

**Phonological sensitivity to syntactic cycles: Swedish and other cases\***

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**1. Introduction**

- (1) The focus of this talk is on affix-related phonological asymmetries:

Under similar conditions, two (classes of) affixes ( $Af_1$ ,  $Af_2$ ) are correlated with different phonological effects.

Stem+ $Af_1$	Effect R
Stem+ $Af_2$	Effect $\sim R$

- (2) Ojibwa manifestation of the asymmetry takes the form of two responses to the ban on vowels in hiatus (i.e. \*VV) (Bloomfield 1957, Piggott 1980, Piggott 2008, Piggott & Newell 2008)

- a. V-initial suffixes in combination with V-final stems trigger vowel deletion (i.e. VV  $\rightarrow$  V); V-initial suffixes mark a variety of nominal and verbal functions (e.g. plural, possessive, causative, obviative)

- (i) akwe:-ag [akwe:g] 'women, wives'  
WOMAN-PLURAL
- (ii) ma[kode:-an [ma[kode:n] 'fields'  
FIELD-PLURAL
- (iii) o-wa:bam-a:-an [owa:bama:n] 'he sees him'  
3P-SEE-TS-3OBV

- b. V-final prefixes in combination with V-initial stems trigger consonant epenthesis (i.e. VV  $\rightarrow$  VCV); V-final prefixes mark Person agreement and future tense)

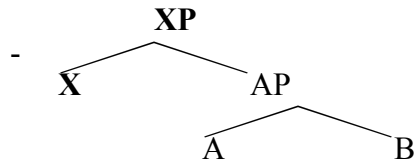
- (i) ni-akwe: [nidakwe:] 'my wife'  
1P-WOMAN
- (i) ni-akwe:ag [nidakwe:g] 'my wives'  
1P-WOMAN
- (iii) ni-ga-a:pawe: [nigada:pawe:] 'I have nightmares'  
'1P-FUTURE-HAVE NIGHTMARES'

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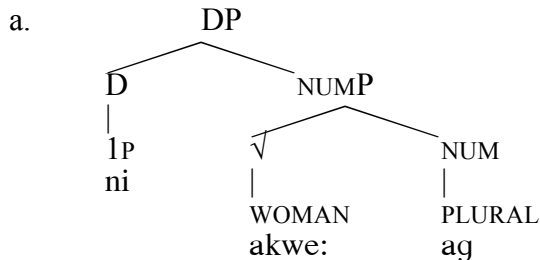
## 1.1 Towards an explanation for (some) affix-dependent asymmetries

- (3) a. Syntactically, affixes are heads of lexical or functional projections (Distributed Morphology (DM) - Halle & Marantz 1993, Marantz 2001, 2006).
- b. Under well-defined conditions, in a configuration [X-AP<sub>XP</sub>], where X is the head of XP and AP is its complement, X sends its complement to the PF interface (to Spell-out) where it is phonologically interpreted, if XP qualifies as a syntactic phase. Subsequently, the phase head X is interpreted (Phase theory - Chomsky 1999, 2001, 2005).



- c. Hence, phonological interpretation of the constituents of a phase occurs in two cycles.
- (4) Crucial steps in phonological interpretation (Embick & Noyer 2001)
- Vocabulary Insertion (VI) and Linearization of morphemes
  - Local Dislocation of a vocabulary item (if necessary)
  - Projection of prosodic domains

(5) The syntactic structure and phonological interpretation of an Ojibwa DP



- b. Derivation:
- VI and Linearization in NUMP; hiatus resolution by vowel deletion: /akwe:-ag/ → [akwe:g]
  - VI and Linearization of D-head: /ni/
  - Local Dislocation of Person prefix: [ni-akwe:g]; hiatus resolution by consonant epenthesis: [ni-akwe:g] → [nidakwe:g] ‘my wives’

- (6) Generalization:  
Under similar conditions, affixes that realize morphemes that are spelled out at different derivational stages may trigger different phonological processes.

