

Rhythmic and interface categories in prosody

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The 18th Japanese/Korean Linguistics Conference, November 13-15, 2008, CUNY

Abstract: A key result of studies in prosodic phonology since the 1970's has been the finding that in language after language phonological processes are localized in the same small set of phonological domains, and do not appear to make use of the vast set of potential domains that are in principle made available by grammatical (syntactic and morphological) structure. *Prosodic Hierarchy Theory* (Selkirk 1978, Nespor and Vogel 1983, etc.) holds that speech is organized into a set of genuinely phonological domains that form a hierarchy of containment, with each non-terminal constituent made up of a sequence of smaller constituents at the next level down. The guiding idea is that prosodic levels cannot be *skipped* or *repeated* (i.e., must be *strictly layered*, Selkirk 1984).

Although this research program has been vastly successful in advancing our understanding of the relation between syntactic/morphological structure and phonological form, many questions, both of detail and of principle, have remained open. Detailed empirical investigations as well as advances in theory have shown that *strict layering* does not always hold, but rather constitutes a prosodic ideal. Level skipping has been assigned a proper place in the weak layering model of Ito and Mester 1992(2003) (and its optimality-theoretic interpretation by Selkirk 1996). Level repetition is instantiated in the recursive intonational and phonological phrasing demonstrated by Ladd 1986, 1996, Gussenhoven 2005, and others.

Given these developments in theory and analysis, it is perhaps time to take stock of the overall model and ask what has been established and what still remains open. First, there are intrinsic—and not just size-related—differences among parts of the hierarchy. Broadly speaking, the word-internal units (syllable, foot, and perhaps mora) are intrinsically defined in terms of sonority-related phonetic factors and speech rhythm, whereas the parsing of higher-level units (prosodic word, phonological phrase, intonational phrase, etc.) is regulated by constraints, alignment-based and other, on the correspondence between syntactic/morphological and phonological constituents. We refer here to the former (smaller prosodic units) as *rhythmic categories*, and the latter (larger prosodic units) as *interface categories*.

The general form of *rhythmic categories* (word-internal prosody), with syllables grouped into rhythmic feet which are in turn assembled into a prosodic word, is relatively uncontroversial, apart from questions of detail (such as the status of the mora as a genuine prosodic constituent vs. a property of syllables, etc.). The picture is less clear for the *interface categories*, even as to the exact number and/or content of the levels of the hierarchy. A large number of different prosodic categories have been proposed in order to provide enough separate domains for different processes, including *utterance*, *intonational phrase*, *phonological phrase*, *major phrase*, *intermediate phrase*, *minor phrase*, *accentual phrase*, *tone group*, *clitic group*, *prosodic word*, *minor word*. The totality of these categories has never been instantiated in a single language, however, and their crosslinguistic identification has remained a largely unsolved problem.

Even within a single language, the doctrine of strict layering has led to a considerable multiplication of categories. Whenever a process is found to operate in a slightly different domain than some other process, the model required setting up two separate categories. Once repetition of levels (adjunction structures) becomes an option, however, "constituent domain" no longer equals "category", raising the suspicion that perhaps some of the categories proposed in the earlier prosodic literature are in reality only larger adjunction structures built on a more basic interface category. Loosening the doctrine of strict layering allows us to strengthen the theory on the category side, and limit the interface categories to a small and universally well-defined set, much like the broadly agreed set for rhythmic categories.

In this talk, we review the evidence for the two central interface categories proposed for Japanese, *major phrase* and *minor phrase* (McCawley 1968, Selkirk and Tateishi 1988, Kubozono 1988, and the roughly equivalent intermediate phrase and accentual phrase of Pierrehumbert and Beckman 1988). The distinction was deemed necessary because the major phrase is the domain of downstep, whereas the minor phrase is the domain of initial rise and accent (hence the alternative name 'accentual phrase'). We will argue that there is no need to postulate two interface categories, and that the evidence favors a model with a single category '*phonological phrase*', with the option of adjunction.

Besides Japanese, we will discuss some other prosodic systems, including Cup'ik, English, German, and Korean. In a larger vein, we hypothesize that there are only three universal interface categories: *intonational phrase*, *phonological phrase*, and *prosodic word*. Additional structure is imposed on the string being parsed through adjunction.

