On prosodic structure and its relation to syntactic structure, again

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Influence of syntax on pronunciation

a. [[No animals] [are allowed]]

b. [No, [animals [are allowed]]]

- In (b), fall in pitch on 'No'; likelihood of glottalization at beginning of 'animals'. But not in (a).

- How do such properties of pronunciation come to form part of utterance (b) and not utterance (a)?

Domains and domain-sensitivity in phonology

- Domain-sensitivity: Some phonological and phonetic phenomena are sensitive to, or apply in virtue of, the organization of the sentence into a syntactic constituent structure – whether directly or indirectly.

- These domain-sensitive phenomena provide evidence for the phonological domain structure of the sentence.

- This talk is about just what the nature of that phonologically relevant domain structure is, and its relation is to syntactic representation.

SPE on syntax-related domains for phonological rules

- Phonological rules may apply cyclically on successively larger syntactic constituents. Example: Nuclear Stress Rule, Compound Rule.

- Phonological rules may apply in function of boundary elements such as +, =, #, and ##, which are inserted into the terminal string on the basis of syntactic constituent structure. Example: word-final deletion of /g/ after nasal in *song*.

Subsequent theories of domain-sensitivity in phonology and phonetics

1. Prosodic structure theory/indirect-access-to-syntax

   (Selkirk, Nespor and Vogel, Pierrehumbert and Beckman, Hayes, Inkelas and Zec, Truckenbrodt, Frota, Féry, and others)

2. Direct-access-to-syntax

   (Cooper and Paccia-Cooper, Kaisse, Odden, Zubizarreta, Wagner, Pak and others)

1. Prosodic structure theory:
Outgrowth of SPE boundary theory

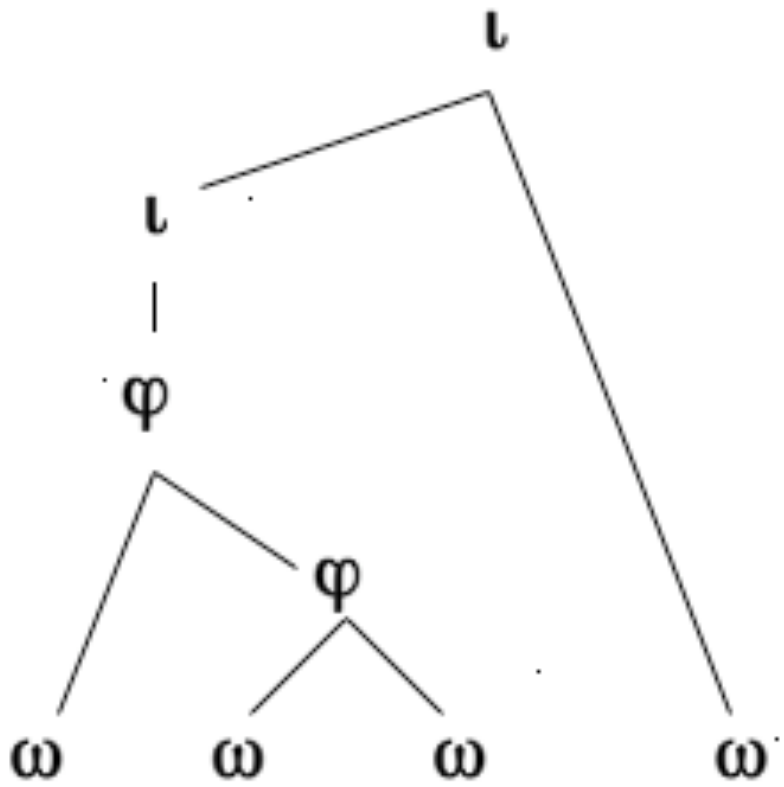
Posits a phonological representation of domains that mediates between syntactic constituency and phonological and phonetic phenomena ('indirect access')

My own current view:

Selkirk 2011 The Syntax-Phonology Interface. In J. Goldsmith, J. Riggle and A. Yu (eds.) The Handbook of Phonological Theory, 2d edition. Wiley-Blackwell.

