Prosody, Syntax, and Information Structure III

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Prosodic Categories and Recursion

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Road map of this talk

- The standard architecture of phrasal phonology
- Trimming the hierarchy: **one** phrasal category
- Maximal/minimal projections
- Prosodic recursion: “MiP” and “MaP” are projections, not categories

Case studies:
1. Prosodic typology of Japanese compounds
2. Japanese phrasal categories: recursion instead of multiple category layers
3. Maximal vs. non-maximal ω in English
The standard architecture of phrasal phonology

A rich and multi-level hierarchy of categories

• Designed to serve as domains for phonological processes in various languages.
• The underlying research program has valued the postulation of new descriptive categories over restrictiveness.
The standard architecture of phrasal phonology

• Claim here: From a cross-linguistic perspective,
• the prosodic hierarchy has too many categories—
• but still too little structure.
Proposal

• A radical simplification on the categorial side is possible,
• given a better understanding of the relational side of prosodic structure:
  • minimal vs. maximal projections
  • heads vs. non-heads
The prosodic hierarchy

There is general agreement regarding ...

- utterance
- intonational phrase

- its upper range

- but many questions remain about the mid range...

- its lower ranges

- foot
- syllable
- mora
Utterance-level prosody

\( \upsilon \) utterance

\( \iota \) intonational phrase

- The relation between \( \upsilon \) and \( \iota \) requires further study (more later).
Utterance-level prosody

• The exact definition of the intonational phrase has proven difficult,
• beyond the absolutely obligatory $t$-parse of root clauses (Downing 1970).
• This is due to the large number of alternative parses and the multitude of factors influencing them.
Utterance-level prosody

• The basic picture is fairly clear since Chomsky and Halle 1968:
Utterance-level prosody

- This stretch of speech breaks, in a normal style of pronunciation, into a sequence of three ‹:\n
```
  v
 /\ 
/  \ 
/\  
This is the cat that chased the rat that ate the malt
```
Word-internal prosody

ω  prosodic word
|  
F  foot
|  
σ  syllable
|  
μ  mora
Word-internal prosody
Phrase-level prosody

• The picture is less clear at the phonological phrase level, in the area between intonational phrase and prosodic word.
Phrase-level prosody

• The standard view (due to Selkirk, Kubozono, Nespor & Vogel, Hayes, Beckman & Pierrehumbert, among others):

• Several different prosodic categories need to be distinguished in order to provide enough separate domains for different processes.
Many phrasal categories proposed

MaP       “major phrase”, “intermediate phrase” (Japanese)

MiP       “minor phrase”, “accentual phrase” (Japanese)

CliP      “clitic group” (English; CliP = MiP?)

ω         “prosodic word”
Problems with the standard view

I. Language-specific gaps in the hierarchy
II. Lack of cross-linguistic identification
III. Language-specific definitions
I: 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.
I: Language-specific gaps

• For example, Japanese has been claimed to have only a single category corresponding to
  • both υ and ι
    – (Pierrehumbert and Beckman 1988),
  • and even to υ, ι, and φ
    – (J-ToBI, see Venditti 1997).
I: Language-specific gaps

- Cf. the parallel situation in syntax:
- Language-specific absence of categories has also been considered, often on prima-facie plausible grounds.
I: Language-specific gaps

• 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.
I: Language-specific gaps

• 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).
I: Language-specific gaps

Saito 1985 (among others):

- The absence of a VP node is not what characterizes “non-configurational” languages such as Warlpiri, Tohono O'odham (Papago), or Japanese.
- VP is universally present.
- The explanation for non-configurational properties lies elsewhere.
I: Language-specific gaps

• Returning to prosody:

• Kawahara and Shinya 2006 have argued that there is indeed evidence supporting a distinction between \( \nu \), \( \iota \), and \( \varphi \) in Japanese, as predicted by the assumption of universality.

• But the general problem persists.
I: Language-specific gaps

- Possible diagnosis: The universal hierarchy might be **overdifferenntiated**.
- "**Too many categories**"
- This makes it necessary to eliminate certain levels of prosody whenever the facts in a given language do not seem to support it.
I: Language-specific gaps

• Insist on the universal presence of all categories in all grammars?
• Problematic in the absence of any audible cues.
II: Cross-linguistic identification of categories

• How can we reliably identify categories across languages?
• In syntax, it is not hard to identify, e.g., the DP constituents in language A,
• and to set them in correspondence with the DPs of language B—
II: Cross-linguistic identification of categories

- Identification is possible despite all kinds of differences in morphosyntax, word order, zero anaphora, etc.
- Reason: There is a set of core syntactic and semantic properties shared by the DPs of all languages.
II: Cross-linguistic identification of categories

- Similarly for word-internal prosodic units (syllables and feet):
- E.g., the foot—a unit of abstract linguistic rhythm taken from a very small inventory of rhythmic types (Hayes 1995).
II: Cross-linguistic identification of categories

- Feet 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.
II: Cross-linguistic identification of categories

- This identification is much harder for the higher units of the hierarchy, beginning with the prosodic word.
- Does the $\alpha$-phrase of language A correspond to the $\alpha$-phrase of language B?
- Or to the $\beta$-phrase of B?
- Or is there no correspondent in B?
II: Cross-linguistic identification of categories

Reason for the difficulty:

• Lack of truly cross-linguistically valid and constant properties associated with these higher prosodic units

III: Language-specific definitions

• Categories are sometimes literally defined in terms of the processes associated with their instantiations in specific languages.