Road Map of Talk

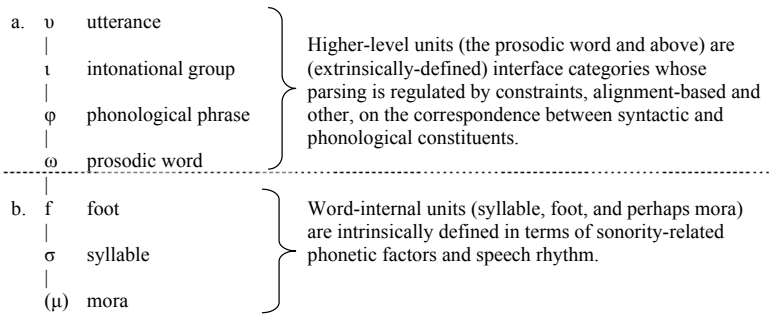
1. Brief review of *Prosodic Hierarchy Theory* (Selkirk 1978, Nespor and Vogel 1983, etc.) and its developments.
 - *Strict Layering Hypothesis*: the guiding idea is that prosodic levels cannot be *skipped* or *repeated* (i.e., must be *strictly layered*, Selkirk 1984).
 - Detailed empirical investigations as well as advances in theory have shown that *strict layering* does not always hold, but rather constitutes a prosodic ideal.
 - Level skipping has been assigned a proper place in the weak layering model of Ito and Mester 1992(2003) (and its optimality-theoretic interpretation by Selkirk 1996).
 - Level repetition is instantiated in the recursive intonational and phonological phrasing demonstrated by Ladd 1986, 1996, Gussenhoven 2005, and others.
2. Evaluation of the overall model -- what has been established and what still remains open.
 - Many differences among parts of the hierarchy that are not just size-related:
 - Two sets of categories: (intrinsically- vs. extrinsically defined)
 - i. *rhythmic categories*: word-internal units (syllable, foot, and perhaps mora) are intrinsically defined in terms of sonority-related phonetic factors and speech rhythm.
 - ii. *interface categories*: higher-level units (prosodic word, phonological phrase, intonational phrase, etc.) regulated by constraints, alignment-based and other, on the correspondence between syntactic/morphological and phonological constituents.
3. Universality and crosslinguistic identification of prosodic categories
 - A large number of different prosodic categories have been proposed in order to provide enough separate domains for different processes.
 - Unanswered questions regarding the exact number and/or content of the levels of the hierarchy.
 - Loosening the doctrine of strict layering allows us to strengthen the theory on the category side, and limit the interface categories to a small and universally well-defined set.
4. Case Study: the two interface categories proposed for Japanese,
 - *major phrase* and *minor phrase* (McCawley 1968, Selkirk and Tateishi 1988, Kubozono 1988, and the roughly equivalent *intermediate phrase* and *accentual phrase* of Pierrehumbert and Beckman 1988).
 - The major phrase is the domain of downstep, whereas the minor phrase is the domain of initial rise and accent (hence the alternative name 'accentual phrase').
 - No need to postulate distinct interface categories, *major phrase* and *minor phrase*: the evidence favors a model with a single category '*phonological phrase*', with the option of adjunction.
5. Further case studies and consequences:
 - Other prosodic systems: Cup'ik, English, German, Korean, Irish, Kiche'e, Yukatek Mayan, Tagalog, Swedish.
 - Only three universal interface categories: *intonational phrase*, *phonological phrase*, and *prosodic word*. Additional structure is imposed on the string being parsed through adjunction.

2. Evaluation of the overall model.

— What has been established and what still remains open

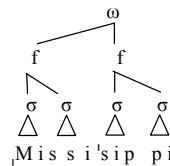
- Intrinsic—and not just size-wise—differences among parts of the hierarchy.
- Exact number and content of the units of the prosodic hierarchy.

(9) A basic distinction: Intrinsically-defined vs. extrinsically-defined categories



(10) Word-internal prosody:

- The general form of word-internal prosody, with syllables grouped into rhythmic feet which are in turn assembled into a prosodic word, is relatively uncontroversial, apart from questions of detail (such as the status of the mora as a genuine prosodic constituent vs. a property of syllables, etc.)



(11) Higher-level prosody:

- Parsing is syntax-based (but see Jun 1998 for other views).
- The resulting structures—most importantly, their constituent boundaries— are often quite different from the corresponding syntactic representations because:
 - (i) the mapping principles themselves introduce deviations, typically, a radical flattening of the structure, and
 - (ii) there are constraints relating to length and structural complexity (binarity, etc.) that lead to further discrepancies.
- According to the standard references on the topic (Selkirk 1981, Kubozono 1988, Nespor and Vogel 1986, Hayes 1989, Pierrehumbert and Beckman 1988, and others), several different interface categories (e.g., major phrase, minor phrase, intermediate phrase, accentual phrase, clitic group) have been proposed in order to provide enough separate domains for different processes.

The basic distinction is also reflected in the types of phonological processes found: Anderbois 2008 shows that crosslinguistically processes with a demarcative function (such as final lengthening) occur only at the juncture of higher level categories.

3. Universality and crosslinguistic identification of prosodic categories

(12) The hierarchy contains **too many categories**, which is the source of the following problems:

- (i) language-specific gaps
- (ii) lack of cross-linguistic identification
- (iii) language-specific definitions

(13) Problem 1: Language specific gaps.

- A natural requirement for a universal hierarchy should be that its elements are present in all languages—otherwise it is not a universal hierarchy.
- But in the prosodic hierarchy, a number of language-specific gaps have been postulated for particular languages.
- For example, Japanese has been claimed to lack a distinction between utterance and intonational phrase, (Pierrehumbert and Beckman 1988), and even between utterance, intonational phrase, and phonological phrase (in the transcription system J-ToBI, see Venditti 1997).

(14) Cf. the parallel situation in syntax:

- Language-specific absences of categories have also been considered, often prima-facie on plausible grounds.
- Take the standard view that a simple sentence in a VSO language still has a VP constituent grouping together V and O, to the exclusion of the intervening S.
- This is not what naïve inspection of surface string VSO suggests.
- It was a reasonable hypothesis that the grammar of such a language might not have a VP constituent.
- Subsequent research has shown, however, that this kind of language-specific gap in the syntactic hierarchy simply does not exist.
- Evidence for the purportedly missing VP turned out to be plentiful once seriously sought after (e.g., McCloskey 1983 for Irish, a VSO language).
- The absence of a VP node is not what characterizes “non-configurational” languages such as Warlpiri, Tohono O’odham (Papago), or Japanese (see Saito 1985):
- VP is universally present.
- The explanation for non-configurational properties lies elsewhere.