1A. The nature of phonological representation:

Prosodic structure organization includes prosodic words (ω), phonological phrases (ϕ) and intonational phrases (ι)



1B. Domain-sensitivity: Defined only in terms of prosodic structure

--Phonological rules/constraints are governed by prosodic structure representation, not directly by syntax, whether they involve segments, segmental features, tone or the assignment of stress.

--Phonetic interpretation is also defined with respect to prosodic structure.

1C. Generating the domain representation: Prosodic structure formation

I. Constraints on the relation between syntactic and prosodic constituency

II. Prosodic wellformedness constraints

1D. In a minimalist grammatical architecture…

2. Direct-access theory:
Outgrowth of SPE syntactic domains for phonology

[The following version of direct-access theory is a straw man, one which allows for clarification of the predictions of the competing indirect-access theories.]

2A: The nature of phonological representation: prosodic structure only at lower levels

There is no prosodic structure organization corresponding to words or phrases.

There is, or may be, prosodic organization into feet and syllables.

2B: Domain-sensitivity: Syntactic domains only (above the foot)

Domain-sensitive phonological and phonetic phenomena above the foot are defined with respect to syntactic structure.

2C. Generating the domain representation: Domains above the foot already provided by syntax

No additional mechanisms in the grammar are involved in the characterization of phonological domains at word level and above

What is the ‘additional machinery’
of prosodic structure theory?

Should we be troubled by the need for this
additional machinery?

Prosodic Structure Formation, Part I
Constraints on the syntactic-prosodic constituency relation

Match Theory (Selkirk 2011):

A minimalist theory of the S-P constituency relation

- Syntactic constituency is mirrored in phonological representation in the form of prosodic constituency

- Syntactic node labels/features/categories reduce to the corresponding prosodic categories word (ω), phrase (ϕ), and clause (ι).

- The three-way distinction in prosodic constituent types above the foot-- ω, ϕ, and ι-- is syntactically grounded.

Universal constraints on syntactic-prosodic constituency correspondence

i. Match Clause

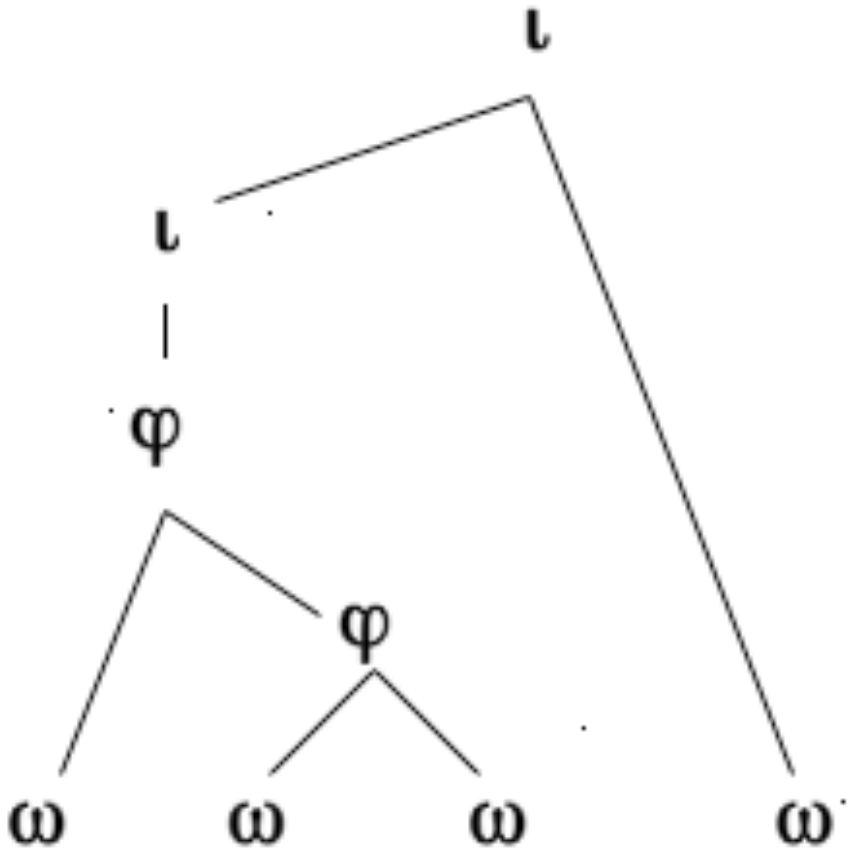
A clause in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it ι, in phonological representation.