• This results in labels like "accentual phrase", "tone group", etc.
III: Language-specific definitions

• This is a natural step for the description of a single language.
• However, it creates additional identification problems for categories between languages and grammars.
III: Language-specific definitions

• The processes are of course specific to each language
  – though hopefully explicable as arising through the interaction of universal constraints, as in OT phonology

• But the domains themselves need to be a universal set of categories.
Proposal here

<table>
<thead>
<tr>
<th>Greek</th>
<th>English</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>υ</td>
<td>utterance</td>
<td>upper-range categories</td>
</tr>
<tr>
<td>ι</td>
<td>intonation group</td>
<td></td>
</tr>
<tr>
<td>φ</td>
<td>phrase</td>
<td>mid-level categories:</td>
</tr>
<tr>
<td>ω</td>
<td>word</td>
<td>Universal phonology provides</td>
</tr>
<tr>
<td></td>
<td></td>
<td>only TWO categories</td>
</tr>
<tr>
<td>F</td>
<td>foot</td>
<td></td>
</tr>
<tr>
<td>σ</td>
<td>syllable</td>
<td>word-internal categories</td>
</tr>
<tr>
<td>μ</td>
<td>mora</td>
<td></td>
</tr>
</tbody>
</table>
Proposal here

• Additional layers arise through prosodic adjunction to these two categories (recursion).
• They do not constitute further distinct categories.
• Without recursion, the theory provides too little structure.
Prosodic recursion

• $\varphi$-adjunction

• $\omega$-adjunction
Recursion in prosodic structure

- Ladd (1986, 1988) shows that nested coordinate constructions form recursive \( \upsilon \)-structures:
Recursion I: Intonational phrase

• Clinton has a lot more money, (but Obama is a stronger campaigner, and Edwards has a more popular program.)

• (Obama is a stronger campaigner, and Edwards has a more popular program,) but Clinton has a lot more money.
Syntactic structure
Evidence: Scaling of downstep

A but (B and C)  (A and B) but C

(schematized pitch contours)
Downstep in recursive coordinate structures

• Within each level of coordination, the second conjunct is downstepped with respect to the first conjunct.

• “Downstep”: The highest peak in the second conjunct is lower than the highest peak in the first conjunct.
A but (B and C)

- $B$ is downstepped relative to $A$,
- $C$ is downstepped relative to $B$. 

A but (B and C)
(A and B) but C

- $B$ is downstepped relative to $A$.
- $C$ is downstepped relative to the conjunct $A$ and $B$, i.e., relative to $A$, the highest peak;
- $C$ is not downstepped relative to $B$. 
Recursion II: phonological phrase

• Background assumption: The “Rhythm Rule” amounts to “early pitch accent placement”.

• It signals the left boundary of a phonological phrase. (Gussenhoven 1991, Shattuck-Hufnagel, Ostendorf, and Ross 1994).
Rhythm Rule in Dutch

★ Ø ★
[φ àardrijkskundig genóotschap]
‘geographical society’

★
cf. aardrijkskundig
Recursion II: phonological phrase

• The option of having of multiple instances of the Rhythm Rule in complex phrases indicates recursive phonological phrasing. (Schreuder and Gilbers 2004, Schreuder 2006).
Recursion II: phonological phrase

φ

[ònafhankelijk φ[Àmsterdams φ[àardrijkskundig genóotschap]]]
‘Independent Amsterdam Geographical Society’

cf.: onafhánkelijk, Amsterdám, aardrijkskúndig
Recursion II: phonological phrase

• Gussenhoven 2005 proposes recursive φ-structures for English prenominal modifier constructions:

Twènty-six gòod-looking Jàpanese DÍJs

• Main argument:
• Their Rhythm Rule behavior shows that they are procliticized: preceded, but not followed, by a φ-boundary.
Recursion II: phonological phrase

\[ \phi \]

\[ \omega \]

\[ \phi [\text{Tw} \text{e} \text{nty-six}] \]

\[ \omega \]

\[ \phi [\text{g} \text{o} \text{d-looking}] \]

\[ \omega \]

\[ \phi [\text{J} \text{a} \text{p} \text{a} \text{nese D} \text{J} \text{s}] ] \]
Other work


• Extensive study and motivation of recursive structures in prosody in two recent dissertations: Wagner 2005 (MIT), Schreuder 2006 (Groningen).
Proposal so far

(i) Universal Phonology distinguishes only a small number of genuinely separate categories (such as "phrase" and "word").

(ii) Recursion: Additional layers arise through prosodic adjunction to these categories, they do not constitute further distinct categories.
Relations vs. categories

(i) Relational side of prosodic structure:
   • Each category defines its own network of projections;
   • The usual tree-structural notions apply, such as "minimal" and "maximal projection".

