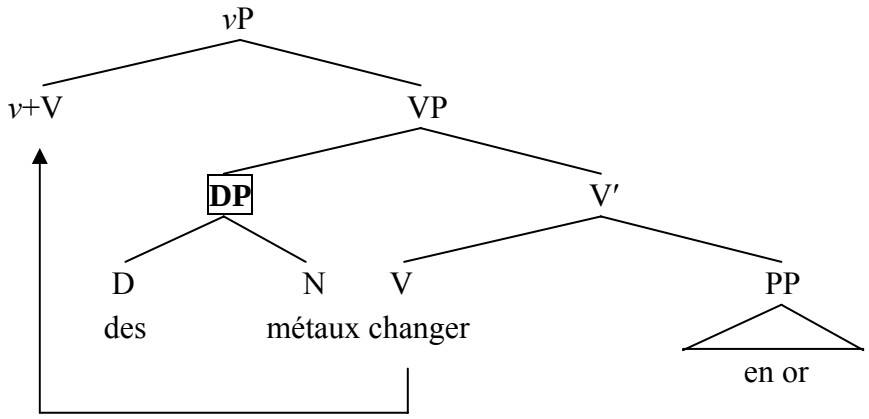
(29) a. Donnez ces **lunettes/à** Marcel.
'Give these glasses to Marcel.'
b. Ils voulaient chnager des **métaux/en** or.
'They wanted to change metals into gold.'
c. Je **réfléchissais/avant** de répondre.
'I was reflecting before answering.'

(30)



[8] Two comments follow. First, the same account can be achieved by the alternative non-transformational analysis of dative alternation such as the ones proposed by Pesetsky 1995 and Harley 1995. I remain neutral in this paper as to which kind of analysis is correct. Second, I notate the higher VP as *v*P, following recent work as in Chomsky 1995 and Harley 1995. This modification, however, does not affect the content of the discussion here in any way.

(31)



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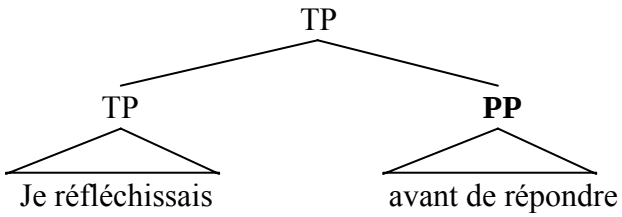

Summary so far:
The generalization in (21) is maintained under one or the other phrase structure. This generalization is an automatic consequence of the mapping hypothesis in (5). It also correctly predicts that liaison is impossible in complex specifier and adjunct configurations as in (29a-c).

What if a specifier or adjunct configuration is simplex? We have liaison in this particular case.

(33) Complex vs. Simplex Temporal Adverbs
   a. Marie le **caressait/aussitôt** qu'elle le voyait.
      'Marie caressed it as soon as she saw it.'
   b. Marie le **caressait ˆ aussi**.
      'Marie caressed it.'

(34) Complex vs. Simplex Indirect Object
   a. **Donnez/un** gâteau à Marcel.
      'Give a cake to Marcel.'
   b. **Donnez ˆ en** à Marcel.
      'Give some of it to Marcel.'

(35) Complex vs. Simplex Subject
   a. Les **garçons/étaint** grands.
      'The boys were big.
   b. **Nousˆallons/Vousˆallez**.
      'We go. /You go.'

5. Gilyak Lenition and Kinyamboo High Deletion

5.1. *Gilyak Lenition*

Kenstowicz and Kisseberth 1979:436-437 (see Krejnovich 1973 for the original data):

- The initial obstruent of a word is voiced after nasals and spirantized after vowels.
- The following four constructions exhaust the contexts in which this alternation is found.

(36) Head-Complement Configuration

a.	noun + noun		b.	adjective-noun	
	q^{h}os	'neck'		*təf*	'house'
	ŋe ***x****os*	'otter neck'		*pilan* ***d****əf*	'big house'
	ves q^{h}os	'crow neck'			
c.	pronoun + noun		d.	direct object + verb[9]	
	pəx	'paint'		*vəkz-d^j*	'throw away'
	*nəŋ-****b****ex*	'our paint'		*ki vəkz-d^j*	'throw away shoes'
				ŋas ***p****əkz-d^j*	'throw away belt'

- Head-complement structure forms a single prosodic unit for lenition in Gilyak, just as predicted by the mapping hypothesis in (5).

5.2. *Kinyamboo High Deletion*

Bickmore 1990:

- A High tone in a word is deleted when it is immediately followed by another word with High tone.[10]

(37) o-mu-k**a**ma mukázi (cf. *omukáma* 'chief (in isolation))
chief old
'old chief'

[9] The direct object-verb examples in (36d) are confounded by a morphological rule that spirantizes the initial consonant of a transitive verb in isolation. However, the underlying stop does emerge when the preceding word ends in an obstruent, as in *ŋas pəkz-d^j* 'throw away belt'. See Kenstowicz and Kisseberth 1979: 436-437 for a comprehensive list of data on Gilyak lenition that is not included here.