ii. Match Phrase

A phrase in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it φ, in phonological representation.

iii. Match Word

A word in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it ω, in phonological representation.


ι
ι
φ
φ
ω
ω
ω
ω

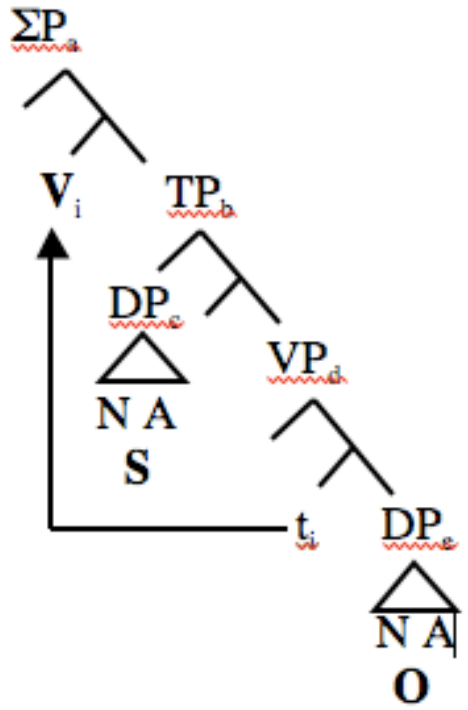
Predictions of Match Theory include: Recursion of phonological domains

- Presence of recursive structure in prosodic structure representation as a consequence of recursive structure in syntax, e.g. nested XP in syntax corresponds to nested ϕ structure

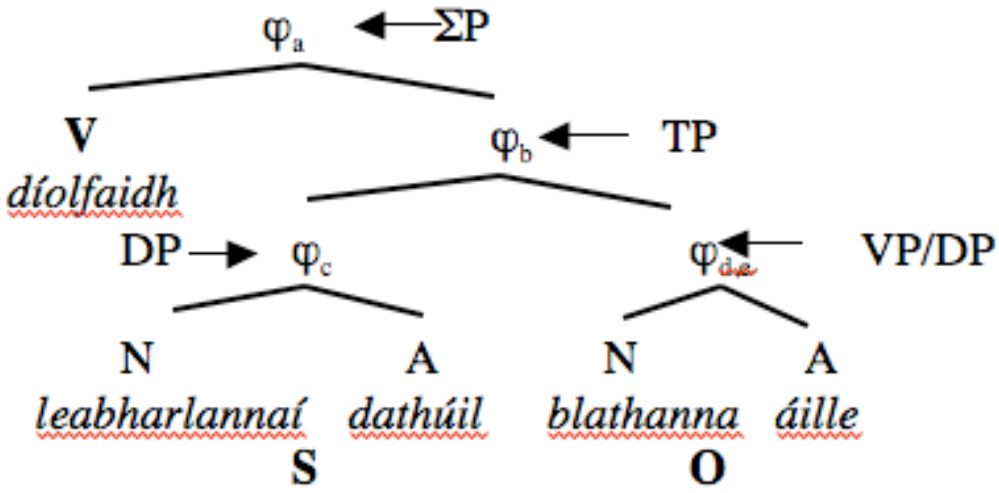
  [There is increasing evidence that such recursivity plays a role in phonology and phonetics, see, e.g. Truckenbrodt and Féry 2005 , Wagner 2005, 2010, Elfner 2010, 2012 and others.]