(ii) Phonological and phonetic processes:
   • are part of the realization of this structure;
   • signal important boundaries by selecting different subconstituents as their domains.
Relations vs. categories

- “Minimal”, “maximal”: relational notions,
- like—
  - “head”, “non-head”;
  - “independent” (mora) “dependent” (mora);
  - “subject”, “object”.

- “Phrase”, “word”: categorial notions,
- like—
  - “syllable”, “mora”;
  - “labial”, “coronal”, “dorsal”;
  - “noun”, “tense”.

54
Maximal and minimal projections

Using standard tree-structural terminology:
• the largest projection of a prosodic category \( \kappa \) is the “maximal \( \kappa \)”,
• its smallest projection is the "minimal \( \kappa \)“.
• More formally:
  \[
  \kappa_{\text{max}} = \text{def} \kappa \text{ not dominated by } \kappa \\
  \kappa_{\text{min}} = \text{def} \kappa \text{ not dominating } \kappa
  \]
Prosodic adjunction: phrase level

\[ \ldots \]

 maximal projection

 minimal projection
Prosodic adjunction: word level

\[
\begin{array}{c}
\phi \\
\omega \\
\omega \\
\omega \\
F
\end{array}
\]

maximal projection

minimal projection

X ...X
Further extensions

“Utterance” as maximal projection of \( \imath \)?

\[ \imath \rightarrow \text{maximal projection} \]

\[ \imath \rightarrow \text{maximal projection} (= \text{“utterance”?}) \]

\[ X \ldots X \imath \rightarrow \text{minimal projection} \]

See also Kawahara and Shinya 2006 on \( \imath \) and \( \imath \) in Japanese.
Case Study 1:
Typology of Japanese compounds

• Adjunction to φ and ω
• Minimal projections
• Maximal projections
• Heads
• Binarity constraints
### Prosodic typology of compounds

<table>
<thead>
<tr>
<th>Word compounds</th>
<th>Phrasal compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>mono-</strong></td>
<td><strong>bi-</strong></td>
</tr>
<tr>
<td>phrasal</td>
<td>phrasal</td>
</tr>
<tr>
<td>compounds</td>
<td></td>
</tr>
</tbody>
</table>

- **hoken-Gaisha**
- **bAnare**
- **genkin**
- **fUri-komi**
- **hatsu**
- **kaio-Awase**
- **zEnkoku**
- **kaisha-Annai**
## Properties of branching compounds

<table>
<thead>
<tr>
<th>Compound Type</th>
<th>word compounds</th>
<th>phrasal compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>rendaku</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>junctural accent</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>deaccenting</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Minimal and maximal projections of $\omega$

<table>
<thead>
<tr>
<th>Word compounds</th>
<th>Phrasal compounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mono-phrasal</td>
</tr>
<tr>
<td>bAnare</td>
<td>haken-Gaisha</td>
</tr>
<tr>
<td>genkin</td>
<td>fUri-komi</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Rendaku is restricted to minimal $\omega$-projections.

It is excluded in higher projections—i.e., in positions which simultaneously initiate two $\omega$-constituents.
Maximal $\omega$-projections: junctural accent

- Junctural accent is found in word compounds, not in phrasal compounds.
- The locus of the compound accent is the internal juncture of a maximal $\omega$. 
Minimal $\phi$-projections: deaccentuation

deaccentuation of dependent (non-head) member within minimal $\phi$

<table>
<thead>
<tr>
<th>mono-phrasal</th>
<th>bi-phrasal</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="link" alt="Diagram" /></td>
<td><img src="link" alt="Diagram" /></td>
</tr>
</tbody>
</table>
## Summary

<table>
<thead>
<tr>
<th>projection:</th>
<th>domain of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• minimal $\omega$</td>
<td>✓ rendaku</td>
</tr>
<tr>
<td>• maximal $\omega$</td>
<td>✓ junctural accent</td>
</tr>
<tr>
<td>• minimal $\phi$</td>
<td>✓ deaccentuation</td>
</tr>
<tr>
<td>• $\phi$ (any $\phi$)</td>
<td>✓ downstep, initial lowering</td>
</tr>
</tbody>
</table>
Why $\omega[\omega\omega]$ versus $\phi[\omega\omega]$?

- Recall: Word compounds $\omega[\omega\omega]$ have junctural accent, phrasal compounds $\phi[\omega\omega]$ do not.

- What determines whether a compound is a word compound $\omega[\omega\omega]$ or a phrasal compound?

- Prosodic length factor (Kubozono, Ito and Mester 1997):
Why $\omega[\omega\omega]$ versus $\phi[\omega\omega]$?

- If the head (second member) exceeds two bimoraic feet ($4\mu$), the whole form is parsed as a phrasal compound.

  head $\leq 4\mu$: $\omega[nankyoku-t\text{Ánken}]$
  'Antarctic exploration'

  head $> 4\mu$: $\phi\ [nankyoku-tankentai\text{¯}]$
  'Antarctic expedition'
4μ size limit for canonical words

(i) Most frequent word type in the lexicon (Sakano 1996, Kozasa 2000).

(ii) 4μ-words show a strong tendency to be unaccented, where unaccentedness has been interpreted as a sign of unmarkedness (Tanaka 2001).
4μ size limit for canonical words

(iii) Significant difference in the amount of final lengthening between 4μ-sequences that constitute phonological words vs. longer sequences (Mori 2002).