- (7) Possible challenges by proponents of autonomous phonology may appeal to different ‘co-phonologies’. There are two obvious possibilities for Ojibwa:
- a. Co-phonologies sensitive to position of the affix:
    - The phonology of the Ojibwa Person agreement affix (a prefix) is different from the plural affix (a suffix).
  - b. Co-phonologies sensitive to the prosodic affiliation of the affix:
    - The Person agreement prefix is a clitic attached to a phonological phrase (PPh), while the plural suffix is prosodically organized within a prosodic word (PWd)
- (8) The aim of the talk:
- a. To defend the claim that morpho-syntactic structure can be a source of difference in phonological behaviour by showing that the co-phonology alternatives cannot be sustained, cross-linguistically.
  - b. To explain why phonological asymmetries may arise from the timing of the spell-out of morpho-syntactic structure.
  - c. To contribute to our understanding of the factors that regulate the mapping between morpho-syntactic structure and phonological form.

## 2. Against co-phonologies

### 2.1 An asymmetry in the interpretation of Swedish DPs

(Embick & Noyer 2001, Lahiri, et al 2005)

- (9) Vowel deletion in Swedish indefinite plural: common gender:

a. lag-ar	[lagar]	‘laws’
student-er	[studenter]	‘students’
b. flicka-or	[flickor]	‘girls’
opera-or	[operor]	‘operas’

- (10) Observation (abstracting away from suffix allomorphy):  
Affixation of the plural suffix to a V-final stem triggers loss of the stem vowel.

- (11) Vowel deletion Swedish definite singular:

a. Common gender		
stol-en	[stolen]	‘the chair’
flicka-en	[flikkan]	‘the girl’ * [flikken]
b. Neuter gender		
lakan-et	[lakanet]	‘the sheet’
øga-et	[ø:gat]	‘the eye’ * [ø:gat]

- (12) Observation:  
Affixation of the definite suffix to a V-final triggers loss of the suffix vowel.

- (13) Two affix-dependent strategies for hiatus resolution in Swedish
- $V_1V_2 \rightarrow V_2$  - (dependent on the number suffix)
  - $V_1V_2 \rightarrow V_1$  - (dependent on the determiner suffix)
- (14) Conclusion:  
The postulation of position-sensitive co-phonologies (i.e. prefix vs. suffix) cannot account for the fact that the definite determiner and plural affixes are linked to different hiatus resolution strategies in Swedish. Both affixes are suffixes.

## 2.2 A phonological asymmetry in Luo possessive constructions: (Lango, Hayes 2009)

- (15) Gemination in alienable possession:
- |         |          |            |  |
|---------|----------|------------|--|
| pala-na | [palana] | 'my knife' |  |
| gulu-na | [guluna] | 'my pot'   |  |
  - |        |         |            |  |
|--------|---------|------------|--|
| pig-na | [pigga] | 'my juice' |  |
| ot-na  | [otta]  | 'my house' |  |
  - |        |         |                     |  |
|--------|---------|---------------------|--|
| dog-na | [dogga] | 'my (animal) mouth' |  |
| jit-na | [jitta] | 'my (animal) ear'   |  |
- (16) Observation:  
Affixation of a nasal-initial suffix (e.g. /na/ '1<sup>st</sup> Person') to a stem-final consonant triggers loss of the nasal and gemination of the stem-final consonant.
- (17) Consonant deletion inalienable possession:
- |        |        |            |  |
|--------|--------|------------|--|
| dog-na | [doga] | 'my mouth' |  |
| jit-na | [jita] | 'my ear'   |  |
  - |        |        |             |          |
|--------|--------|-------------|----------|
| bad-na | [bada] | 'my arm'    | *[badda] |
| leb-na | [leba] | 'my tongue' | *[lebba] |
- (18) Observation:  
Affixation of a nasal-initial suffix (e.g. /na/ '1<sup>st</sup> Person') to a stem-final consonant triggers loss of the nasal but not gemination of the stem-final consonant.
- (19) Enforcing a coda restriction in Luo (the Syllable Contact Law??): two strategies
- C-N  $\rightarrow$  CC (gemination)
  - C-N  $\rightarrow$  C- $\emptyset$  (N-deletion)
- (20) Optional gemination in Acholi (Bavin 1996)
- dog-na            [dogga]/[dogna]    'my (animal) mouth'
  - ot-na             [otta]/[otna]       'my house'