Corresponding syntactic and prosodic phrase structures

a. Syntactic Representation



b. Prosodic Representation



Emily Elfner 2012 *Syntax-Prosody Interactions in Irish*. Ph.D. dissertation, UMass Amherst

Predictions of Match Theory include: S-P nonisomorphism as phonology-driven

- Prosodic wellformedness constraints, not constraints on the syntactic-prosodic structure relation, are responsible for any divergence between syntactic constituency and prosodic constituency ('nonisomorphism') produced by the grammar.

Prosodic Structure Formation, Part II
Constraints on Prosodic Wellformedness (PWF)

A selective overview of prosodic wellformedness constraints

- Below the word-level

  What can constitute a syllable, or a foot? How can this differ across languages?

  What principles are responsible for determining syllable or foot structure in any language?

  = The stuff of introductory phonology classes, the subject of intensive investigation in phonology

A selective overview of possible prosodic wellformedness constraints

- At word-level and phrase-level
  - Is there a minimal size, e.g. binary minimum?
  - Is there a main stress, and if so at what edge?
  - Are the right or left edges submitted to specific constraints on composition, e.g. must a ω begin with a foot? must a ϕ begin with a ω?
  - Must a tone associated with main stress, must main stress be associated with tone?
  - Must tone be associated with an edge, must an edge be associated with tone?

The crux of the matter

- Evidence for a prosodic structure theory of phonological domains comes from the role for prosodic wellformedness constraints (PWF) in defining phonological domains.
- Syntactic constituent structure per se cannot characterize phonological domain structure, if it is true that prosodic wellformedness constraints (PWF) play a role in defining word-size or phrase-size domains for phonological or phonetic phenomena.

- Word- or phrase-level prosodic wellformedness constraints would not constitute 'additional machinery' of the theory, if it proves true that these constraints are the types of constraints that play a role in phonology more generally, namely at foot or syllable level.

Tone, vowel length and ϕ-structure in Bantu languages

a) Varieties of ϕ–sensitive tonal and vowel length-related phenomena

b) Motivation for ϕ-formation as characterized by Match Phrase and constraints of PWF, e.g.

BinMin(ϕ):

A ϕ must consist of at least two ω

Chichewa revisited

(Downing & Mtenje 2011, cf. Kanerva 1990, Truckenbrodt 1999)

- No lexical vowel length contrast in Chichewa

- Empirical generalization:

  Lengthening of penultimate vowel before R edge of XP, but only if XP consists of at least two lexical words

- Presence and location of H tone is contrastive. There is retraction of phrase-final lexical tone onto the lengthened penult of ϕ.

CVV distribution in Chichewa verb-DP-DP: single-word DPs

[[...CVCV]$_{verb}$ [[[…CVCV]$_{noun}$]$_{DP}$ $_{DP}$[[…CVVCV]$_{noun}$]$_{DP}$]]

1. A-ná-ménya nyumbá ndí mw-ááálá
   s/he-TAM-hit CL9.house with CL3-rock
   ‘S/he hit a house with a rock.’

2. A-na-dyétsa a-nyáni nsóomba
   2SUBJ-TAM-feed CL2-baboon CL10-fish
   ‘They fed the baboons fish.’

CVV distribution in Chichewa verb-DP-DP: multi-word DPs

[[...CVCV]$_{verb}$ [[[…CVCV]$_{noun}$ […CVVCV]$_{Mod}$]$_{DP}$ $_{DP}$[[…CVVCV]$_{noun}$]$_{DP}$]]

1. A-ná-ménya nyumbá yá í-kúulu ndí mw-áálá
   s/he-TAM-hit CL9.house 9.of 9-big with CL3-rock
   'S/he hit a big house with a rock.'

2. A-na-dyétsa a-nyáni á m-fúumu nsóomba
   2SUBJ-TAM-feed CL2-baboon 2.of CL9-chief CL10-fish
   'They fed the chief's baboons fish.'