Prosodic length limit

• Two-foot limit as a consequence of a constraint requiring words to be prosodically binary (Ito and Mester 1992, Ussishkin 2000, 2005, and others).

• With bimoraic foot parsing, any form longer than four moras ends up with more-than-binary branching: \([(\mu\mu)_1(\mu\mu)_2\mu_3]\), etc.
Maximal and minimal prosodic size constraints

- For a prosodic category $\kappa$, we distinguish $\text{MaxBin}(\kappa)$ and $\text{MinBin}(\kappa)$.
  
  (Mester 1994, 6-8, Hewitt 1994, and Selkirk 2000, 244)

- As a derivative constraint, we refer to their combination as $\text{Bin}(\kappa)$.

- For $\kappa = \sigma, F, \omega, \varphi, \text{etc.}$, this yields a family of (independently rankable) constraints.
Binarity constraints

<table>
<thead>
<tr>
<th>MaxBin((\kappa))</th>
<th>MinBin((\kappa))</th>
<th>Bin((\kappa))</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\kappa) is maximally binary.</td>
<td>(\kappa) is minimally binary.</td>
<td>(\kappa) is exactly binary.</td>
</tr>
</tbody>
</table>

Family of binarity constraints

| MaxBin(\(\sigma,F,\omega,\phi\)) | MinBin(\(\sigma,F,\omega,\phi\)) | Bin(\(\sigma,F,\omega,\phi\)) |
Evaluation of MaxBin(ω)

Fulfills MaxBin(ω)

\[ \begin{array}{c}
\omega \\
F \\
(kasu)(tera)
\end{array} \]

Violates MaxBin(ω)

\[ \begin{array}{c}
\omega \\
F \\
(asu)(para)(gasu)
\end{array} \]

\[ \begin{array}{c}
\omega \\
F \\
(kuri)su(masu)
\end{array} \]

(tere) bi

(tere) bi
OT analysis

• Constraints enforcing canonicity (here, binarity constraints) have specific instantiations for heads.
• → an instance of positional markedness
• MaxBin(Head(ω)):
  Heads of prosodic words are maximally binary.
• Result: Adjunction is only possible to canonical words.
OT analysis

Ranked constraints:

Align-Left ($\omega$, MWd):
$\omega$ must begin a MWd.

MaxBin(Head($\omega$)):
$\omega$-heads must be maximally binary.

Wrap (MWd, $\omega$):
MWd constitutes a $\omega$. 
Violation of $\omega$-head binarity yields phrasal compounds

<table>
<thead>
<tr>
<th>/ hatu - kao awase /</th>
<th>AI-L</th>
<th>MxBinHd$\omega$</th>
<th>Wrap</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Diagram 1" /></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image2.png" alt="Diagram 2" /></td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

77
Fulfilling ω-head binarity results in word compounds

<table>
<thead>
<tr>
<th>/ denki - kami sori /</th>
<th>Align-L</th>
<th>MaxBinHd</th>
<th>Wrap</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Diagram of ω-head binarity]</td>
<td>[Diagram of Align-L, MaxBinHd, Wrap]</td>
<td>[Diagram of Align-L, MaxBinHd, Wrap]</td>
<td>[Diagram of Align-L, MaxBinHd, Wrap]</td>
</tr>
</tbody>
</table>

[Diagram of word compounds]
Align-Left forestalls breaking up simplex words

<table>
<thead>
<tr>
<th>/ kurisumasu /</th>
<th>Align-Left ((\omega, \text{MWd}))</th>
<th>MaxBinHd</th>
<th>Wrap</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="diagram1.png" alt="Diagram" /> kuri sumasu</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="diagram2.png" alt="Diagram" /> kuri sumasu</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Case Study 2: Japanese phrasal categories

• Rich area of previous phonological and phonetic work:
Phrasal categories in Japanese

• The standard approach distinguishes two phrasal categories:
  
  - MaP major (≈ “intermediate”) phrase
  - MiP minor (≈ “accentual”) phrase
  - \( \omega \) prosodic word
Proposal here

- There is only ONE category:

\[ \phi \] ("phrase")
Question

• The distinction between MiP and MaP is supposed to be irreducible because the two are domains for different processes.
• How can these domains be distinguished if there is only one kind of “phrase”? 
Reconsidering the arguments

• MiP:
  Domain of accentual culminativity: at most one accent.
MiP as domain of culminativity

There can only be one accent in a Minor Phrase (hence the alternative name “Accentual Phrase”).

* MiP
Reconsidering the arguments

• MiP:
  Domain of initial lowering: Low tone at left boundary followed by High tone.
Initial lowering within MiP

We cannot find Mr. Inayama’s friend from Oomiya.

Mr. Inayama from Oomiya called his friend.

From Selkirk and Tateishi 1991
Reconsidering the arguments

• MaP:
  Domain of downstep: Lowering of the pitch register following each accented syllable.
Downstep within MaP

[Ao’yama-no [Yama’guchi-no ani’yome-ga]] [inai]
We cannot find Mr. Yamaguchi’s sister-in-law from Aoyama.

[ Ao’yama-no Yama’guchi-ga] [ani’yome-o yonda]
Mr. Yamaguchi from Aoyama called his sister-in-law.