(15) For the case of Japanese prosody:

- Kawahara and Shinya 2006 have argued that there is indeed evidence supporting a distinction between three categories (utterance, intonational phrase, and phonological phrase).
- Intonational Phrase in Japanese: Characterized by tonal lowering, creakiness and a pause in final position, as well as a distinctive large initial rise and pitch reset at its beginning.
- Utterance: Domain of declination, and is signaled by an even larger initial rise, as well as a phrasal H tone at its right edge.

(16) General problem of an overdifferentiated hierarchy:

- need to excise a certain level of prosody whenever the facts in a given language do not seem to support it, or
- simply insist on the universal presence of all the familiar categories, even in the absence of any audible cues -- an act of faith, not of rational argument, and counterproductive for the overall research program.

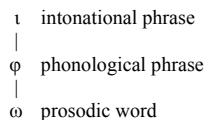
(17) Problem 2: Cross-linguistic identification of categories.

- In **syntax**, there is little difficulty in identifying the DP constituents in a new language under investigation, and to set them in correspondence with the DPs of another languages, in spite of all kinds of differences in morphosyntax, word order, zero anaphora, etc.
 - Reason: There is a set of core syntactic and semantic properties that is shared by the DPs of all languages.
- **Word-internal prosodic categories:** A similar point can be made for syllables and feet. The latter, conceived of in modern phonology as units of abstract linguistic rhythm taken from a small inventory of rhythmic types (see Hayes 1995 for an authoritative presentation of the evidence for this kind of model), can be identified in languages whether they have word stress or not, whether they have multiple stress peaks per word or just one, etc.
 - Reason: These units are intrinsically defined by properties that recur in all of their instantiations.
- **Interface categories:** This is much harder for the higher units of the hierarchy, beginning with the prosodic word. Does the α -phrase of language I correspond to the α -phrase of language II? Or does it rather correspond to the β -phrase of language II? Or does it not have any correspondent in language II?
 - Reason for the difficulty: The lack of truly cross-linguistically valid and constant properties associated with these units makes these questions hard to answer, and make it hard to know whether a given answer is actually the correct one (see Selkirk 2005 and Truckenbrodt 2006 for related discussion).

(18) Problem 3: Language-specific definitions

- Categories are sometimes literally defined in terms of the processes associated with their instantiations in specific languages, resulting in labels like "accentual phrase", "tone group", etc.
- While this is a natural step, and mnemonically useful, for the description of a single language, it creates additional obstacles in an area which is already fraught with problems of identification of categories between languages and grammars.
 - E.g., "The intonational unit corresponding to the Phonological Phrase is the Intermediate Phrase in English [...] or the Accentual Phrase in Korean [...]. The Intermediate Phrase in English is the domain of downstep, and is delimited by a phrase accent, H- or L-; the Accentual Phrase in standard (Seoul) Korean is demarcated by a phrase-final High tone." (Jun 1998)
 - The processes are of course specific to each language (though hopefully explicable as arising through the interaction of universal constraints, as in optimality-theoretic phonology), but the domains themselves need to be a universal set of categories.

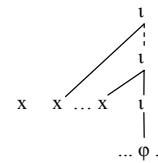
(19) **Proposal here:** Universal phonology provides only THREE interface categories, the prosodic word, the phonological phrase, and the intonational phrase:



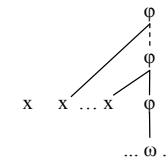
- The fact that there are only three categories does not mean, however, that there are only three layers of structure at this level in prosodic representations.
- This conclusion holds only if one subscribes to the doctrine, part of orthodox "strict layering", that only a new category can introduce a new level of structure.
- Additional layers arise through prosodic adjunction to these categories.

(20) **Prosodic recursion**

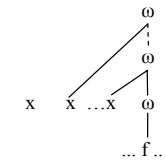
a. t-adjunction



a. φ-adjunction



b. ω-adjunction



- Adjunction imposes further structure on the string being parsed without claiming that different categories are involved.
- Constituent does not equal category once recursive structures are admitted (see Ladd 1996 for a summary and below).

(21) Embedding (recursion) in prosodic structure: a does not imply b.

- Prosodic structure does not show the depth of embedding known from syntactic structure.
- Prosodic structure has no embedding (=strict layering).

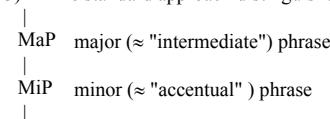
(22) Summary so far:

- Recursion is motivated in all three interface categories: prosodic words, phonological phrases, and intonational phrases.
- *Loosening the doctrine of strict layering allows us to strengthen the theory on the category side, and limit the interface categories to a small and universally well-defined set.*
- Proposal: Universal Phonology distinguishes only a small number of genuinely separate interface categories. Additional layers arise through prosodic adjunction to these categories, they do not constitute further distinct categories.