Prosodic structure analysis of Chichewa long vowel distribution

(a) Domain-sensitivity:

At the Right edge of ϕ, lengthen penult vowel

(b) Prosodic structure formation:

Match Phrase is subordinated to a PWFness requirement that a ϕ be minimally binary (=BinMinϕ):

BinMin(ϕ) >> Match Phrase

BinMin(ϕ) >> Match Phrase

S: [verb [[noun]$_{DP}$ $_{DP}$[noun]$_{DP}$]]

P:

→ a. $_{\phi}$(verb $_{\phi}$(noun noun)$_{\phi}$)$_{\phi}$

b. * $_{\phi}$(verb $_{\phi}$($_{\phi}$(noun)$_{\phi}$ $_{\phi}$(noun)$_{\phi}$)$_{\phi}$

BinMin(ϕ) >> Match Phrase

S: [verb [[noun+modifier]$_{DP}$ $_{DP}$[noun]$_{DP}$]]

P:

→ a. $_{\phi}$(verb $_{\phi}$($_{\phi}$(noun modifier)$_{\phi}$ noun)$_{\phi}$)$_{\phi}$

Xitsonga
(Kisseberth 1994, Selkirk 2011)

- The presence of H tone is lexically contrastive

- Empirical generalization: H tone may spread to the right, but is restricted:
  - H tone spread is blocked at the Left edge of an XP consisting of two or more words.
  - H tone spreads up to but not onto the Rightmost syllable in an XP.

H tone rightward spread in Xitsonga verb-DP: single-word DPs

H H H H H

[[va+CV…CV]$_V$ [$_{DP}$[$_N$[CV…CVCV]$_N$]$_{DP}$]]

1. Vá-súsá n-gúlú:ve

   they-remove pig

   ‘They are removing a pig.’

2. Vá-tísá xí-hóntlóví:la

   they-bring giant

   ‘They are bringing a giant.’

H tone rightward spread in Xitsonga verb-DP: multi-word DPs

H H H

[[va+CV…CV]$_{V}$ [$_{DP}$[$_{N}$[CV…CVCV]$_{N\ Mod}$[…..]$_{Mod}$]$_{DP}$]]

1. Vá-súsá n-guluve y-á voonáá

   they-remove pig

   ‘They are removing a pig.’

Prosodic structure analysis of Xitsonga H tone spread

I. Prosodic structure formation as in Chichewa:

BinMin(ϕ) >> Match Phrase

II. Domain-sensitivity:

-- H tone spread blocked at Left edge of ϕ

Crisp EdgeLeft (ϕ, H) (cf. Ito and Mester 1999)

-- No H tone spread onto Rightmost syllable of ϕ

Nonfinality (ϕ, H) (Cassimjee & Kisseberth 1998)

BinMin(ϕ) >> Match Phrase

S: [pref+verb [$_{DP}$[[noun]$_{N}$]$_{DP}$]]

P:

→ a. $_{\phi}$(pref+verb noun)$_{\phi}$

Vá-súsá n-gúlú:ve

b. * $_{\phi}$(pref+verb $_{\phi}$(noun)$_{\phi}$)$_{\phi}$

BinMin(ϕ) >> Match Phrase

S: $_{TP}[$ pref+verb $[\ _{DP}[\ [\text{noun}]_{N}\ [\text{modifier}]_{Mpd}\ ]_{DP}\ ]\ ]_{TP}$

P:

→ $_{\phi}($ pref+verb $_{\phi}($ noun modifier $)_{\phi}\ )_{\phi}$

Vá-súsá n-guluve y-á voonáá

NB: The fact that H tone spreads onto the final syllable of the verb here is evidence that the verb is not itself ϕ-final, hence the recursive ϕ-structure here in which the prosodic word ω of the verb is sister to the ϕ grouping noun and modifier.

Chimwiini revisited
(Kisseberth and Abasheikh 1974, Kisseberth 2011)

Single-word and multi-word XPs display the same domain-related properties in Chimwiini, in contrast to Xitsonga and Chichewa:

- Vowel length is contrastive, but is licensed only on the penult of an XP, or on the antepenult if the penult syllable is light.

