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Categories and Projections in Prosodic Structure

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Road map of this talk

Categories

- The standard architecture of phrasal phonology
- Trimming the hierarchy: one phrasal category
- Prosodic recursion

Relations

- Maximal and minimal projections of Φ and ω
- Case study: typology of Japanese compounds
- Case study: ω-adjunction in English and German

Hierarchy

- The role of strict layering
- Adjunction sites for proclitic function words

Part I: Categories

The standard architecture of phrasal phonology

- Postulates a rich and multi-level hierarchy of categories that are 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

- When viewed from a cross-linguistic perspective,
- the prosodic hierarchy has too many categories but still too little structure.

Proposal here

- A radical simplification on the categorial side is possible through a proper understanding of the relational side of prosodic structure:
- minimal vs. maximal projections
- heads vs. non-heads

Case Study: Japanese phrasal categories

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

Phrasal categories in Japanese

- The standard approach distinguishes two phrasal categories:

MaP major (≈ “intermediate”) phrase

MiP minor (≈ “accentual”) phrase

(ω prosodic word)

Proposal here

- There is only ONE category:

Φ (“phrase”)

Question

- The distinction between MaP and MiP 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

- 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 tone.

Reconsidering the arguments

- MiP:

  Domain of accentual culminativity: at most one accent.

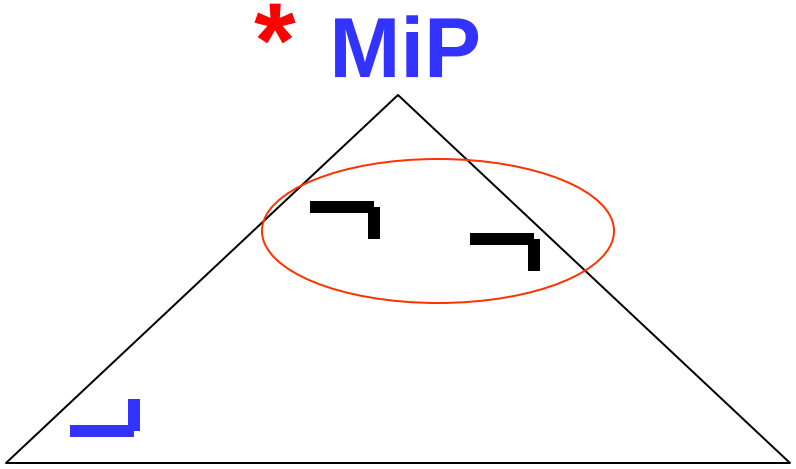
Cf. also

- ω:

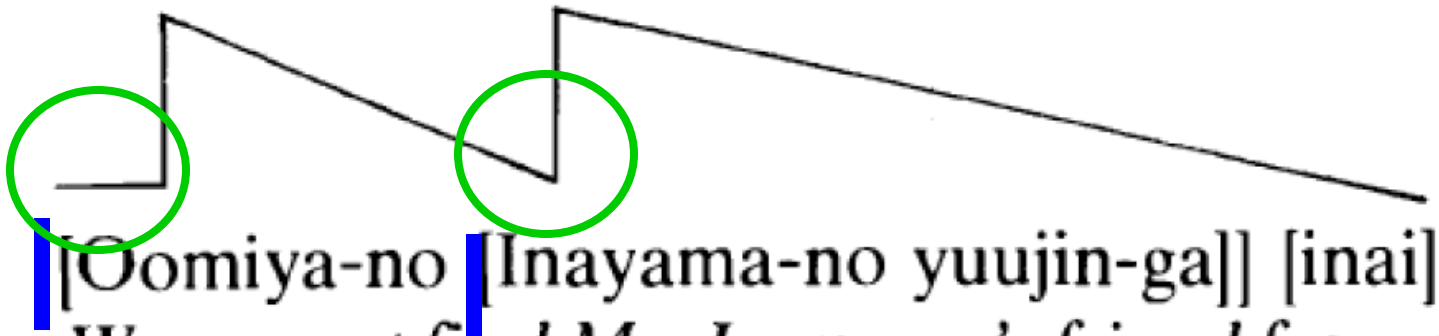
  Domain of word accent rules (junctural compound accent, dominant/recessive accent)

MiP as domain of culminativity

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

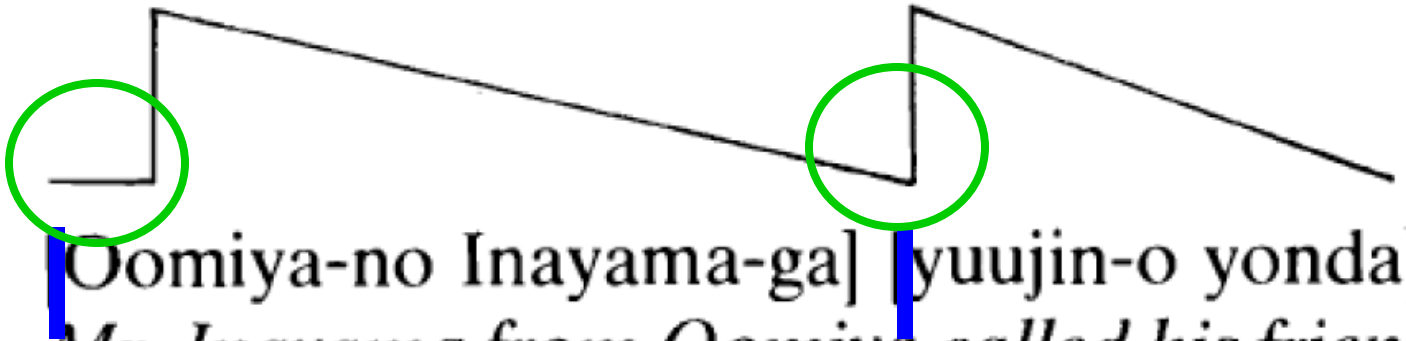


Initial lowering within MiP



[[Oomiya-no [Inayama-no yuujin-ga]] [inai]

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

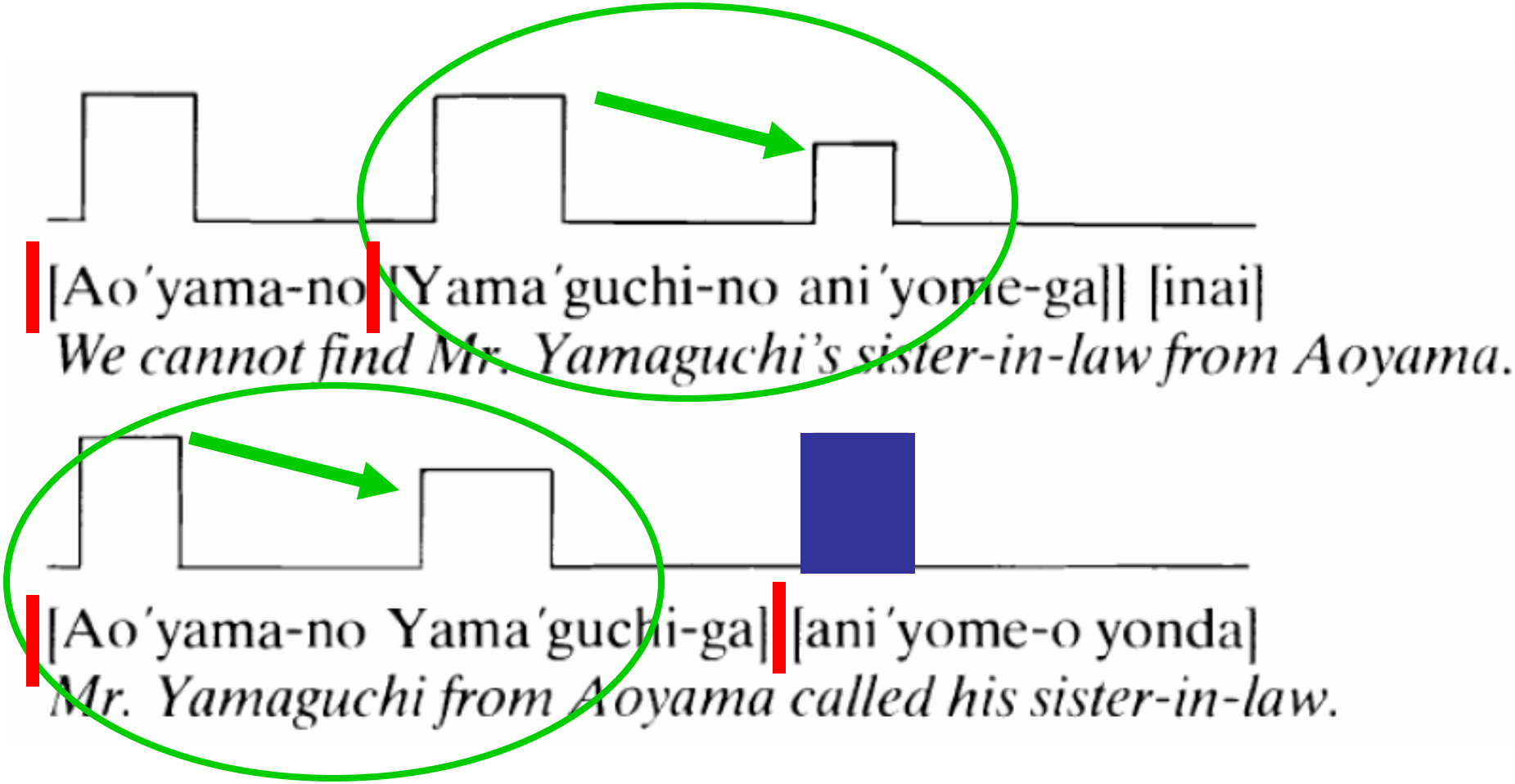


[Oomiya-no Inayama-ga] [yuujin-o yonda]

Mr. Inayama from Oomiya called his friend.