4. Case Study: interface categories proposed for Japanese

- Rich area of previous phonological and phonetic work: McCawley 1968, Haraguchi 1977, Poser 1984, Kubozono 1988, Beckman & Pierrehumbert 1986, Selkirk & Tateishi 1988, etc.

(23) The standard approach distinguishes two phrasal interface categories:



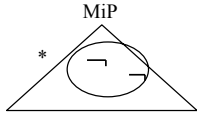
(24) Proposal here: There is only ONE category φ ("phonological phrase")

- The distinction between MaP and MiP is supposed to be irreducible.
- Main rationale: The two are domains for different processes.
- How can these domains be distinguished if there is only one kind of "phonological phrase"?

(25) Reviewing the previous arguments:

- MaP: Domain of downstep: Lowering of the pitch register following each accented syllable.
- MiP: Domain of initial lowering: Low tone at left boundary followed by High phrasal tone. Domain of accentual (H*L) culminativity: at most one accent.
- ω : Domain of word accent rules (junctural compound accent, dominant/recessive accent).

(26) MiP as domain of culminativity:

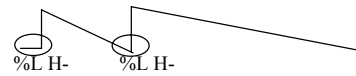


□ = H*L (lexical pitch accent)

- There can only be one accent (H*L) in a Minor Phrase (hence the alternative name "Accentual Phrase").

(27) Initial lowering (Low boundary tone followed by H phrasal tone) within MiP

(from Selkirk and Tateishi 1991)



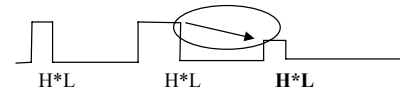
- a. [Oomiya-no [Inayama-no yuujin-ga]] [inai]
'friend' 'isn't'
'Mr. Inayama's friend from Oomiya isn't there'



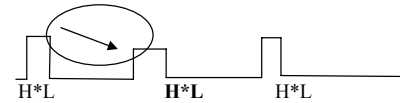
- b. [Oomiya-no Inayama-ga] [yuujin-o yonda]
'friend' 'called'
'Mr. Inayama from Oomiya called his friend.'

(28) Downstep within MaP (from Selkirk and Tateishi 1991)

- bolded H*L downstepped (ML in Poser 1984)

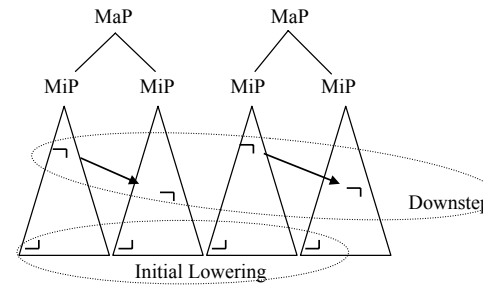


- a. [Aóyama-no [Yamáguchi-no anyiome-ga]] [inai]
'sister-in-law' 'isn't'
'Mr. Yamaguchi's sister-in-law from Aoyama isn't there.'



- b. [Aóyama-no Yamáguchi-ga] [anyiome-o yonda]
'sister-in-law' 'called'
'Mr. Yamaguchi from Aoyama called his sister-in-law.'

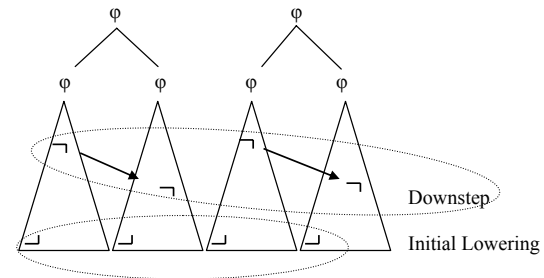
(29) Schematically:



┘ = %L
┘ = H*L (lexical pitch accent)

- How solid are the domain arguments?
- Are they sufficient grounds to motivate distinct categories?
- What would go wrong if both MaP and MiP are simply ϕ 's?

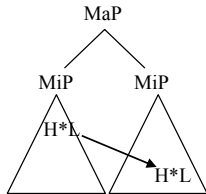
(30) One- ϕ model



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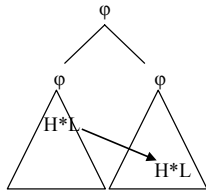
- Could the One- ϕ model possibly work?
- Surprising finding: It actually works without any problems.
- It turns out that there is no reason to distinguish between different kinds of phrases, MaP and MiP, as far as initial lowering and downstep are concerned.

(32) No need to limit downstep to MaP

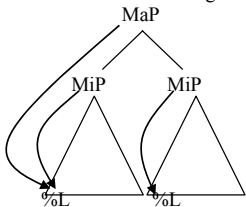


- A MiP contains maximally one accent (H*L);
- downstep requires two accents and cannot have any effect within MiP;
- it can apply vacuously to MiP;
- there is no reason to limit downstep to MaP.

(33) Downstep applies to EVERY ϕ . (Here, vacuously to the lower ϕ 's)

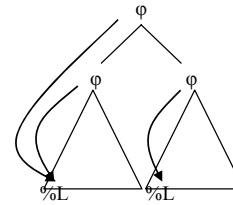


(34) No need to limit lowering to MiP

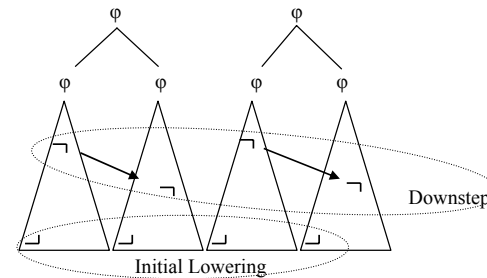


- Initial Lowering (%L boundary tone) is found not only MiP-initially, but also MaP-initially.
- The degree of initial lowering is even more extreme at MaP edges (Selkirk, Shinya, and Sugahara 2003).