- Tone is not contrastive, but a H tone will appear by default on the penult syllable of an XP, or on the final syllable of XP in certain morphologically defined cases (cf. Kisseberth 2011)

Prosodic Structure Analysis of Chimwiini

I. Prosodic structure formation:

Match Phrase >> BinMin(ϕ)

II. Domain-sensitivity:

--Vowel length licensed on syllable bearing stress that is assigned wrt Right edge of ϕ (Selkirk 1986)

--Default tone assigned to penultimate syllable of ϕ (Kisseberth 2011)

$[\ [\text{noun}\ldots..]_{DP}\ [\ \text{verb}\ \ldots\ [\text{noun}\ldots..]_{DP}\ \ldots..]\ ]$

1. $_{\phi}$(sultani $_{\phi}$(w-aa $_{\phi}$(nóka)$_{\phi}$)$_{\phi}$)$_{\phi}$ $_{\phi}$(ta-ki-sh-paa $_{\phi}$(dáwa)$_{\phi}$)$_{\phi}$
   'The sultan of snakes will-give-us medicine.'

2. $_{\phi}$(Núuru)$_{\phi}$ $_{\phi}$(naqishene $_{\phi}$(na $_{\phi}$(Múusa)$_{\phi}$)$_{\phi}$)$_{\phi}$
   'Nuuru argued with Muusa.'

3. (Hamádi)$_{\phi}$ (mw-andikilile (mw-áana)$_{\phi}$ (xáti)$_{\phi}$ (ka (Núuru)$_{\phi}$)$_{\phi}$)$_{\phi}$
   'Hamadi wrote for-the-child a letter to Nuuru.'

Typology of prosodic structure formation: L-P ranking of Match and PWF constraints

- Match (XP, ϕ) >> BinMin(ϕ)

  Chimwiini, …..

- BinMin(ϕ) >> Match (XP, ϕ)

  Chichewa, Xitsonga, ……

Other types of PWF effects on ϕ-structure:

- ϕ-structure correlates with presence/absence of lexical accent [Acc vs. U] in Japanese and NB Basque (Kubozono 1993, Elordieta 1998), e.g in genitive DPS: $[\ \text{DP-no N}]_{DP}$

  ((Acc) (Acc)), (U U), (U (Acc)), (Acc U)

- Creation of sequence of binary ϕ from DP-internal recursive structure in Japanese (Kubozono 1990, Shinya et al 2004):

  S: [[Acc-no] [[Acc-no] [[Acc-no] Acc-case]]]]

  P: (((Acc-no) (Acc-no)) ((Acc-no) (Acc-no)))

- Noncanonical location of phrasal stress (as might be produced in Spell-Out of Focus-marking in English and Japanese) can induce adjacent locus of ϕ-edge and attendant tonal properties (Truckenbrodt 1995, Selkirk 2002)

The crux of the matter

- Direct-access/syntax-only domain theory can't account for PWF-related effects on domains and domain-sensitivity

- Prosodic structure-based domain theory can.

1D. In a minimalist grammatical architecture ...

Suppose prosodic structure formation forms part of Spell-Out

i. Prosodic Structure Formation (including Match and PWF constraints) could potentially influence/interact with other aspects of Spell-Out: e.g. Vocabulary Insertion, or Linearization (see, e.g., Elfner 2012)

ii. If Spell-Out is phasal, with syntax inaccessible after Spell-Out, then Match constraints, which access syntactic structure, would necessarily be phasal. Prosodic wellformedness constraints (PWF) could be phasal or post-phasal, since prosodic structure would be accessible both at and after Spell-Out. Prosodic domain-sensitive phonology could also possibly be phasal or post-phasal (post-cyclic).

iii. Necessarily post-phasal (post-cyclic) phenomena probably include:

--- performance-based alterations to prosodic structure– involving speech rate, style, paralinguistic emphasis, etc.

--- phonetic interpretation, which transpires in real time, from left to right in the utterance