From Selkirk and Tateishi 1991
The domain arguments
Questions

• 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 $\phi$’s?
One-$\phi$ model
One-\(\varphi\) model

- Could the One-\(\varphi\) 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.
No need to limit downstep to MaP

- A MiP contains maximally one accent;
- downstep requires two accents and cannot have any effect \textit{within} MiP;
- it can apply vacuously to MiP;
- there is no reason to limit downstep to MaP.
Downstep in all $\varphi$

\[ \therefore \text{Downstep applies to EVERY } \varphi. \]

(Here, vacuously to the lower $\varphi$'s)
No need to limit lowering to MiP

- Initial Lowering 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).
Lowering in all $\varphi$

$\therefore$ Lowering applies to EVERY $\varphi$. 
Downstep and initial lowering in the one-φ model
Trimming the hierarchy

• Immediate conclusion:
  – Initial lowering applies to all phrases (i.e., not just to MiP).
  – Downstep applies to all phrases (i.e., not just to MaP).

• More interesting conclusion:
  – Let there be no more MaPs and MiPs. Let there be only $\phi$ (“phrase”).
Maximal and minimal projections of $\varphi$
MiP/MaP vs. maximal-φ/minimal-φ

• In specific instantiations,
  • MaP often corresponds to maximal φ,
    MiP to minimal φ.
MiP/MaP vs. maximal-\(\phi/\text{minimal-}\phi

- Does this mean that we are recreating MaP and MiP with new names?
- No, the two theories are not notational variants.
- There are significant differences between the two,
- and the evidence favors the single category approach.
MiP-MaP approach provides too much structure

MiP and MaP can appear nested if the Recursivity constraint is low-ranking.
Inherent restrictiveness of the $\varphi$-only model

No such possibility for maximal and minimal $\varphi$.

There can only be one maximal and one minimal instantiation in every projection.
Nested MaP’s disallowed in English

* MaP
  MaP ...

• Such recursive MaP structures need to be ruled out by specifically assuming high ranking NonRecursivity-MaP (Selkirk 2000: 25).
Nested MaP’s disallowed in English

• If “MaP” $\approx$ maximal $\varphi$, this follows automatically without invoking other constraints or ranking.
• There can be no such thing as a “recursive maximal $\varphi$."

\[
\begin{align*}
\text{maximal} & \quad \longrightarrow & \varphi \\
\text{nonmaximal} & \quad \longrightarrow & \varphi \quad \ldots
\end{align*}
\]
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.
Recursive MiP in Japanese?

```
[[náoko-no][áni-no]] [[aói] [erímaki]]
(I saw) Naoko’s brother’s blue muffler'
```
A problem for recursive MiP

- The higher MiPs contain two accents, one from each of the subordinate MiPs.
- PROBLEM: This violates the one-accent-requirement on MiP.
No problem for $\varphi$-only model

- In the $\varphi$-only model, the issue does not even arise:
- The one-accent requirement holds of minimal $\varphi$.
- The intermediate branching $\varphi$s are non-minimal,
- hence the requirement does not apply.
Focus and MaP domains

- Kubozono 2005, Kubozono, Kitagawa, Yoshida (WPSI 3):
- Focus does not block downstep: no pitch reset, i.e., no new MaP.
- Possibility: Prosodic structure with higher inclusive $\phi$, and $\phi$-recursion (triggered by the Focus element).
- Prediction: Downstep in any $\phi$.
- No need to posit another prosodic category.
Reponse of MiP-MaP theory: add more categories

- In order to account for rhythmic boost, Shinya, Selkirk, and Kawahara 2004 introduce a new category:
- **SMiP** (“Superordinate Minor Phrase”),
- located between MiP and MaP.
Reponse of MiP-MaP theory: add more categories

- SMiP = “Superordinate Minor Phrase”
- The one-accent requirement is assumed to hold only of MiP, not of SMiP.
Response of MiP-MaP theory: add more categories

• A similar response might be given to account for the focus-downstep facts:
  • Either use the MaP-SMiP-MiP distinction, or introduce still another category—
  • **SMaP** (“Subordinate Major Phrase”)
Comparison

- **MiP-MaP approach:**
  - New intermediate category necessary

- **ϕ-only approach**
  - No new assumptions necessary

\[ \begin{align*}
\text{MaP} & \quad \text{SMiP} \\
| & \quad | \\
\text{MiP} & \quad \text{SMiP} \\
| & \quad | \\
\text{MiP} & \quad \text{MiP} \\
\end{align*} \]
Labels as a liability

• What comes for free in $\varphi$-only theory requires a further elaboration of the labeled hierarchy in MiP-MaP theory.
• This further weakens the prospects for a cross-linguistically uniform hierarchy.
Initial Lowering

- **MiP-MaP approach:**
  - Lowering occurs MiP-initially.