(35) Lowering applies to EVERY ϕ .



(36) Downstep and initial lowering in the one- ϕ model



- Immediate conclusion:
 - Initial lowering applies to *all* ϕ -phrases (i.e., not just to MiP).
 - Downstep applies to *all* ϕ -phrases (i.e., not just to MaP).
- More interesting conclusion:
 - Let there be no more MaPs and MiPs.
 - Let there be only ϕ .

5. Prosodic projection theory

- Each category defines its own network of projections; the usual tree-structural notions apply, such as "minimal" and "maximal projection".
- Phonological and phonetic processes are part of the realization of this structure; and signal important boundaries by selecting different subconstituents as their domains.

(37) Distinguishing relations versus categories:

- Relational notions: minimal, maximal, head, non-head; independent vs. dependent (mora); subject, object.
- Categorical notions: phrase, word, foot, syllable, mora, labial, coronal, dorsal; noun, tense.

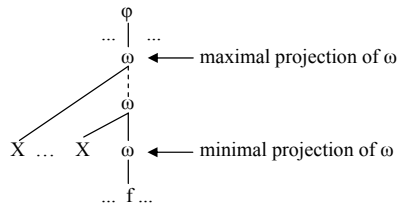
(38) Identifying maximal and minimal projections:

- Using standard tree-structural terminology, the largest projection of a prosodic category κ is the "maximal κ ", its smallest projection is the "minimal κ ".

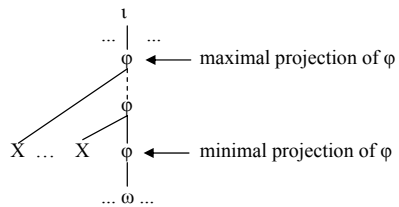
(39) More formally:

- $\kappa_{\max} =_{\text{def}} \kappa$ not dominated by κ
- $\kappa_{\min} =_{\text{def}} \kappa$ not dominating κ

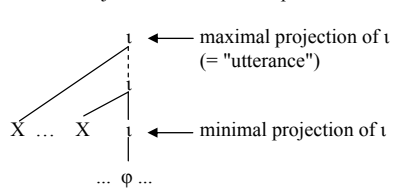
(40) Prosodic adjunction: prosodic word level



(41) Prosodic adjunction: phonological phrase level



(42) Prosodic adjunction: intonational phrase level

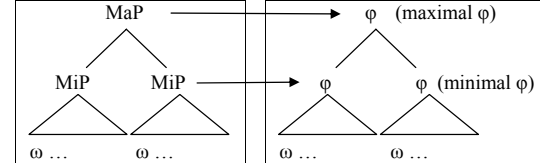


- Utterance* (υ) is not a separate category, but is the maximal projection of the *intonational phrase* (τ) (suggested by Shigeto Kawahara). See Kawahara and Shinya 2006 on τ and υ in Japanese, and (15) above.
- No recursion of υ (utterance), its only role is to gather up the lower intonational phrases.

6. Prosodic projection theory vs. MiP/MaP

- In specific instantiations, MiP may correspond to minimal ϕ , MaP to maximal ϕ .
- Does this mean that we are recreating MiP and MaP with new names?

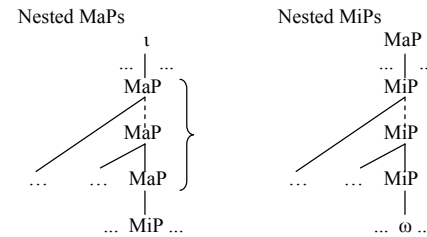
(43) MiP/MaP vs. minimal- ϕ /maximal- ϕ



- No, the two theories are not notational variants.
- There are significant differences between the two, and
- the evidence favors the single category approach.

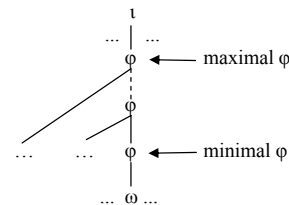
6.1 MiP-MaP approach provides too much structure

(44) MiP and MaP can appear nested if the Recursivity constraint is low-ranking.



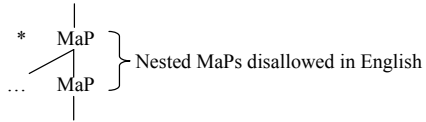
- No such possibility for maximal and minimal ϕ .
- There can only be **one maximal** and **one minimal** instantiation in every projection.

(45) Inherent restrictiveness of the ϕ -only model



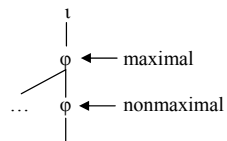
- Is this difference of any consequence? Perhaps.
- Nested MaP's are disallowed in English, and perhaps in most if not all languages (?)