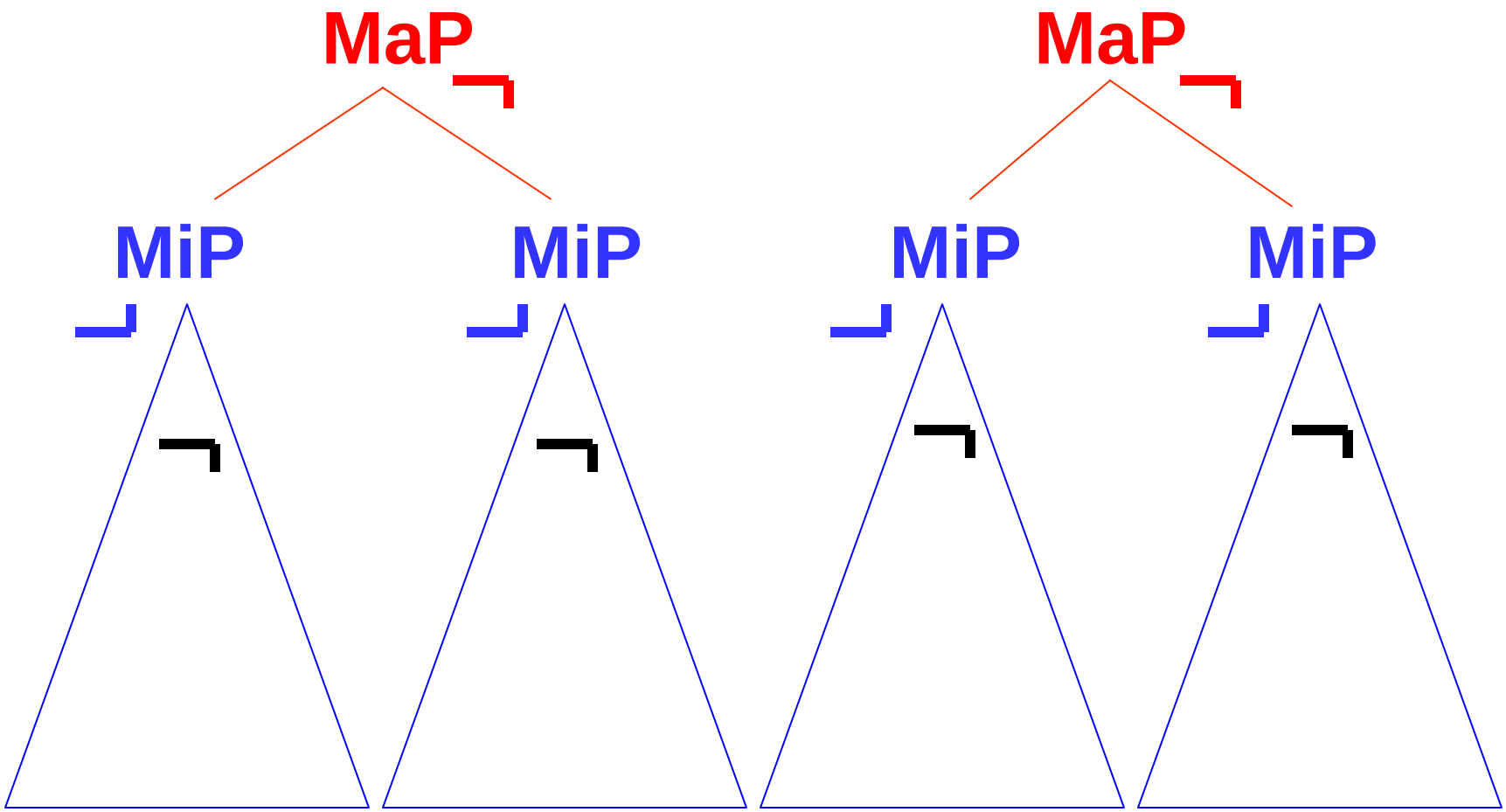
From Selkirk and Tateishi 1991

Downstep within MaP



From Selkirk and Tateishi 1991

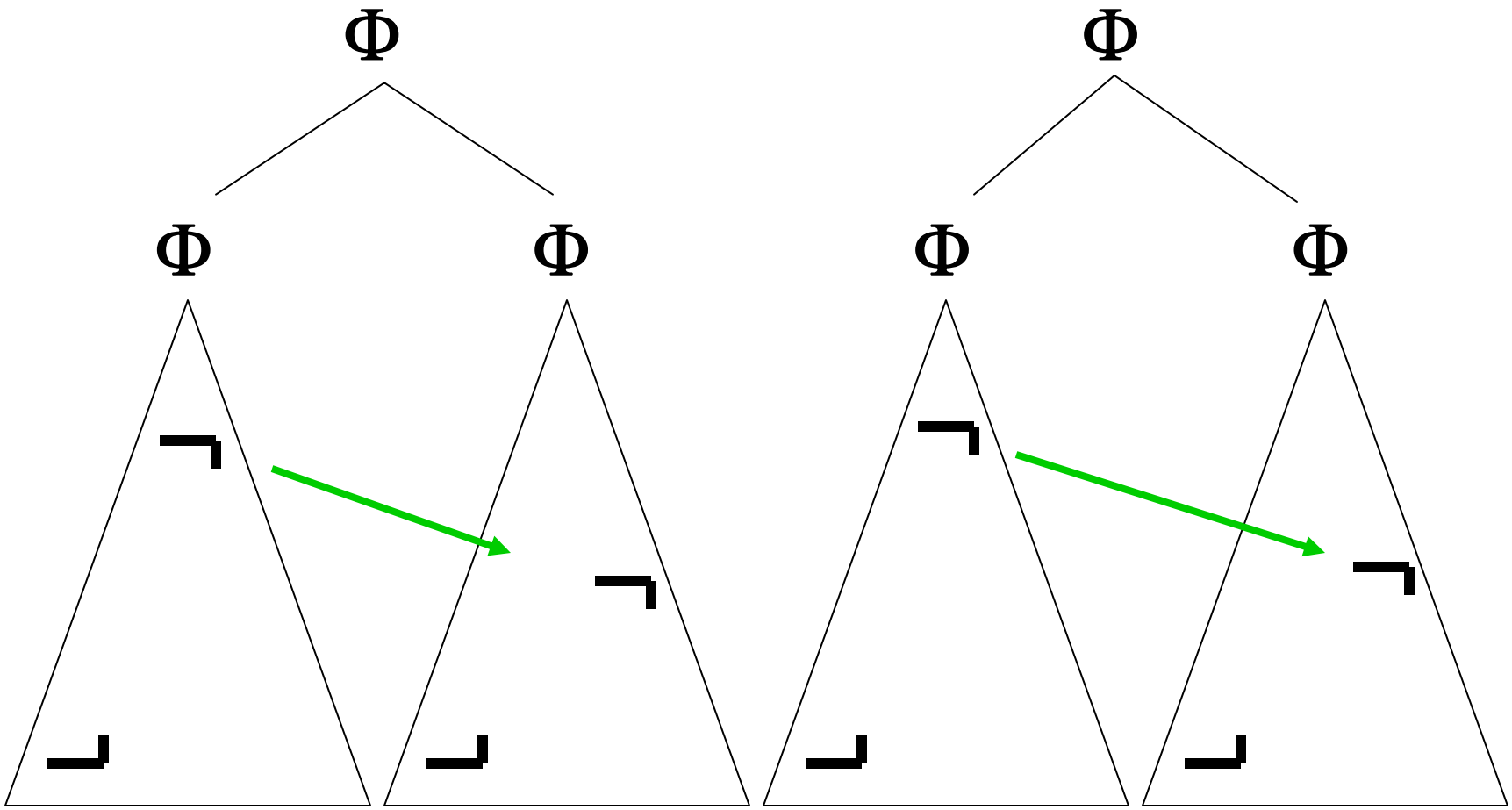
The domain arguments



Questions

- But 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?

One-Φ model

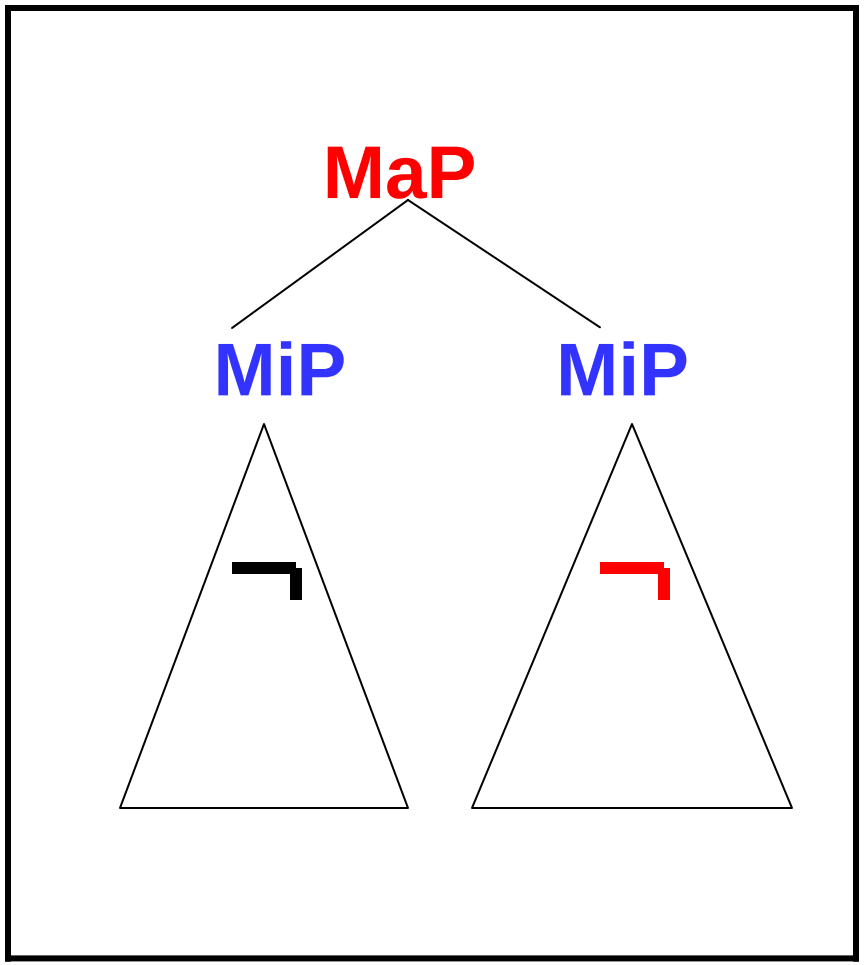


One-Φ model

- 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.