- **φ-only approach:**
  - Lowering occurs at the beginning of EVERY phrase φ.
Initial Lowering

- The two theories make different predictions when MaP does not begin with MiP:
<table>
<thead>
<tr>
<th>MiP-MaP:</th>
<th>φ-only:</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>No, since not MiP-initial</em></td>
<td><em>Yes, since φ-initial</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MiP-MaP:</th>
<th>φ-only:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorrect prediction</td>
<td>Correct prediction</td>
</tr>
</tbody>
</table>
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.
MaP-initial Lowering

• The MiP-MaP approach must stipulate that every MaP begins with a MiP.
Initial Lowering

• **MiP-Map approach:**
  
  • Extra MiP at MaP edges necessary
  
  • Strict Layering must be enforced in this particular configuration.

• **φ-only approach:**
  
  • No extra structure necessary.
  
  • No extra assumptions necessary.
Degree of initial lowering

• What accounts for the different degrees of initial lowering?

• $\phi$-only approach: Lowering occurs at the beginning of all $\phi$, and more strongly at the beginning of a maximal $\phi$.

• MiP-MaP approach: Another separate stipulation that MaP edges have more extreme lowering.
Summary of MiP/MaP problems

(i) Domain arguments (downstep and initial lowering) to distinguish MiP and MaP do not go through.

(ii) Further increase in categories, such as S(uperordinate)MiP.

(iii) Stipulated Nonrecursivity of MaP.

(iv) Stipulated left-alignment of MaP to MiP.
Case Study 3: Adjunction in English

• Further evidence for singling out the maximal $\omega$ among the $\omega$-projections:

• \textit{r-sandhi} in varieties of nonrhotic English (NRE), where [r] has been lost in syllable codas (\textit{I paak my caa in Haavaad Yaad}).
Nonrhotic dialects

- r-loss word-finally (actually, $\sigma$-finally)

<table>
<thead>
<tr>
<th>underlying r</th>
<th>no underlying r</th>
</tr>
</thead>
<tbody>
<tr>
<td>better</td>
<td>comma</td>
</tr>
<tr>
<td>sta/</td>
<td>law</td>
</tr>
<tr>
<td>soar/</td>
<td>withdraw</td>
</tr>
<tr>
<td>sta/</td>
<td>Kafka</td>
</tr>
</tbody>
</table>
R-sandhi

• Most well-known as a feature of British RP ("Received Pronunciation").
• Also found in other nonrhotic variants, as spoken in New Zealand, Eastern Massachusetts, and the Deep South of the U.S.
R-sandhi

<table>
<thead>
<tr>
<th></th>
<th>underlying (linking) r</th>
<th>epenthetic (intrusive) r</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>at word juncture</strong></td>
<td>bette-r-off</td>
<td>comma-r-in</td>
</tr>
<tr>
<td></td>
<td>sta-r-is</td>
<td>law-r-of</td>
</tr>
<tr>
<td><strong>word-internal juncture (level 2)</strong></td>
<td>soa-r-ing</td>
<td>withdraw-r-al</td>
</tr>
<tr>
<td></td>
<td>sta-r-r-y</td>
<td>Kafka-r-esque</td>
</tr>
</tbody>
</table>

- after the non-high vowels [ə, ɔː, əː]
R-sandhi is productive

• Intrusive r in loanwords:
  the Stella-r-Artois event

• NRE speakers’ pronunciations of foreign languages:
  *ich habe-r-eine Reservierung* (German)
  *hosanna-r-in excelsis* (Latin)

(Wells 1982, McMahon 2000)
R-sandhi is widespread

• For example, a process virtually identical to the one in NRE exists in Bavarian German, with both linking and intrusive r.

  wia-r-i gsãgd hab   kema-r-is
  wie ich gesagt habe  gekommen ist
  'as I said'           'has come'

  (Examples after Merkle 1975:30-33; Standard German versions added for comparison.)
Bavarian German

Mia kena-r-αwa-r-aa-r-an αndasmɔi kema.
Wir können aber auch ein andersmal kommen.
'But we can also come another time.'
The function word gap

• In most dialects, intrusive $r$ cannot appear at the juncture between a function word and a following word (McCarthy 1993).
  *Fnc-$r$-Lex (*I wanna-$r$-eat)
  *Fnc-$r$-Fnc (*add to-$r$-(h)is troubles)
Cf. Lex-$r$-Lex (Let Wanda-$r$-eat)
  Lex-$r$-Fnc (the law-$r$-of the land)
The function word gap

- didja eat? * didja-r-eat?
- he went to eat *he went to-r-eat
- I wanna eat *I wanna-r-eat
- the apples *the-r-apples
The function word gap

Let Wanda $\sigma[reat]$

*Let Wanda $\sigma[ eat]$

*I’m gonna $\sigma[reat]$

I’m gonna $\sigma[ eat]$
Proclitic status

- Such function words in English are not prosodic words by themselves, but rather proclitic:
  
  \[
  \text{[gonna}_{\text{fnc}}] \ - \text{[eat}_\omega \text{]} \\
  * \ [gonna}_{\text{fnc}} \underbrace{\text{[reat}_\omega \text{]}} \\
  \text{[supposta}_{\text{fnc}}] \ - \text{[add}_\omega \text{]} \\
  * \ [supposta}_{\text{fnc}} \underbrace{\text{[radd}_\omega \text{]}}
  \]
Prosodic adjunction

• Function words in English form adjunction structures with following prosodic words:
Prosodic adjunction