- (21) The alienable-inalienable contrast in Ojibwa
- a. Alienable possession and consonant epenthesis
    - (i) ni-akwe:            [nidakwe:]            'my wife'  
       1P-WOMAN
    - (ii) ni-e:mikwa:n    [nide:mikwa:n]        'my spoon'  
       1P-SPOON
  - b. Inalienable possession and vowel deletion
    - (i) ni-o:s                [no:s]                    'my father'  
       1P-WOMAN
    - (ii) ni-o:komis        [no:komis]              'my grandmother'  
       1P-GRANDMOTHER

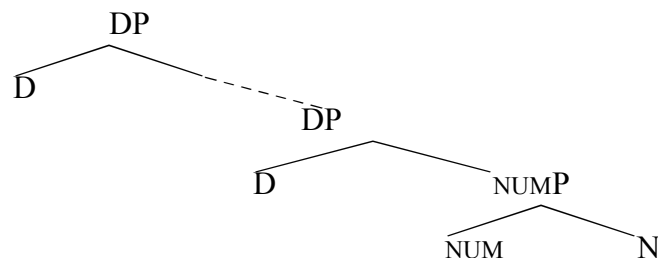
- (22) Conclusion:  
 Since the same affix triggers different phonological processes in different possessive constructions, the contrast cannot be attributed to a clitic-affix distinction.

### 3. Derivation by phase and phonological interpretation

#### 3.1 The spell-out of Swedish DPs

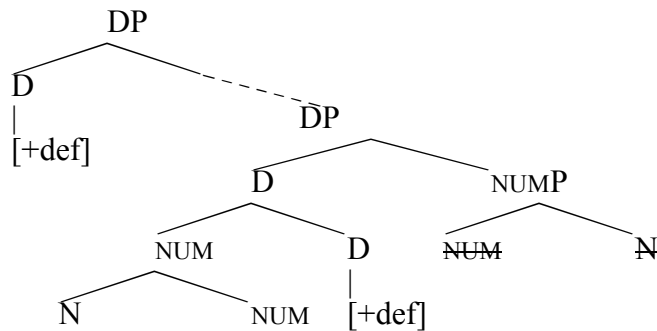
- (23) Swedish determiner doubling (Embick & Noyer 2001, Leu 2008)
- a. mus                    'a mouse'
  - b. musen                'the mouse'
  - c. den musen/\*mus     'that mouse'
  - d. den gamla musen    'the old mouse'
- Note occurrence of overt determiner and determiner suffix (23c, d)

- (24) Swedish DP structure (abbreviated)



- (25) Derivation of *flicka-or* [flickor] 'girls'
- 1st Cycle: VI and Linearization in NUMP - /flicka-or/ → [flickor]  
 Deletion resolves hiatus problem; stem vowel and affix vowel equally visible at VI; deletion of stem vowel is arbitrary
  - 2<sup>nd</sup> Cycle: VI and Linearization of lower D-head (Insertion of null (∅) element produces no change)

(26) DP structure with a definite determiner in Swedish (abbreviated)



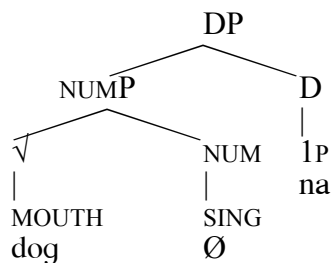
- **Agreement with higher D-Head triggers merger of the noun with lower D-head, assuming post-spell-out movement.**

(27) Derivation of *flicka-en* [flikkan] 'the girl'

- 1<sup>st</sup> Cycle: VI and Linearization of NUMP - /flicka-Ø/ → [flikka]
- 2<sup>nd</sup> Cycle: Output of 1<sup>st</sup> Cycle inherited  
 Merger of [+def] morpheme with noun - [flikka]-[+def]  
 VI and Linearization of [+def]: [flikka-en] → [flikkan]
- Deletion resolves hiatus problem; root-final vowel, spelled out on the 1<sup>st</sup> cycle, is protected from deletion on 2<sup>nd</sup> cycle.