(46)



- Such recursive MaP structures need to be ruled out by specifically assuming high ranking NONRECURSIVITY-MAP (Selkirk 2000: 25).
- Disallowing nested MaP's: If "MaP" \approx maximal ϕ , this follows automatically without invoking other constraints or ranking.
- There can be no such thing as a "recursive maximal ϕ ."

(47) Only "one" maximal ϕ



- If there were a recursive maximal ϕ , the lower one would not be maximal.

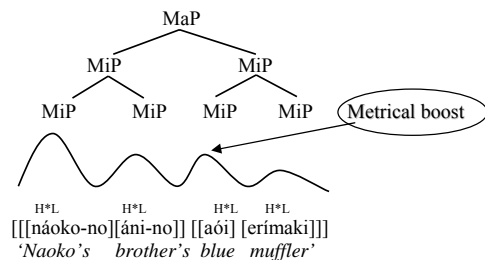
(48) A potential problem for ϕ -only approach:

Kratzer and Selkirk 2006 on German recursive MaP (we return to this below)

6.2 MiP-MaP approach provides too little structure

- Kubozono (1988, 1989): Evidence that the standard MiP-MaP approach does not provide enough structure to represent the ways downstep plays out in Japanese.
- Kubozono's proposal: A sequence of four accented MiPs is restructured as a binary MiP-MiP sequence resulting in a recursive (branching) MiP structure.

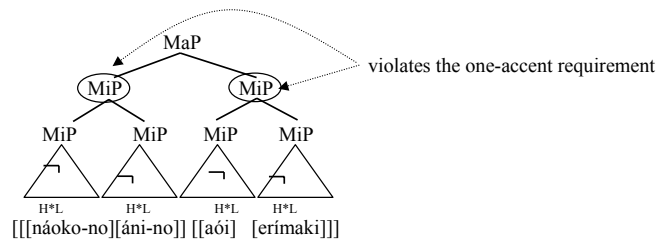
(49) Recursive MiPs in Japanese?



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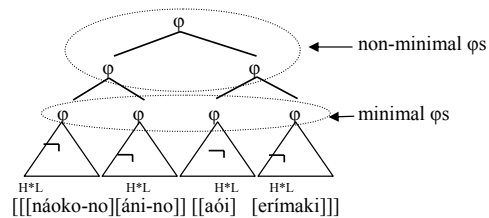
(50) A problem for recursive MiP:

- The higher MiPs contain two accents, one from each of the subordinate MiPs. This violates the one-accent-requirement on MiP.



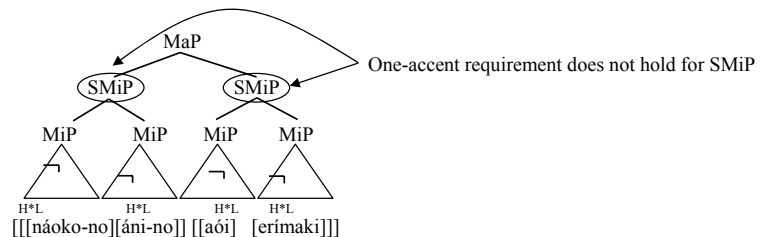
(51) In the ϕ -only model, the issue does not arise:

- The one-accent requirement holds of minimal ϕ .
- The intermediate branching ϕ s are non-minimal.



(52) Response of MiP-MaP theory: add more categories.

- Shinya, Selkirk, and Kawahara 2004 introduce an extra category, "SMiP" ("Superordinate Minor Phrase"), between MiP and MaP.
- The one-accent requirement is assumed to hold only of MiP, not of SMiP.



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(53) Comparison

- MiP-MaP approach: New intermediate category (SMiP) necessary
- ϕ -only approach: No new assumptions necessary

(54) Labels as a liability:

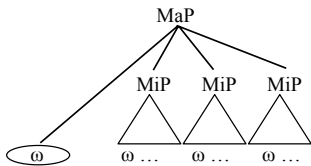
- What comes for free in ϕ -only theory calls for a further elaboration of the labeled hierarchy in MiP-MaP theory, further weakening the prospects for a cross-linguistically uniform hierarchy.
- See also Wagner 2005 (MIT diss.) for a more radical departure from the standard labeled hierarchy, with arguments for a 'label-free' purely metrical model of prosodic structure.

6.3 MiP-MaP misses hierarchical generalizations

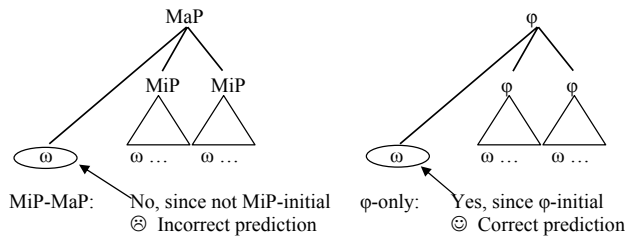
(55) Comparison

- MiP-MaP approach: Lowering occurs MiP-initially.
 - ϕ -only approach: Lowering occurs at the beginning of EVERY ϕ .
- The two theories make different predictions when MaP does not begin with MiP. This situation arises when MaP directly dominates ω (in violation of Strict Layering).

(56) MaP begins with ω



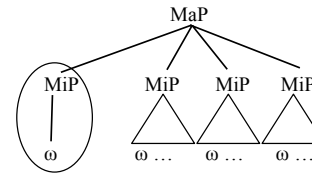
(57) Initial Lowering predicted?