Reminder:
\[ \kappa_{\text{max}} = \text{def} \quad \kappa \text{ not dominated by } \kappa \]
\[ \kappa_{\text{min}} = \text{def} \quad \kappa \text{ not dominating } \kappa \]

For words,
– the resulting maximal projection is referred to as \( \omega_{\text{max}} \) ("maximal prosodic word"),
– its innermost \( \omega \)-subconstituent as \( \omega_{\text{min}} \) ("minimal prosodic word").
Consequence of adjunction

*Eat* does not have the same prosodic status

- in *lex+lex*:
  Let Wanda \( \sigma[\text{reat}] \)

- and *fnc+lex*:
  I’m gonna \( \sigma[\text{eat}] \)
A structural difference

let Wanda eat

I’m gonna eat

maximal $\omega$
A structural difference

Let Wanda \( \sigma[\text{reat}] \) maximal \( \omega \)

I’m gonna \( \sigma[\text{eat}] \) subpart of a maximal \( \omega \)
Consequences for $r$-insertion

Let Wand[ə $r$]eat

I’m gonn[ə $r$]eat

Let Wand[ə] eat

I’m gonn[ə] eat

r-inserting candidates

hiatal candidates
Analysis

\[ \text{ONSET}(\omega_{\text{max}}) * \left[ \omega_{\text{max}} \ V \right] \]

Special version of Onset-constraint for prominent positions (maximal projections of \( \omega \))

\[ \text{DEP-init}(\omega) \]

Positional faithfulness: special version of DEP-constraint ruling out insertion of a root node. (Root node is filled by spreading from preceding vowel, hence no phrase-initial epenthetic \( r \).)

Any root node of the output in \( \omega \)-initial position has an input correspondent.
Ranking

Onset($\omega_{\text{max}}$)

Dep-init($\omega$)

Onset

Dep
(Let) Wanda eat

- Onset($\omega_{\text{max}}$) » Dep-init($\omega$)

<table>
<thead>
<tr>
<th>... Wanda eat</th>
<th>Ons ($\omega_{\text{max}}$)</th>
<th>Dep -init($\omega$)</th>
<th>Ons</th>
<th>Dep</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\omega_{\text{max}}$</td>
<td>$\omega_{\text{max}}$</td>
<td>$\omega_{\text{max}}$</td>
<td>$\omega_{\text{max}}$</td>
<td>$\omega_{\text{max}}$</td>
</tr>
<tr>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

\[\omega_{\text{max}} \quad \omega_{\text{max}}\]
(I) wanna eat

- Dep-init(ω) » Onset

<table>
<thead>
<tr>
<th>... wanna eat</th>
<th>Ons (ω_{max})</th>
<th>Dep-init(ω)</th>
<th>Ons</th>
<th>Dep</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ wanna][eat]</td>
<td></td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ wanna][eat]</td>
<td></td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

\[ \omega_{max} F \quad \omega \]

\[ \omega_{max} F \quad \omega \]
Emergence of Onset

- Epenthetic r is excluded if after function words because of high-ranking Dep-init(ω). The other kind of r-sandhi, underlying r, is not:

<table>
<thead>
<tr>
<th>for eating</th>
<th>Ons (ω_{max})</th>
<th>Dep-init(ω)</th>
<th>Ons</th>
<th>Dep</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ [ fo ] [ reating ]]</td>
<td>ω_{max} σ ω</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>[ [ fo ] [ eating ]]</td>
<td>ω_{max} σ ω</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>
Side issue: Why insert $r$?

- R-insertion is a kind of diphthongization of the preceding vowel.
Saw [r]Ed

- DEP-INIT(ω) is therefore actually DEP-ROOTNODE-INIT(ω),
- with the root node filled by spreading from preceding non-high central/back vowels.

<table>
<thead>
<tr>
<th>saw Ed</th>
<th>Ons (ω_max)</th>
<th>Dep-root-init(ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>► [sɔ ] [rɛd]</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>ω_max (\overrightarrow{\omega_{\max}})ω_max</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Place</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[ sɔ ] [ɛd] | *! | |
|ω_max |ω_max | |
High-ranking DEP-PLACE prevents post-pausal epentheses.

<table>
<thead>
<tr>
<th>$Ed$</th>
<th>Dep-Place</th>
<th>Ons ($\omega_{\text{max}}$)</th>
<th>Dep-root-init($\omega$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$[\text{r}\varepsilon d]$</td>
<td>!</td>
<td>$*$</td>
<td></td>
</tr>
<tr>
<td>$\omega_{\text{max}}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$[\varepsilon d]$</td>
<td>$*$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\omega_{\text{max}}$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
R-insertion in other dialects

- Cockney English and some other dialects (e.g., Norwich) spoken in the British Isles show a more extensive process of r-insertion:
- more vowels reduced to schwa, the main sponsor of the inserted segment;
- less restrictive prosodic context: no function word gap.
Cockney

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>tomato</td>
<td>tomat[ə r]and cucumber production</td>
</tr>
<tr>
<td>window</td>
<td>pull the wind[ə r]up</td>
</tr>
<tr>
<td>you how</td>
<td>I'll tell y[ə ræ:]</td>
</tr>
<tr>
<td>you a</td>
<td>Give [jə rə] job</td>
</tr>
<tr>
<td>not a hope</td>
<td>not [ə rəup]</td>
</tr>
</tbody>
</table>