No need to limit downstep to MaP

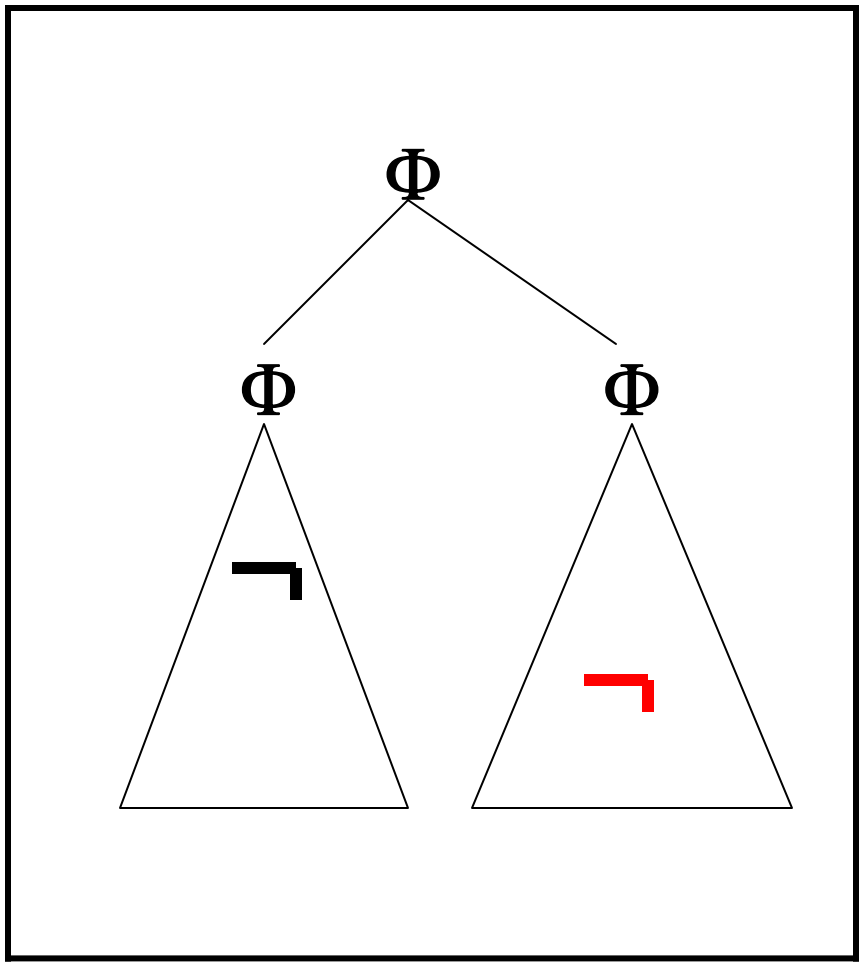
- A MiP contains maximally one accent;
- downstep requires two accents and cannot have any effect within MiP;
- it can apply vacuously to MiP;
- there is no reason to limit downstep to MaP.



Downstep in all Φ

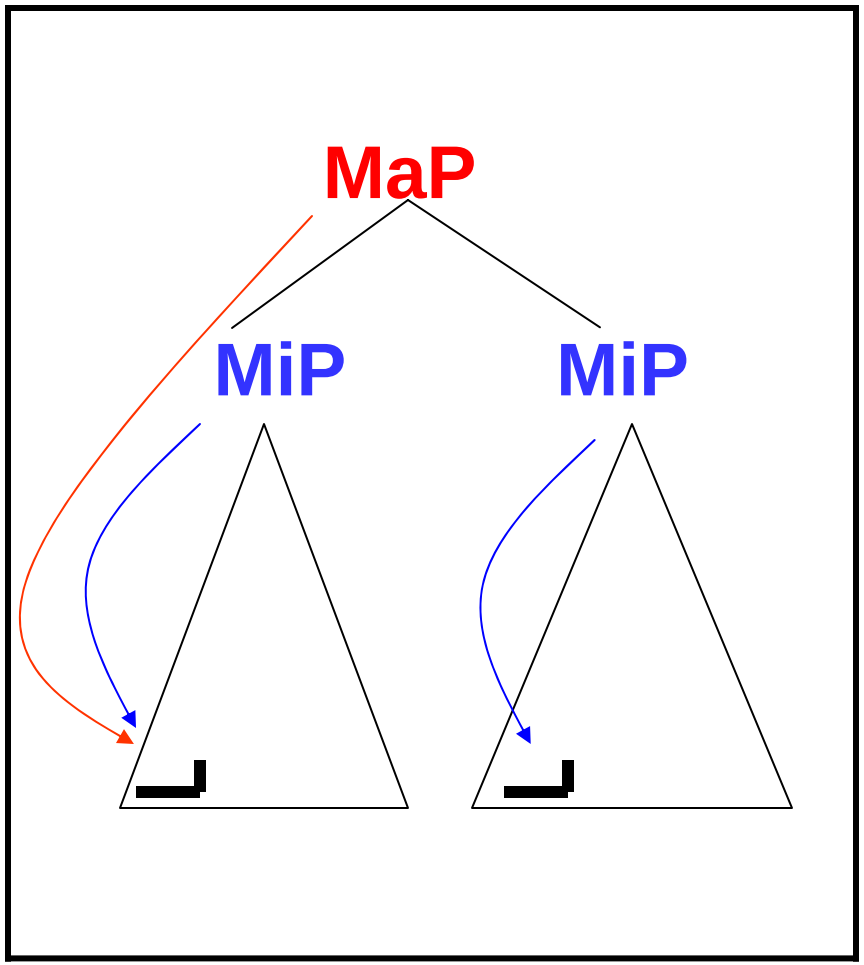
∴ Downstep applies to EVERY Φ.

(Here, vacuously to the lower Φ's)



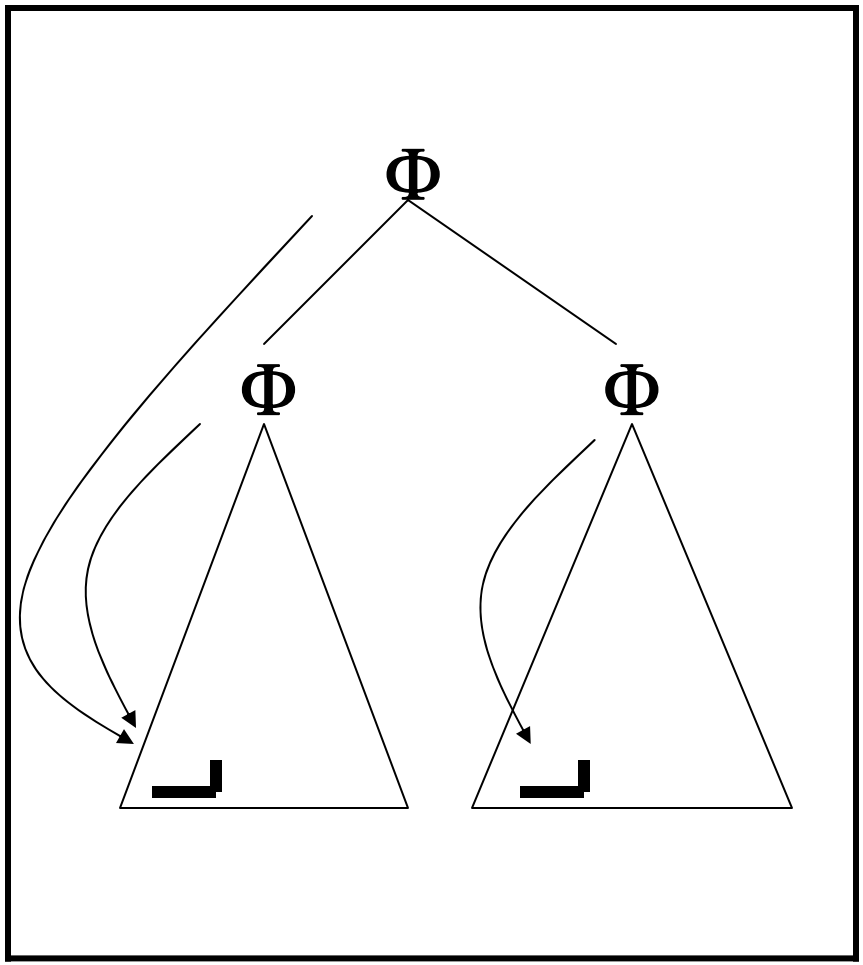
No need to limit lowering to MiP

- 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).

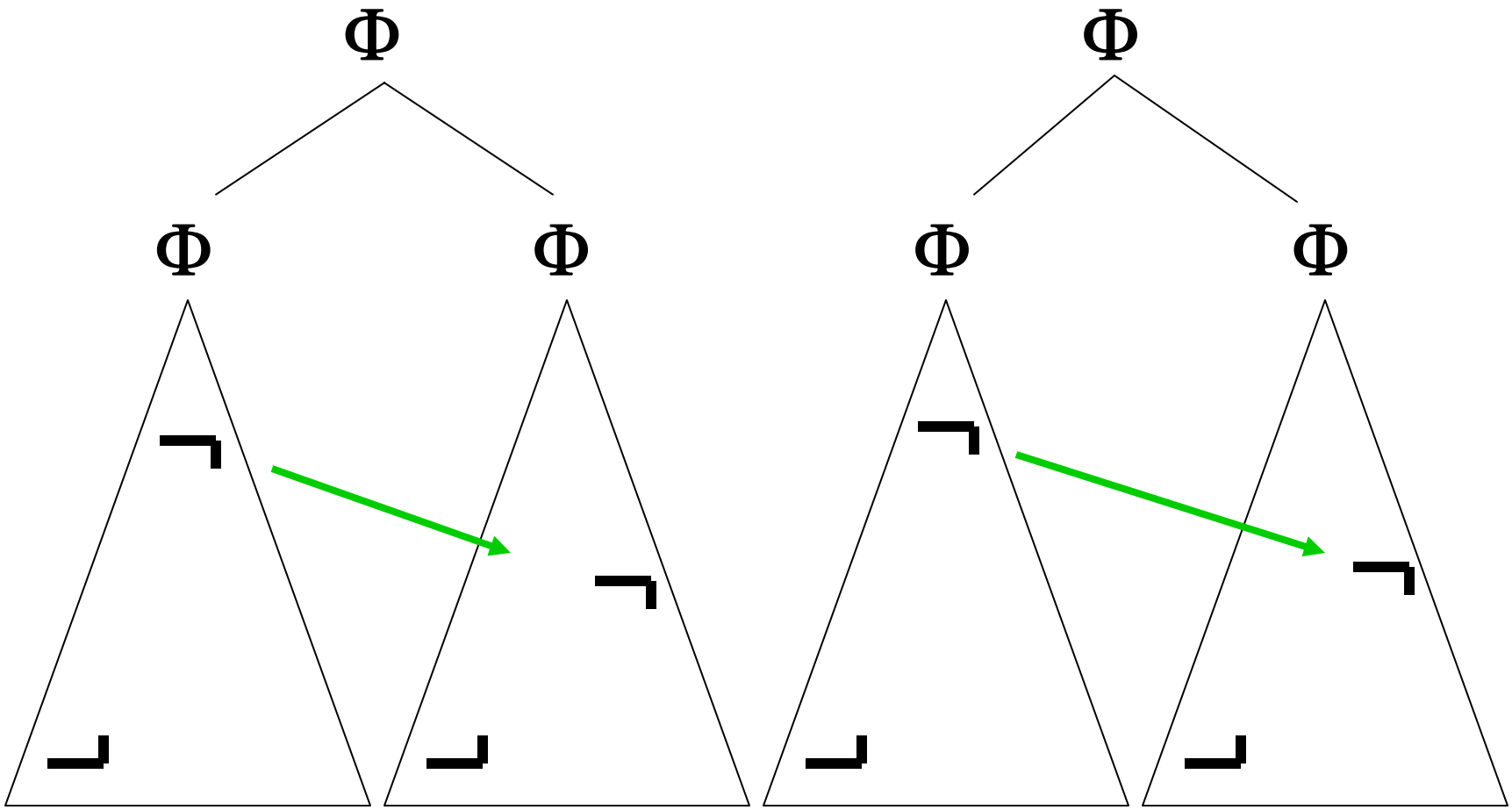


Lowering in all Φ

∴ Lowering applies to EVERY Φ.