### 3.2 The spell-out of Luo alienable and inalienable possessive constructions

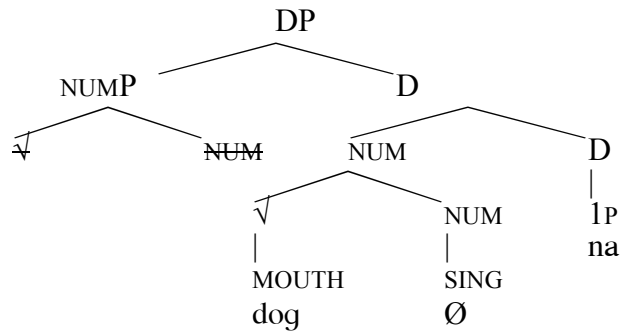
(28) The structure of alienable possession: (e.g. /dog-na/ [dogga] 'my (animal) mouth')



(29) Derivation of /dog-na/ [dogga] 'my (animal) mouth'

- 1<sup>st</sup> Cycle: VI and Linearization of NUMP - - /dog-Ø/ → [dog]
- 2<sup>nd</sup> Cycle: Output of 1<sup>st</sup> Cycle inherited  
 VI and Linearization of D-head: /na/  
 Local dislocation of Person affix: [dog-na]; gemination of stem-final consonant - [dog-na] → [dogga]
- Gemination resolves coda problem and preserves elements of both stem-final and affix-initial consonants.

- (30) The structure of inalienable possession: (e.g. /dog-na/ [doga] 'my mouth')



- (31) Derivation of /dog-na/ [doga] 'my mouth'
- 1<sup>st</sup> Cycle: VI and Linearization (vacuous)
  - 2<sup>nd</sup> Cycle: VI and Linearization of D-head: /dog-na/ → [doga]
- Deletion resolves coda problem; stem-final C and affix-initial C equally visible at VI; deletion of affix-initial C is arbitrary

#### 4. Atomization at PF

- (32) Unanswered questions:
- a. Why do asymmetries occur?
  - b. How are the contrasts that emerge in Ojibwa, Swedish and Luo explained?

#### 4.1 Elements of a theory of Spell-out to PF.

- (33) The Model (adapted from Embick & Noyer 2001)
- Hierarchical morpho-syntactic structure  
 ↓  
 Lowering  
 ↓  
 Vocabulary Insertion and Linearization  
 ↓  
 Projection of Prosodic Domains  
 ↓  
 Phonological Form (> Pronunciation)
- (34) Crucial components of the mapping from syntactic structure to phonological form
- a. Vocabulary Insertion and Linearization
  - b. *P-Word Projection*  
 The constituents of a phase containing a root morpheme must project a prosodic word.(PWd).
- (35) Phase Impenetrability at PF: *Cohesion Principle*
- Within a PWd, the edges of adjacent morphemes are erased

- (36) Morphological implications of the *Cohesion Principle*
- A morpheme cannot be extracted from a PWd.
  - A morpheme cannot be targeted within a PWd.
- (37) Phonological strategies for enforcing the *Cohesion Principle*
- Segment deletion targeting segments at the edges of morphemes
  - Fusion of segments at adjacent edges
  - Full and partial gemination of segments at adjacent edges
  - Epenthesis
  - Liaison
- (38) Hypothesis:  
Cross-linguistically, the strategies in (37) are all available at the point of Vocabulary Insertion, but only the last three (37c-e) are available after VI
- (39) Illustrating a derivation in Ojibwa: /ni-akwe:g/ → [nidakwe:g] ‘my wives’
- |                             |                          |
|-----------------------------|--------------------------|
| [WOMAN-PL <sub>NUMP</sub> ] |                          |
| [akwe:-ag <sub>PWd</sub> ]  | (VI at NUMP)             |
| [akwe:g <sub>PWd</sub> ]    | (Vowel deletion at NUMP) |
  - |                                                 |               |
|-------------------------------------------------|---------------|
| [1P[WOMAN-PL <sub>NUMP</sub> ] <sub>DP</sub> ]  |               |
| [ni[akwe:g <sub>PWd</sub> ] <sub>PWd</sub> ]    | (VI at DP)    |
| [ni[ni-akwe:g <sub>PWd</sub> ] <sub>PWd</sub> ] | Cliticization |
| [ni[nidakwe:g <sub>PWd</sub> ] <sub>PWd</sub> ] | C-epenthesis  |