(58) MaP-initial Lowering:

- The degree of initial lowering is even more extreme at MaP edges (Selkirk, Shinya, and Sugahara 2003).
- This is a puzzling fact for the view that initial lowering is a MiP-exclusive property.

(59) The MiP-MaP approach must stipulate that every MaP begins with a MiP.



(60) Comparison:

- MiP-Map approach: Extra MiP at MaP edges necessary; Strict Layering must be enforced in this particular configuration.
- ϕ -only approach: No extra structure, no extra assumptions.

(61) What accounts for the different degrees of initial lowering?

- ϕ -only approach: Lowering occurs at the beginning of all ϕ , and more strongly at the beginning of a maximal ϕ . (See Flack 2007, Keating et al. .)
- MiP-MaP approach: Another separate stipulation that MaP edges have more extreme lowering.

(62) Summary of MiP/MaP problems

- Domain arguments (downstep and initial lowering) to distinguish MiP and MaP do not go through.
- Further increase in categories, such as S(uperordinate)MiP.
- Stipulated Nonrecursivity of MaP.
- Stipulated left-alignment of MaP to MiP.

(63) Recap:

- Problems with strict layering.
- Recursion (adjunction) necessary and adopted by most researchers.
- Strictly layered structures are "optimal" prosodic structures.
- Once recursion is allowed, relational notions such as maximal and minimal projections of categories play a natural role.
- Which is the more restrictive theory?
- Given recursion, ϕ -only theory is more restrictive, and MiP-MaP theory needs to show that the distinction is necessary.

7. Further case studies and consequences

7.1 German phrasal stress

Kratzer and Selkirk 2005: MiP/MaP distinction

- No such distinction is needed once the contrasting structures are properly analyzed.

(64) The basic contrast:

a. <i>María</i> studiert die Gesetze <i>studies the laws</i>	b. <i>María</i> studiert die Gesetze
c. dass <i>María</i> die Gesetze studiert	d. *dass <i>María</i> die Gesetze studiert – ... unless <i>studiert</i> is focused

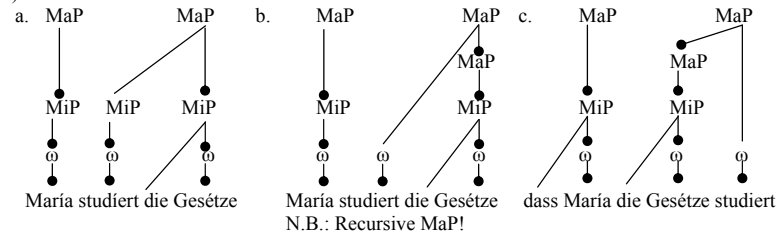
(65)

a. $\begin{matrix} x & x & x \\ x & x & x \\ \text{María} & \text{studiert} & \text{die Gesetze} \end{matrix}$	b. $\begin{matrix} x & & x \\ x & x & x \\ \text{María} & \text{studiert} & \text{die Gesetze} \end{matrix}$
c. $\begin{matrix} x & x & \\ x & x & x \\ \text{dass} & \text{María} & \text{die Gesetze studiert} \end{matrix}$	d. $\begin{matrix} x & x & x \\ x & x & x \\ \text{dass} & \text{María} & \text{die Gesetze studiert} \end{matrix}$

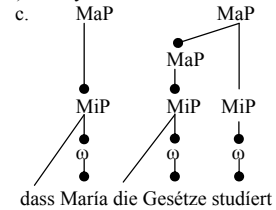
(66) Summary Kratzer and Selkirk 2007:

- “[A] pitch accent necessarily falls on the subject and object arguments;
- the verb necessarily lacks accent when it is sentence-final,
- but shows optional accent if it precedes an object.”

(67)



(68) Why not this structure?



(69) **Align-R**

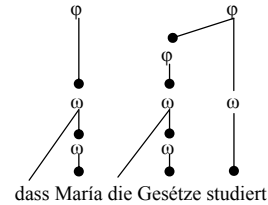
- Align-R (Head-of-MaP, MaP; MiP)
- Interpretation (categorical, following McCarthy 2003):
Assign one violation mark for every MiP that intervenes between the right edge of the head of MaP and the right edge of MaP.

AdjHd: In adjunction structures $[\alpha \beta]$ or $[\alpha \beta \alpha]$, the prosodic head is α , the element being adjoined to, not the adjoined element β .

(70) Analysis in Kratzer & Selkirk 2007 (our interpretation):

	AdjHd	Align-Right
MaP: (x) MaP: (x)(x) MiP: (x)(x) ω : (x) (x)(x) dass <i>María</i> die Gesetze studiert		
MaP: (x) MaP: (x)(x) MiP: (x)(x)(x) ω : (x) (x)(x) dass <i>María</i> die Gesetze studiert		*!
MaP: (x) MaP: (x)(x)(x) MiP: (x)(x)(x) ω : (x) (x)(x) dass <i>María</i> die Gesetze studiert	*!	