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 Φ ("phrase").

The prosodic hierarchy

There is general agreement regarding ...

utterance
intonational phrase

- its upper ranges

"phrase"

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

word
foot
syllable
mora

- its lower ranges

Utterance-level prosody

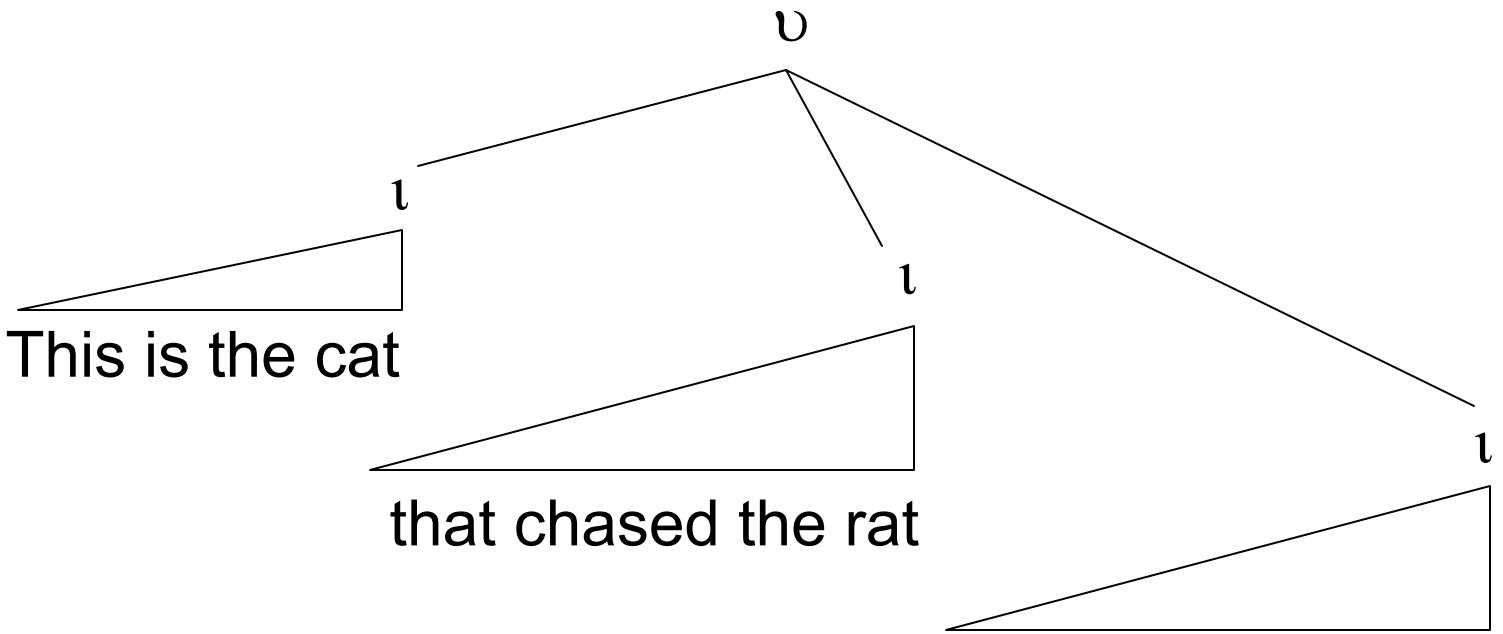
υ utterance

|

ι intonational phrase

– But the relation between υ and ι requires further study, see below.

Utterance-level prosody



This is [the cat that chased [the rat that ate [the cheese]]]

Word-internal prosody

ω prosodic word

|

F foot

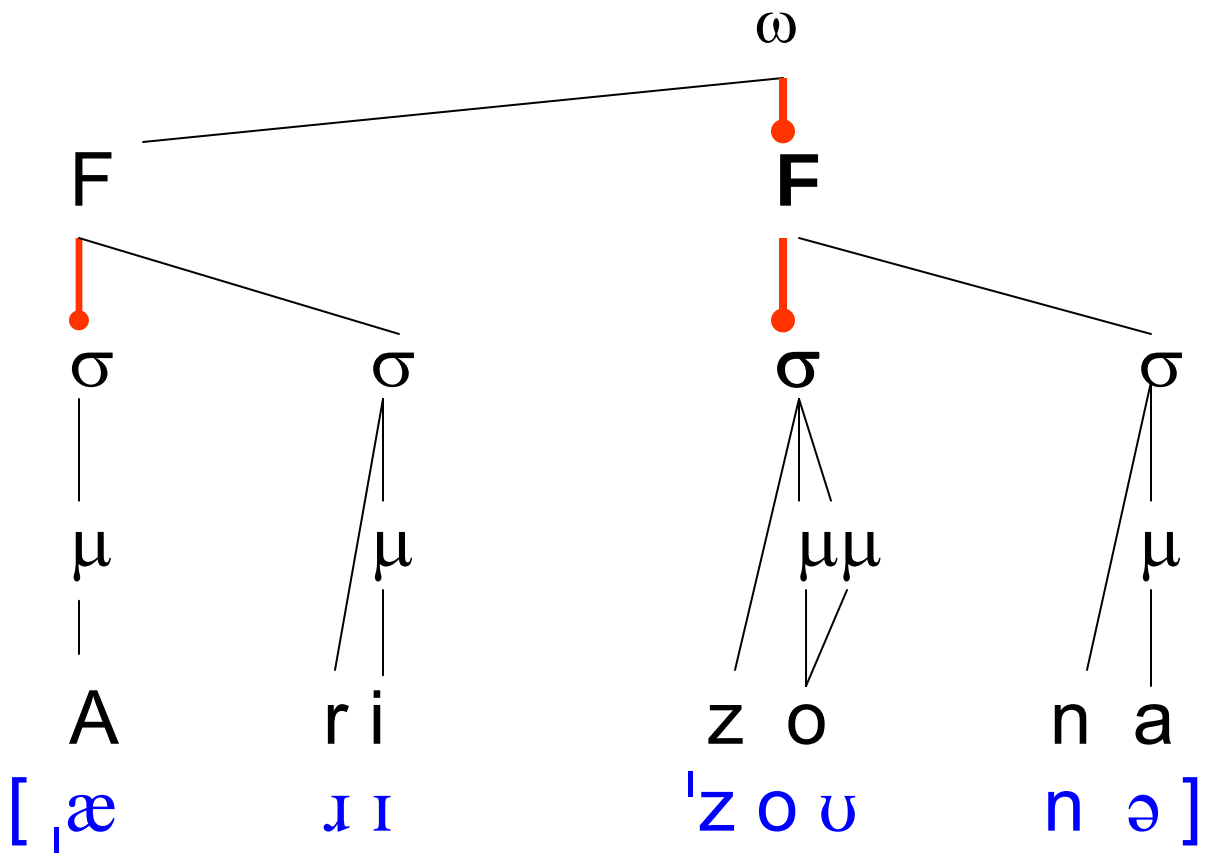
|

σ syllable

|

μ mora

Word-internal prosody



Phrase-level prosody

- The picture is less clear at the phrasal level, in the area between intonation group and prosodic word.
- The standard view (due to Selkirk, Kubozono, Nespor & Vogel, Hayes, Beckman & Pierrehumbert, and 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 criteria
II. Non-universality of categories
III. Lack of cross-linguistic identification

I: Language-specificity

- Categories are sometimes defined in terms of language-specific properties ("accentual phrase", "tone group", etc.).

II: Non-universality of categories

- A universal hierarchy cannot admit language-specific gaps.
  - Cf. syntax: The proposal that the crucial property of 'non-configurational' languages is the absence of a VP has been shown to be wrong (Saito 1985, etc.). The category VP is present in all languages.
- But a number of 'holes' in the prosodic hierarchy have been proposed for particular languages.

II: Non-universality of categories

- 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).

II: Non-universality of categories

- Kawahara and Shinya 2006 demonstrate the necessity of distinguishing υ, ι, and Φ in Japanese, as predicted by the assumption of universality.

III: Lack of cross-linguistic Identification

- How can we reliably identify categories across languages?
  - Does the α-phrase of language A correspond to the α-phrase of language B?
  - Or does it correspond to the β-phrase of language B?
  - See Selkirk 2005 and Truckenbrodt 2006 for related discussion.

Proposal here

υ	utterance	*upper-range categories*
ι	intonation group	

Φ	phrase
ω	word

mid-level categories:

Universal phonology provides only TWO categories

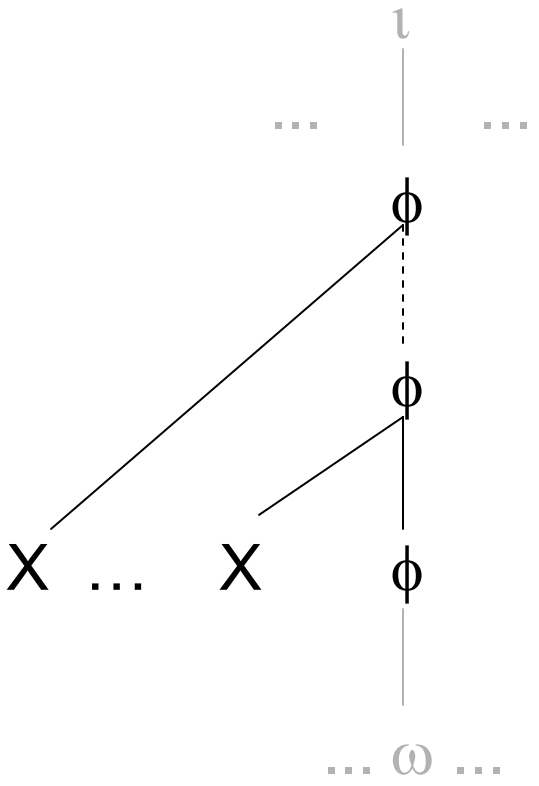
F	foot	*word-internal categories*
σ	syllable	
μ	mora	

Proposal here

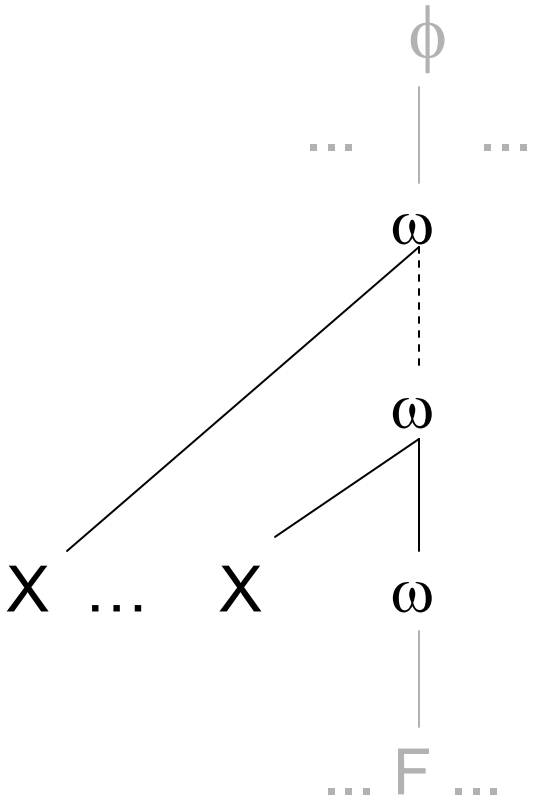
- Additional layers arise through prosodic adjunction to these two categories (recursion).
- They do not constitute further distinct categories.