[10] 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. Bickmore 1990 provides a number of examples of nouns in their isolation forms based on the number of syllables and tone patterns.

(38) Simplex vs. Complex Subject

a. abak**o**zi bákajúna (cf. *abakózi* 'workers (in isolation)')
workers' they helped'
'The workers helped.'

b. abakozi bak**ú**ru bákajúna (cf. *bakúru* 'mature (in isolation)')
workers mature they helped
'The mature workers helped.'

(39) Simplex vs. Complex Indirect Object

a. Nejákworech' ábak**o**z' émbwa
he-will-show workers dog
'He will show the workers the dog.'

b. Nejákworech' ómukama w'ábak**ó**zi émbwa
he-will-show chief of workers dog
'He will show the chief of the workers the dog'
(cf. *nejákwórecha* 'he-will-show (in isolation)', *émbwa* 'dog (in isolation)')

-- When a specifier is complex, its High tone is maintained; when it is simplex, its High tone is deleted, as predicted by the hypothesis in (5). [11]

6. Welsh Consonant Mutation

Consonant Mutation = the intial consonant of the citation form of a word undergoes the replacements in (40) under certain syntactically definable configurations, as shown in (41). [12]

(40)

p	→	b	b	→	f	m	→	f
t	→	d	d	→	dd	rh	→	r
c	→	g	g	→	NULL	ll	→	l

(41) Consonant Mutation

Gwenlodd y dyn **gi**. (cf. *ci* 'dog (in isolation)')
saw-PAST-3S the man dog.
'The man saw a dog.'

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[11] A remaining problem with this analysis, of course, is why, then, the verb *nejákworech' 'he-will-show'* loses High tone in its third syllable in (39b). The present analysis would wrongly predict that it should not, given that the indirect object is Spelled-Out and mapped onto a P-domain that excludes the simplex subject. I leave this problem for future study.

[12] Thanks to Andre Carnie (personal communication) and Heidi Harley (personal communication) for bringing my attention to the relevance of the present analysis to Welsh consonant mutation.

Tallerman 1990: 405-406 (U.I.G.C. 1976: 92; see also Harlow 1989 and Roberts 1997):

- CP clauses, not IP clauses, constitute barriers for consonant mutation.

(42) Dywedodd [$_{NP}$ 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.'

(43) Dywedodd [$_{NP}$ yr athro] [$_{IP}$ **fod** Gareth wedi colli'r bws].
said-3s the teacher be Gareth PERF lose-the bus
'The teacher said Gareth had missed the bus.'

(44) * Dydy o ddim yn credu [$_{CP}$ y [$_{IP}$ **fod** Gwyn yn dweud y gwir]
NEG-is-3s he NEG PROP believe COMP be Gwyn PROG say the truth
'He doesn't believe that Gwyn is telling the truth.'

What is it that makes CPs, not TPs, blockers for consonant mutation?

- Uriagereka's 1999 MSO model cannot answer this question because it does not draw any distinction between CP and TP nodes that would be pertinent to Spell-Out.

- Chomsky's 2000, 2001, 2004, 2005 MSO model (known as Phase Theory) provides a straightforward answer. C is a strong phase head; T is not.

(45) The (Revised) Syntax-Prosody Mapping Hypothesis
The Spelled-Out domains are mapped onto prosodic domains at PF.
Spell-Out domains are relativized: i) left-branching or ii) CP configurations

-- The CP vs. TP distinction in Welsh consonant mutation provides phonological support for the CP phase under the hypothesis in (5). (See also Bošković 2001 and Bošković and Lasnik 2003 for the argument that the C head creates intonational boundary and blocks PF-affixation/merger).

7. Conclusions and Future Investigations

i) A syntax-prosody interface hypothesis has been proposed within a derivational system of syntactic derivation. This hypothesis yields a number of empirical predictions about domains of prosodic rule application, which have been borne out by a variety of phonological alternations.

- Taiwanese tone sandhi, French liaison, Gilyak lenition, Kinyamboo high deletion, Welsh soft consonant mutation. Other prosodic alternations? [13]

ii) Both Uriagereka's 1999 and Chomsky's 2000, 2001, 2004, 2005 MSO models are necessary to correctly demarcate prosodic domains across languages of the world under the proposed hypothesis.

- CP phase boundaries are blockers for prosodic alternations; DPs cannot be phases. How about *v*P phases? (Legate 2003, Kahnemuyipour 2004, Sato 2006a, b, c, Carnie in prep)

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[13] Kaisse 1985: ch.7 examines a wide range of other sandhi rules, including syntactic doubling in Italia, tone sandhi in Mandarin Chinese/Ewe and vowel shortening in Kimatuumbi, and proposes a unified parametric account of them that makes crucial recourse to c-command. These alternations may also be amenable to the present account when examined more fully. Another phenomenon within the possible reach of the proposed approach is Japanese initial lowering explored by Azuma 1992 (see also Tokizaki 1999), which seems to be sensitive to the presence/absence of left-branching structures. I leave examination of these facts for another occasion.

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