(71) ϕ -only hierarchy:



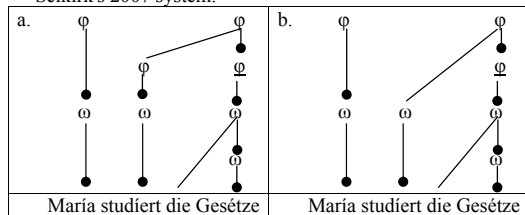
(72) **Align-Right (ϕ)**

- Align-R (Head-of- ϕ , ϕ ; ϕ/ω)
- Interpretation (categorical, following McCarthy 2003):
Assign one violation mark for every ϕ/ω that intervenes between the right edge of the head of ϕ and the right edge of ϕ .

(73) **AdjHd**: In adjunction structures [_a α β] or [α β α], the prosodic head is α, the element being adjoined to, not the adjoined element β.

(74)	AdjHd	Align-R
φ: (x) φ: (x)(x) ω: (x)(x)(x) ω: (x)(x) dass Maria die Gesetze studiert		ω
φ: (x) φ: (x)(x)(x) ω: (x)(x)(x) ω: (x)(x) dass Maria die Gesetze studiert		ω, φ!
φ: (x) φ: (x)(x)(x) ω: (x)(x)(x) ω: (x)(x) dass Maria die Gesetze studiert	*!	

(75) The accentual variation found with main clause word order follows in a way analogous to Kratzer & Selkirk's 2007 system.



7.2 Minimal and maximal projections in other languages

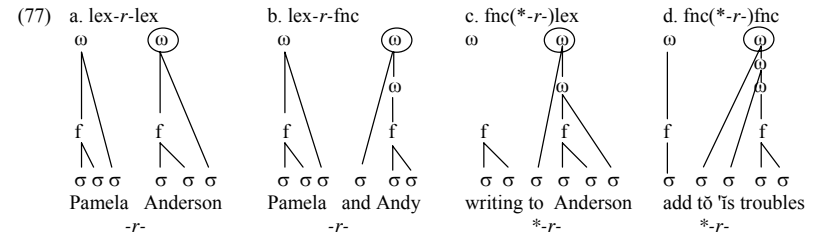
(76) English maximal projection of prosodic word.

The function word gap:

In the non-rhotic dialects of English usually considered, *r*-intrusion happens only after lexical words, not after function words:

	Second word: <i>lex</i>	Second word: <i>func</i>	
First word: <i>lex</i>	Pamela- r -Anderson	law- r -and order	← with hiatus breaker
First word: <i>func</i>	do(- *r -)Albert	to(- *r -)'is troubles	← no hiatus breaker

Explanation (Ito and Mester 2008): Intrusive *r* appears in the onset of maximal ω, not of smaller ω-projections.

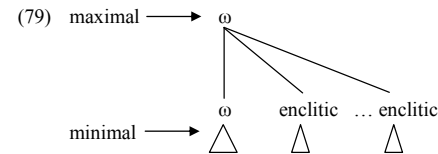


- Similar type of function word evidence for German (Ito and Mester to appear)

(78) Cup'ik prosodic words: maximal and minimal

Woodbury 2002 show in detail, using both prosodic and segmental phenomena as evidence, that in Cup'ik prosody there is a need to distinguish two "word" categories:

- the grammatical word minus all enclitics,
- the grammatical word plus all enclitics.
- In our terms, this distinction ("PW-" vs. "PW", in Woodbury's terminology) corresponds exactly to the minimal ω and the maximal ω.



Some phonological properties are shared by all ω:

- For example, simplification to a single segment is an option for clusters if identical consonants arising at both junctures (80a, b),
- but elsewhere both segments remain and are released separately (80c).

(80) a. [[ʃn:ɑit ω] tuq ω] b. [ʃn:ɑit ω] [taukut ω] c. [mĩŋqut-tən ω]
 [[ʃn:ɑi ω] tuq ω] [ʃn:ɑi ω] [taukut ω]
 'their.houses I.wish' 'their.houses those' 'needles-your(sg.)'

For other processes, the two domains show differences.

- In terms of the stress system, NonFinality is observed in the maximal ω , but not in the minimal ω .
- Final gutturals appear as continuants at the end of the strictly minimal word when a sonorant follows ((81a),
- but at the end of the maximal word they can appear either as sonorants or as stops, depending on speech rate (81b).

- (81) a. [[qayar ω] mi ω] b. [qayar ω] [mana ω]
 [qayaq ω] [mana ω]
 'a.kayak indeed' 'kayak this.one'

(82) Japanese complex compounds (Ito and Mester 2007):

projection:	domain of:
minimal ω	rendaku voicing
maximal ω	junctural accent
minimal ϕ	deaccentuation
ϕ (any ϕ)	downstep, initial lowering

(83) Persian stress (Kahnemuyipour 2003): reanalysis of word-level stress domain and the Ezafe construction in terms of minimal and maximal projection of the prosodic word.

(84) Irish prosodic ω domain (Dowd 2008): Irish synthetic agreement as prosodic incorporation -- maximal prosodic ω as the domain of agreement.

(85) K'ichee' h-final allomorph as a phonological phrase marker (Henderson 2008): For conjoined phrases, optionally on the first conjunct. Analyzed as recursive ϕ -phrase (h-final allomorph appearing either on the minimal or the maximal ϕ -phrase).

(86) Irish ϕ -phrase (Bennett 2008, McCloskey 2008): Irish ϕ -phrases: *right*-aligned to XP. Diagnostics: pause, downstep, lengthening. Analysis of weak pronouns as appearing at the *right* edge of the maximal ϕ -phrase.

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