Prosodic recursion

- ϕ-adjunction

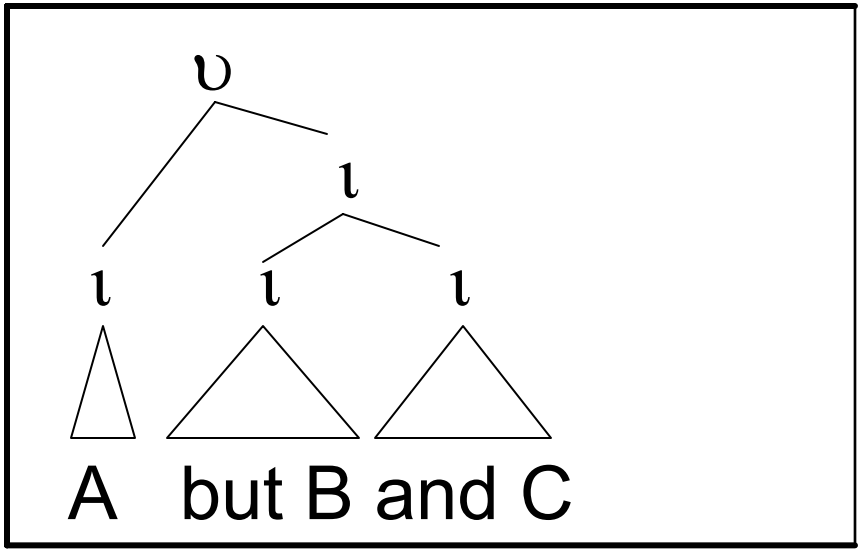


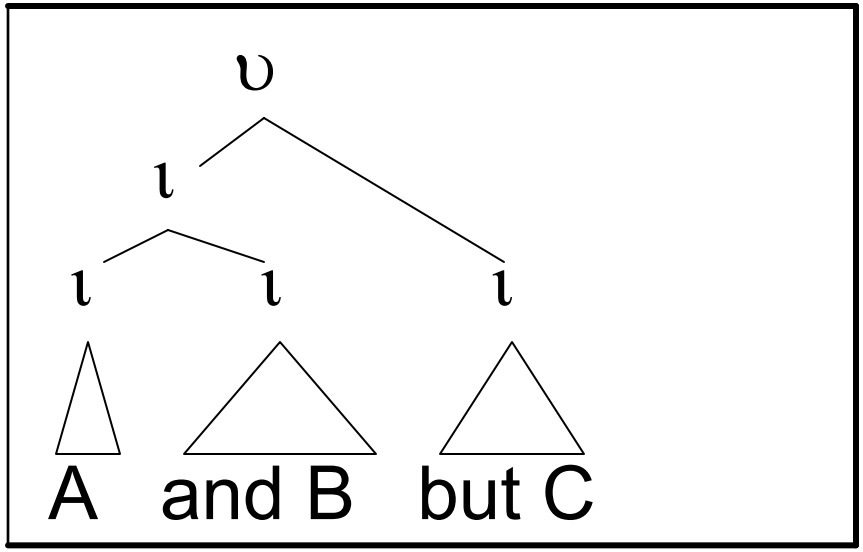
- ω-adjunction



Recursion in prosodic structure

- Ladd (1986, 1988) shows that nested coordinate constructions form recursive ι-structures:



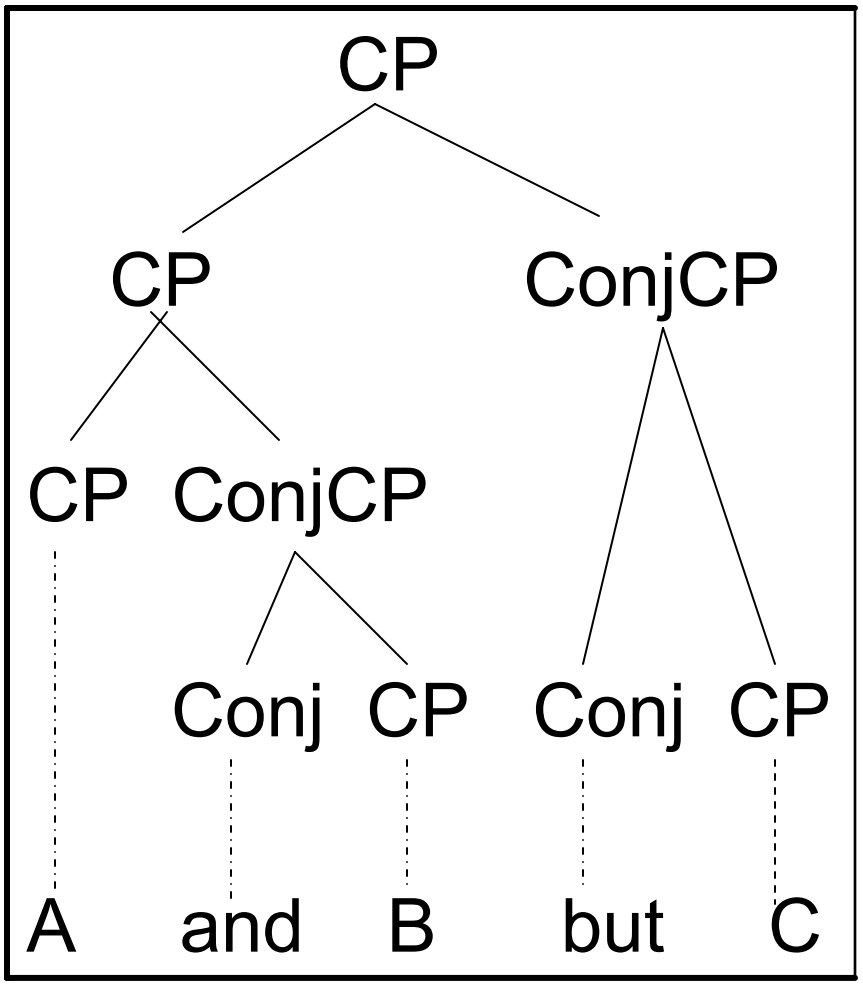


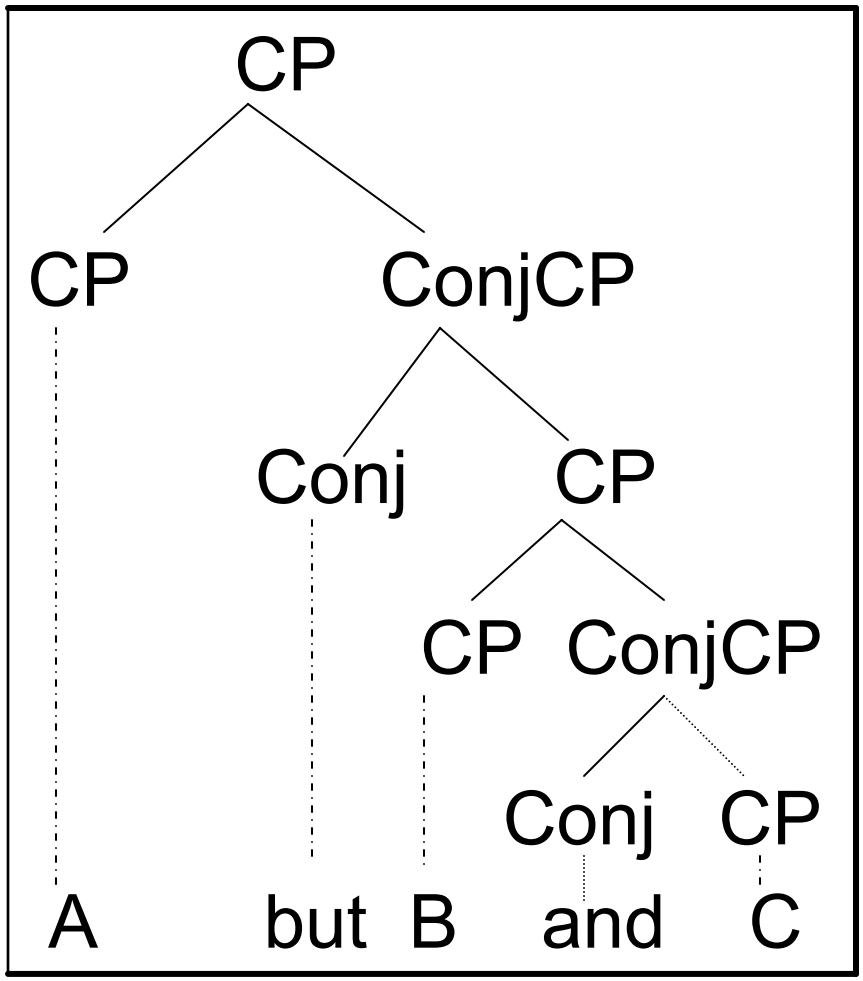
Recursion I: Intonational phrase

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

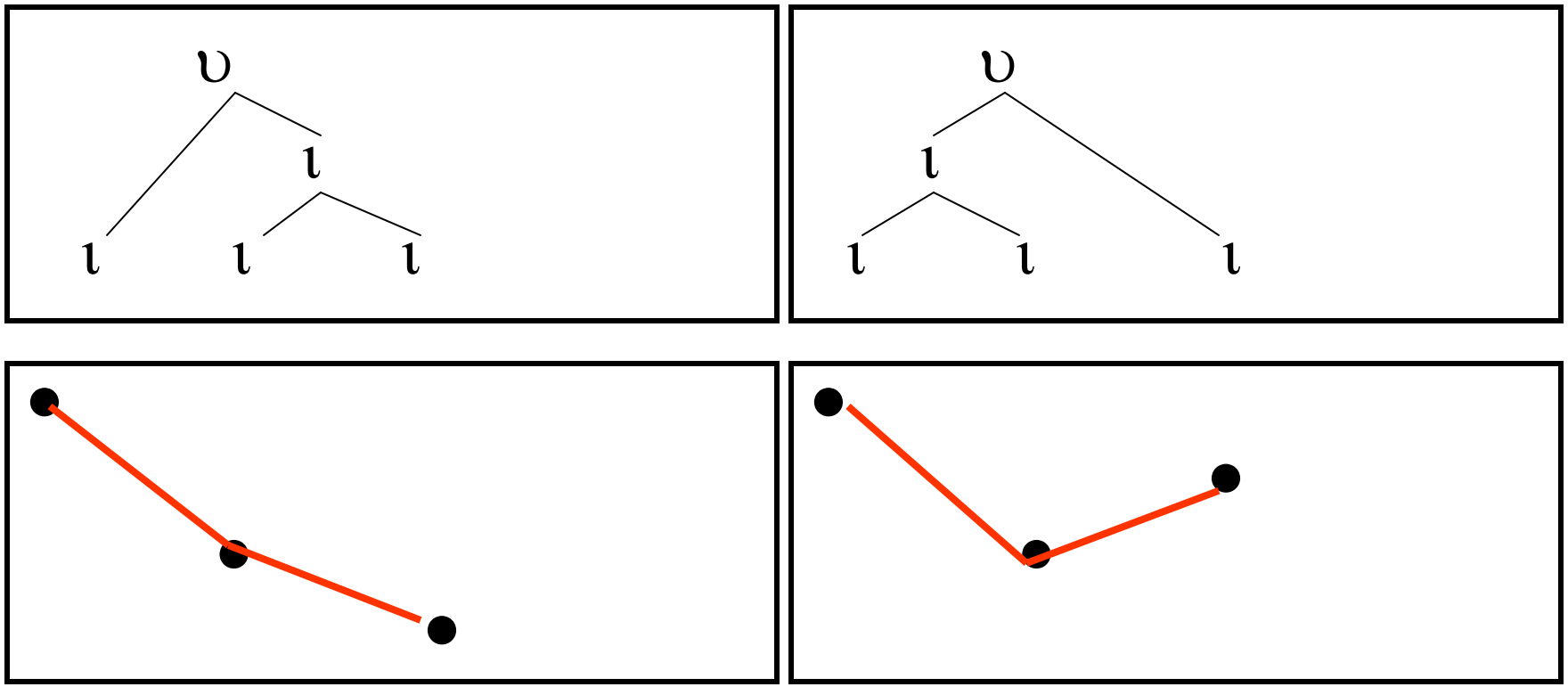
- (Obama is a stronger campaigner, and Edwards has more popular policies,) but Clinton has a lot more money.

Syntactic structure





Evidence: Scaling of downstep



A but (B and C)

(A and B) but C

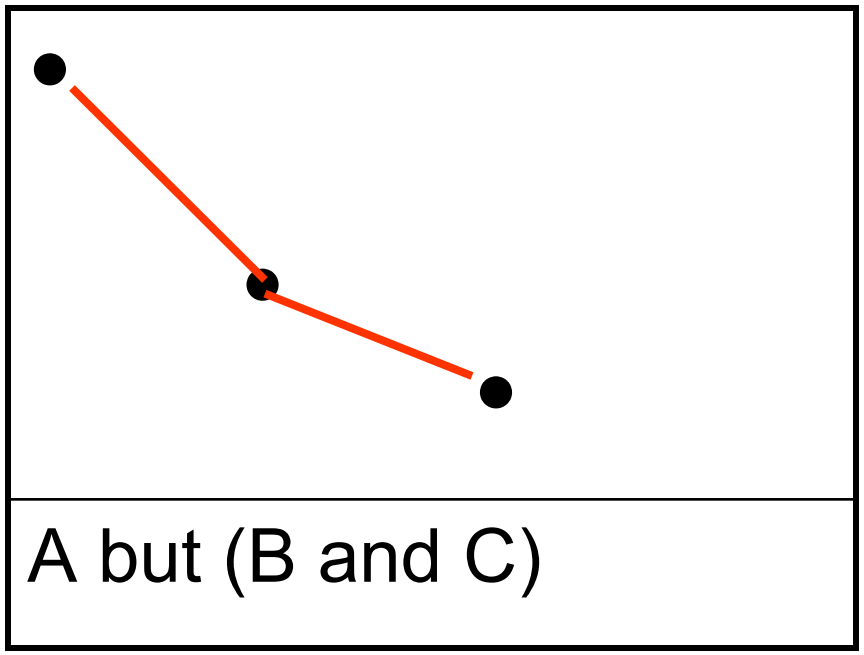
(schematized pitch contours)

Downstep in recursive coordinate structures

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

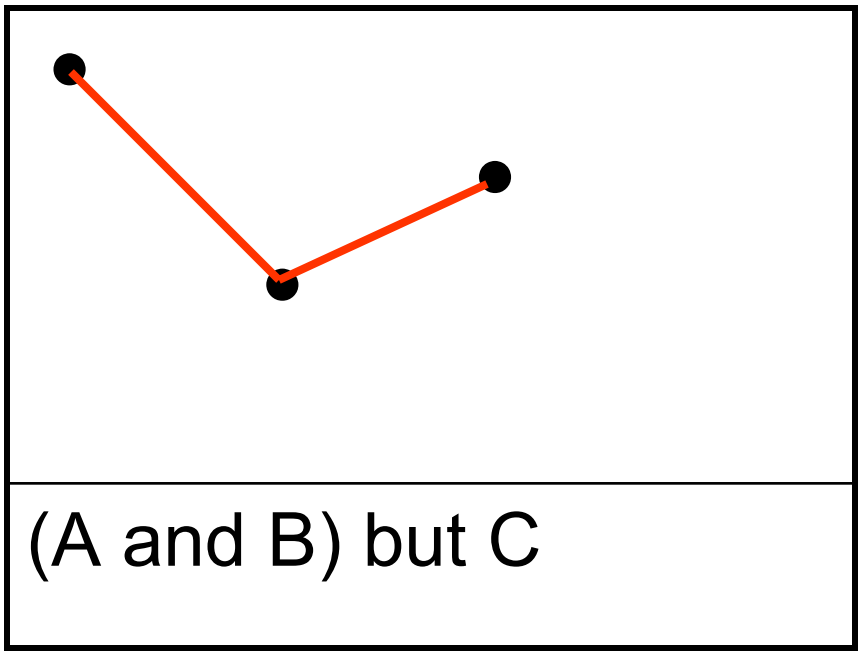
- “Downstep”: The highest peak in the second conjunct is lower than the highest peak in the first conjunct.

A but (B and C)



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

(A 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*.

Other work

- Further development, with additional evidence, in Kubozono (1988/93, 2005), van den Berg, Gussenhoven, and Rietfeld 1992, Truckenbrodt 2002, and Féry and Truckenbrodt 2005.
- Extensive study and motivation of recursive structures in prosody in two recent dissertations: Wagner 2005 (MIT), Schreuder 2006 (Groningen).

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

★ ∅ ★

[$_{\Phi}$ àardrijkskundig genóotschap]

‘geographical society’

★

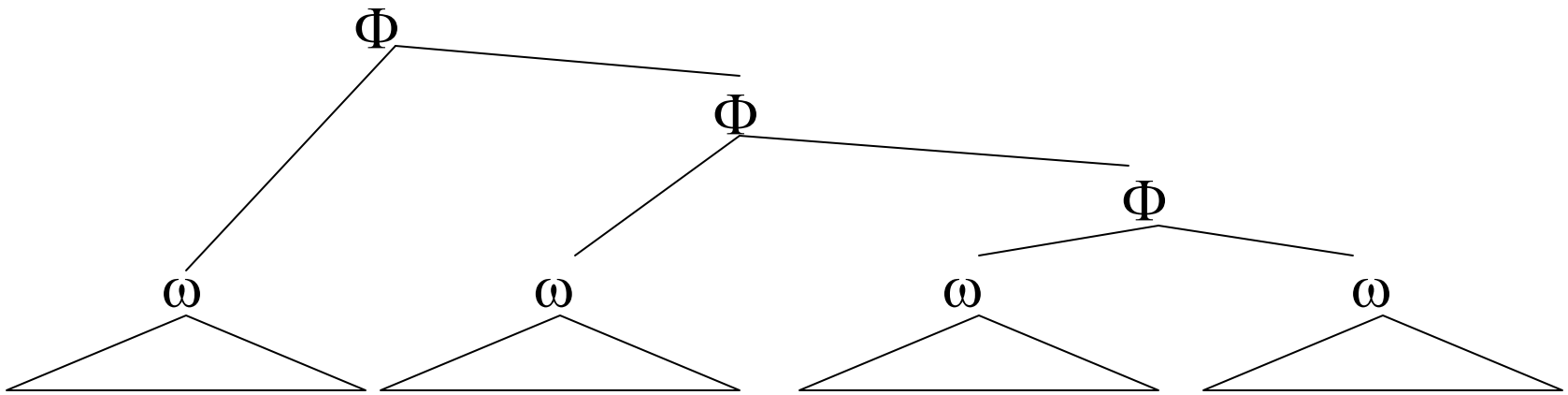
cf. aardrijkskúndig

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



★ ★ ★ ★

$_{\Phi}$[ònafhankelijk $_{\Phi}$[Àmsterdams $_{\Phi}$[àardrijkskundig genóotschap]]]

‘Independent Amsterdam Geographical Society’