- Since VI and Linearization occurred before cliticization, adjacent vowels (after cliticization) are not at morpheme edges; segment deletion is not an option.
- (40) Illustrating a derivation in Swedish: /flicka-or/ → [flickor] ‘girls’
- |                             |                          |
|-----------------------------|--------------------------|
| [GIRL-PL <sub>NUMP</sub> ]  |                          |
| [flicka-or <sub>PWd</sub> ] | (VI at NUMP)             |
| [flickor <sub>PWd</sub> ]   | (Vowel deletion at NUMP) |
  - DP stage irrelevant, since no vocabulary items are inserted.
  - Since the root and plural morphemes are inserted at the same stage (NUMP), the edges of both morphemes are visible and either may therefore be targeted for deletion. The deletion of the root-final vowel is arbitrary.
- (41) Illustrating a derivation in Swedish: /flicka-en/ → [flikkan] ‘the girl’
- |                            |              |
|----------------------------|--------------|
| [GIRL-SG <sub>NUMP</sub> ] |              |
| [flicka-Ø <sub>PWd</sub> ] | (VI at NUMP) |

- b. [[GIRL-SG<sub>NUMP</sub>]- DET<sub>DP</sub>]                      Merger of Determiner  
 [[flicka-en<sub>PWd</sub>]                                      (VI at DP)  
 [[flicka-n<sub>PWd</sub>]                                      (Vowel deletion at DP)

- Since the determiner is the only morpheme that undergoes VI at DP, it contains the only visible morpheme edge and is therefore targeted for deletion.

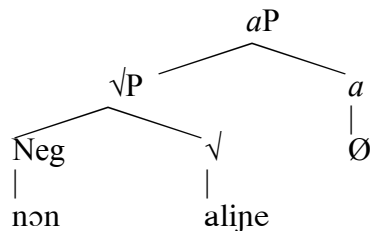
(42) Cohesion in Luo

- a. Alienable possession  
 VI at NUMP: (e.g. /dog/ '(animal) mouth')  
 VI at DP (e.g. /dog-/na/ 'my mouth')  
 Cliticization (optional) and gemination: (e.g. [dogga] 'my mouth')
- b. Inalienable possession  
 VI at NUMP: (∅)  
 VI at DP (e.g. /dog-na/ 'my mouth')  
 Consonant deletion: (e.g. [doga] 'my 'mouth')

4.2 The timing of liaison in French (Prunet 1986)

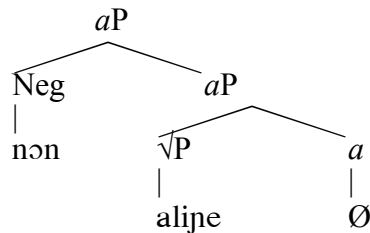
- (43) a. non-aligné [nɔnalɛ] 'non-aligned' (liaison; no nasalization)  
 b. non-aligné [nɔ̃nalɛ] 'not in a line' (liaison with nasalization)

- (44) a. The structure of non-aligné [nɔnalɛ] 'non-aligned': direct merge of /non/ as a modifier of the root.



- VI and Linearization at aP:                      /nɔn-alɛ/  
 PWd Projection and Liaison                      [nɔ.na.li.ɛ]  
 Nasalization:                                              -----

- b. The structure of non-aligné [nɔ̃nalɛ] 'not in a line': late adjunction of /non/.



- 1<sup>st</sup> Cycle
 

VI and Linearization at aP:	/alipe/
PWd Projection and Liaison:	[a.li.pe]
Nasalization:	-----
  
- 2<sup>nd</sup> Cycle
 

VI and Linearization at Neg-Head:	/nɔn/
PWd Projection and Liaison	[nɔn]
Nasalization:	[nɔ̃n]
Cliticization and Liaison:	[ <del>nɔ̃n</del> [nɔ̃.na.li.pe]]
Surface form	[nɔ̃.na.li.pe]

## 5. Conclusion

- a. Phonology interprets morpho-syntactic
- b. In the DM framework, VI is a crucial feature of the interpretive process
- c. VI is cyclic, as determined by the theory of derivation by phase
- d. Phonological asymmetries are linked to cyclic VI
- e. A theory that links phonological interpretation to morpho-syntactic structure therefore predicts the occurrence of asymmetries, cross-linguistically.

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