Norwich

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>to it</strong></td>
<td>[tər]it</td>
</tr>
<tr>
<td><strong>by a</strong></td>
<td>run over [bərə] bus</td>
</tr>
<tr>
<td><strong>of old</strong></td>
<td>lot [ər]old</td>
</tr>
<tr>
<td><strong>to eat</strong></td>
<td>out [tər]eat</td>
</tr>
<tr>
<td><strong>to eight</strong></td>
<td>quarter [tər]eight</td>
</tr>
</tbody>
</table>

- Note insertion after function words (*to-r-eat*)
Analysis

- Standard non-rhotic:

  \[
  \text{Onset}(\omega_{\text{max}}) \quad | \quad \text{Dep-init}(\omega) \quad | \quad \text{Onset} \quad | \quad \text{Dep}
  \]

- Norwich, etc.:

  \[
  \text{Onset}(\omega_{\text{max}}) \quad | \quad \text{Onset} \quad | \quad \text{Dep-init}(\omega) \quad | \quad \text{Dep}
  \]
Norwich *to-r-eat*

<table>
<thead>
<tr>
<th>to eat</th>
<th>Ons ($\omega_{max}$)</th>
<th>Ons</th>
<th>Dep-init($\omega$)</th>
<th>Dep</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\uparrow$ $\left[ \left[ t\emptyset \right[ \right[ \text{rit} ]] \right[ \right[ \text{rit} ]</td>
<td>\omega_{max} \sigma \omega$</td>
<td>$\omega_{max} \sigma \omega$</td>
<td>$*$</td>
<td>$*$</td>
</tr>
<tr>
<td>$\left[ \left[ t\emptyset \right[ \right[ \text{it} ]] \right[ \right[ \text{it} ]</td>
<td>\omega_{max} \sigma \omega$</td>
<td>$\omega_{max} \sigma \omega$</td>
<td>$*$!</td>
<td></td>
</tr>
</tbody>
</table>

Note: The table shows the analysis of the word 'to eat' in Norwich dialect, with constraints and dependencies indicated.
Summary

• We have proposed a minimal prosodic ontology at the phrase level:
• Only $\omega$ and $\phi$ are distinct categories
• Adjunction structures play a large role
• Relational notions, such as “maximal/minimal projection of category $\alpha$”, are essential for the formulation of constraints.
### Consequences

<table>
<thead>
<tr>
<th>Recursivity</th>
<th>Layering fulfilled</th>
<th>Layering violated</th>
</tr>
</thead>
<tbody>
<tr>
<td>fulfilled</td>
<td><img src="layered_fulfilled.png" alt="" /></td>
<td><img src="layered_violated.png" alt="" /></td>
</tr>
<tr>
<td>violated</td>
<td><img src="violated_fulfilled.png" alt="" /></td>
<td><img src="violated_violated.png" alt="" /></td>
</tr>
</tbody>
</table>

*“strictly layered”*
Layering and recursion

• Strictly layered structures with no recursion impose a fixed upper limit on the depth of prosodic structures.
• This limit is too tight.
• On the other hand, grammars impose limits on recursive structure:
  – In terms of number of recursions
  – Based on binarity
  – Based on phonetic length
Layering and recursion

• It is unclear whether layering is ever clearly violated at the phrase level, different from word-internal prosody.

• Cases where $\sigma$ is demonstrably dominated by $\varphi$ are hard to find (but see Selkirk 1996 for English, Hall 1999 for German).
Layering and recursion

• On the other hand, layering violations are common at the word-foot level due to non-exhaustive parsing (unfooted $\sigma$ directly dominated by $\omega$).

Layering and recursion

• The opposite holds for recursive structures:
• They are quite common for $\omega$ and higher constituents
• But recursive foot and syllable structures have rarely been proposed, and are not solidly motivated.
Summary of properties

Below the word level:

- $\omega$, $\varphi$, $\iota$

- Recursivity violations frequent

- Layering violations rare

Word and higher levels:

- $\Omega$, $\varphi$, $\iota$

- Recursivity violations frequent

- Layering violations rare
Similar difference in binarity violations

- Binarity is usually observed below the word level:
- Ternary feet and trimoraic syllables are often ungrammatical.
- But at higher levels, \( \omega \), \( \varphi \), \( \iota \), there is usually only a *tendency* towards binarity (as the unmarked option).
Why this systematic difference?

There are two different kinds of prosodic categories:

- Intrinsically defined categories
- Extrinsically defined categories
Two kinds of categories

Intrinsically defined categories:
• Word-internal prosodic units are largely governed by substantive constraints.
• These deal with syllable and foot shape and relate to sonority profile and rhythm.

Extrinsically defined categories:
• Higher-level units are largely governed by syntax-phonology mapping constraints (Alignment, Wrap, etc.).
Layering: phrasal vs. word-internal

• Word-internal violations of Layering are frequent—
• due to high-ranking substantive constraints.
• Violations of Layering above the word are rare—
• because such substantive constraints on form and rhythm are largely absent for extrinsically defined prosodic categories.
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