★ ★ ★

cf.: onafhánkelijk, Amsterdám, aardrijkskúndig

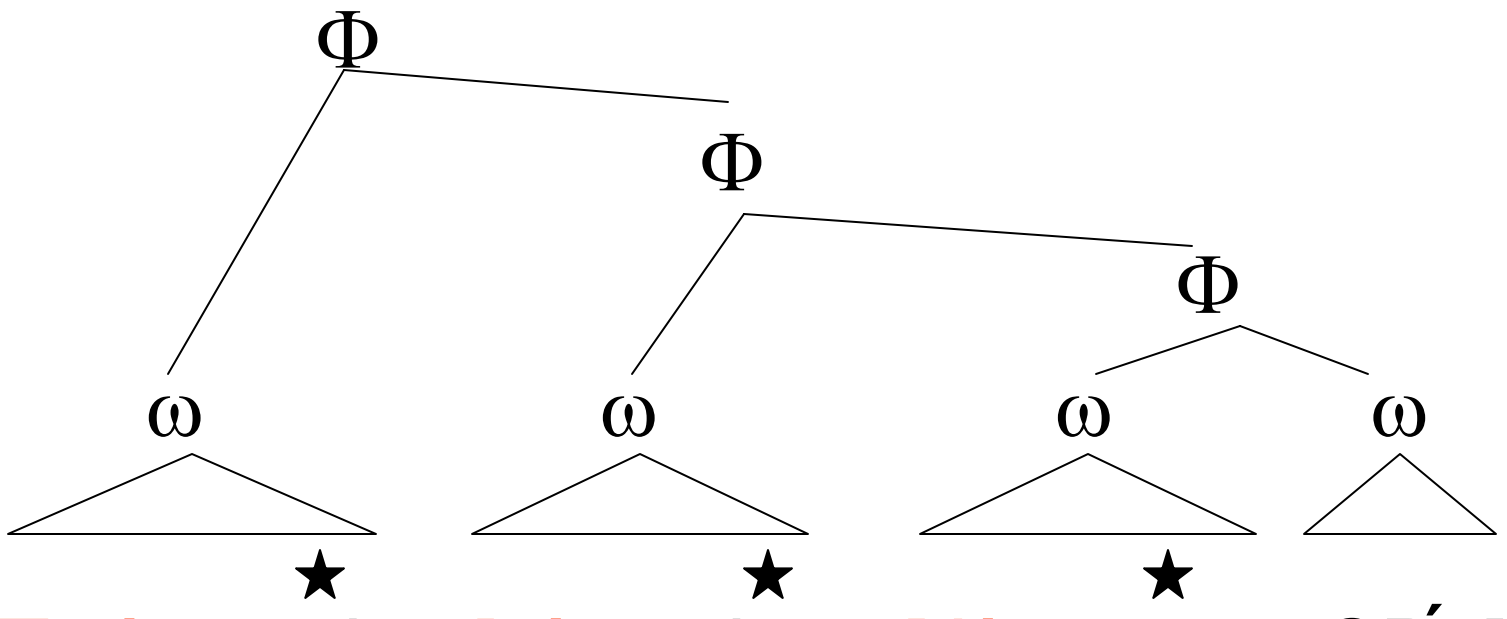
Recursion II: phonological phrase

- Gussenhoven 2005 independently proposes such recursive Φ-structures for English prenominal modifier constructions:

  Twènty-six vèry nice Jàpanese CDś

- Main argument:
- Their Rhythm Rule behavior shows that they are procliticized: preceded, but not followed, by a Φ-boundary.

Recursion II: phonological phrase



$_{\Phi}$[Twènty-six $_{\Phi}$[vèry nice $_{\Phi}$[Jàpanese CD́s]]]

Summary of proposal so far

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

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

Part II: Relations

(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".

Maximal and minimal projections

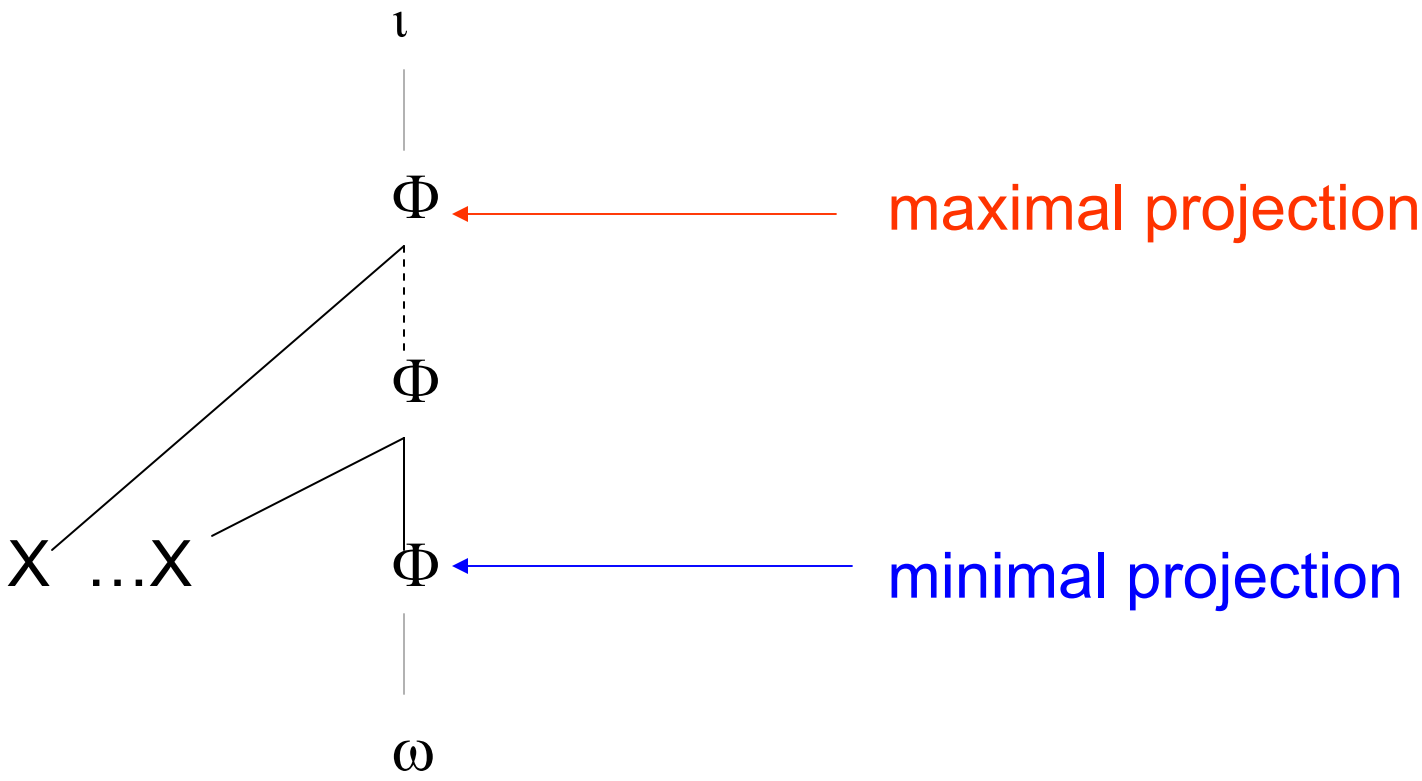
Using standard tree-structural terminology:

- the largest projection of a prosodic category κ is the “maximal κ”,
- its smallest projection is the "minimal κ“.
- More formally:

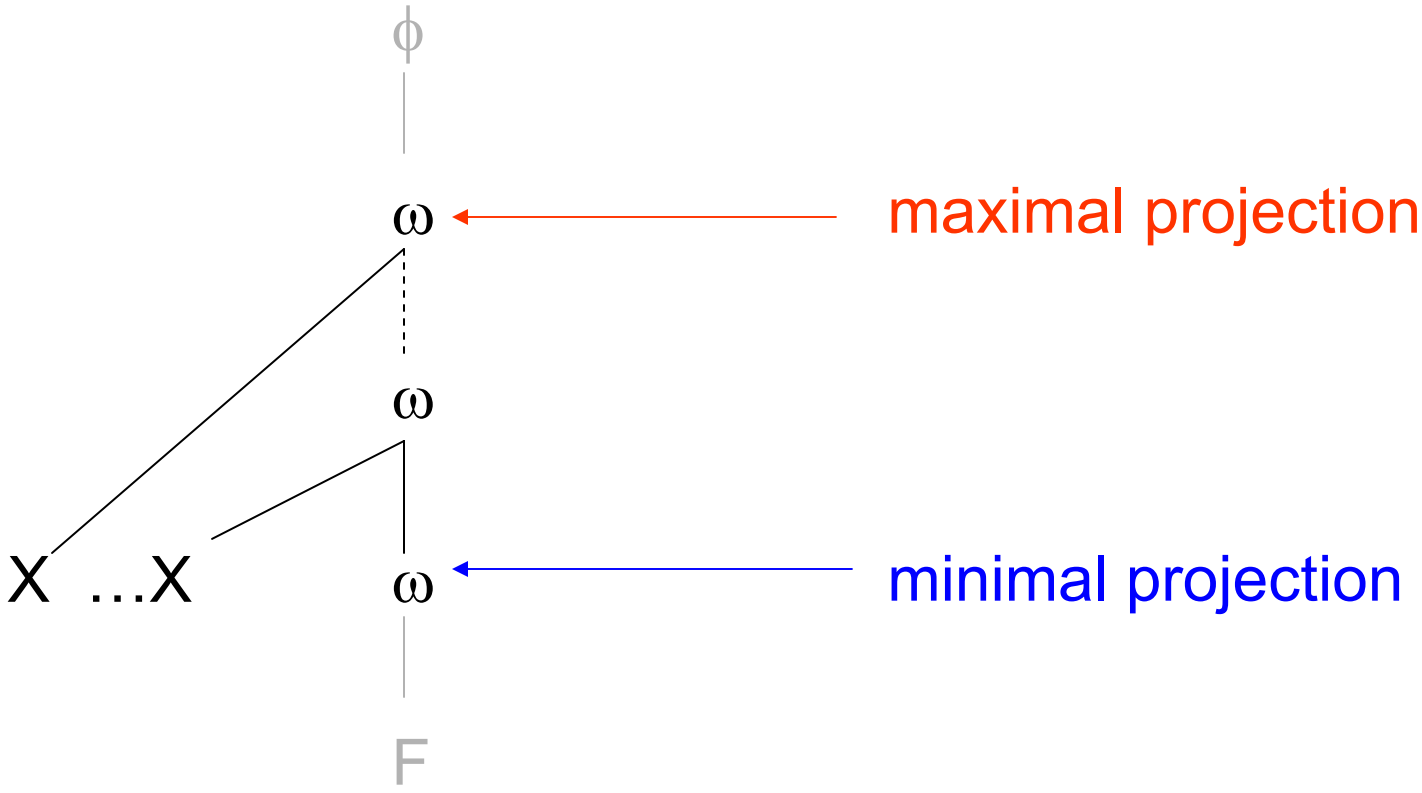
  $\kappa_{max} =_{def}$ κ not dominated by κ

  $\kappa_{min} =_{def}$ κ not dominating κ

Prosodic adjunction: phrase level

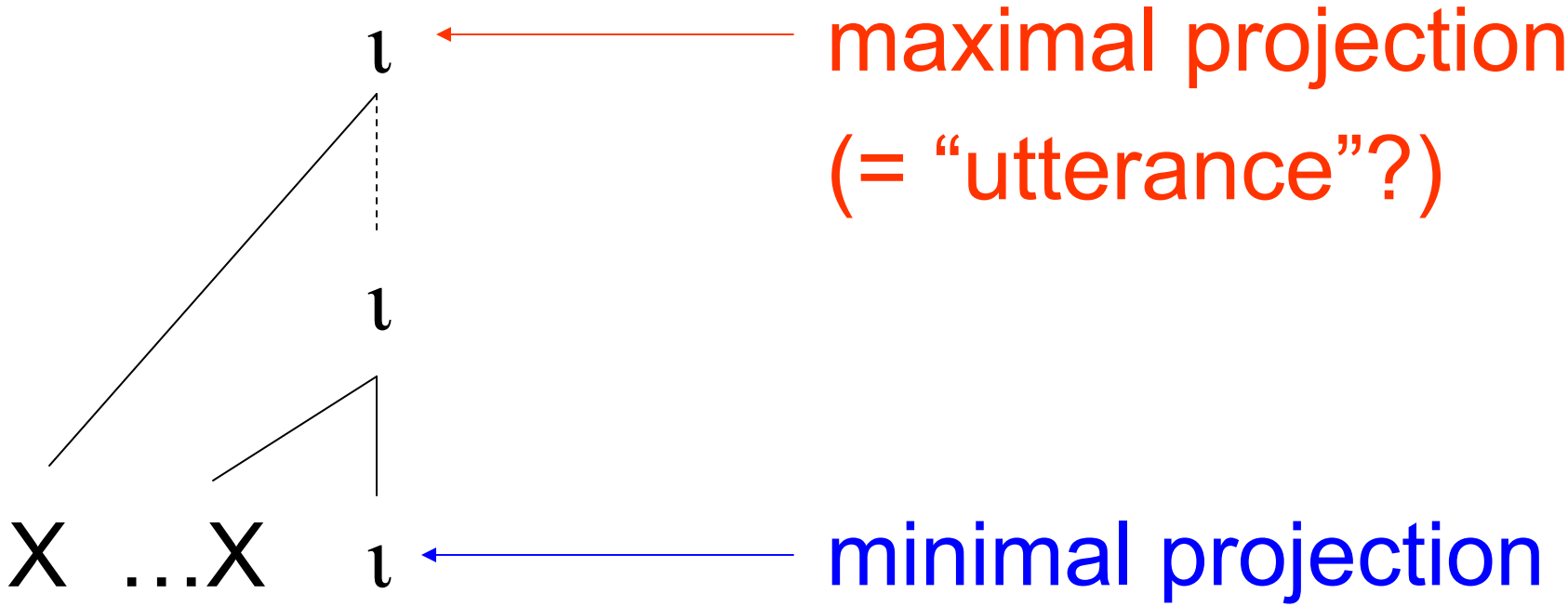


Prosodic adjunction: word level



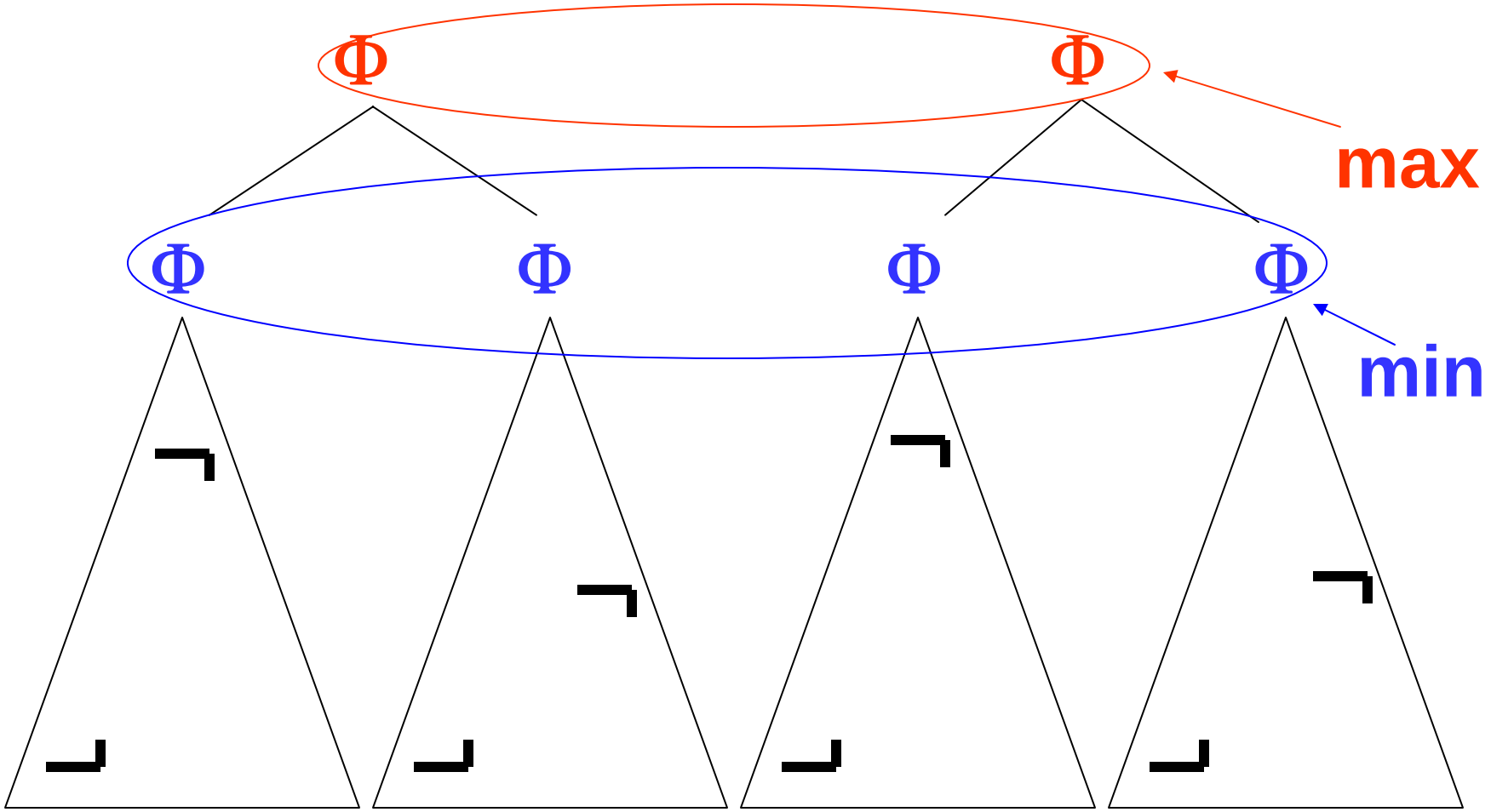
Further extensions

"Utterance" as maximal projection of ι?

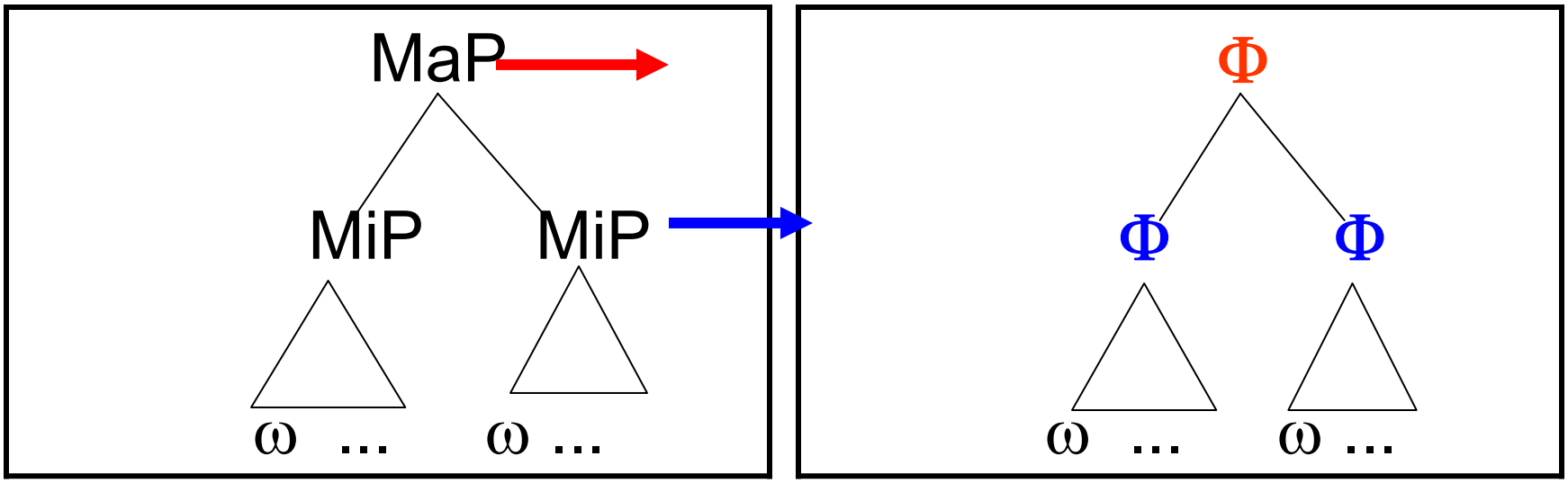


See also Kawahara and Shinya 2006 on ι and υ in Japanese.

Maximal and minimal instantiation of Φ



MiP/MaP vs. maximal-Φ/minimal-Φ



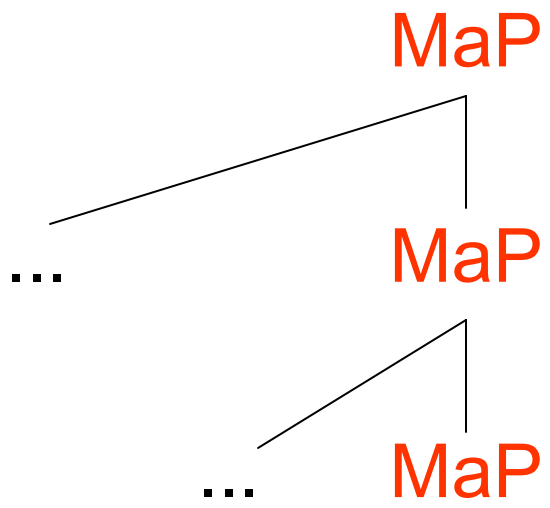
- In specific instantiations,
- MaP often corresponds to maximal Φ,
  MiP to minimal Φ.

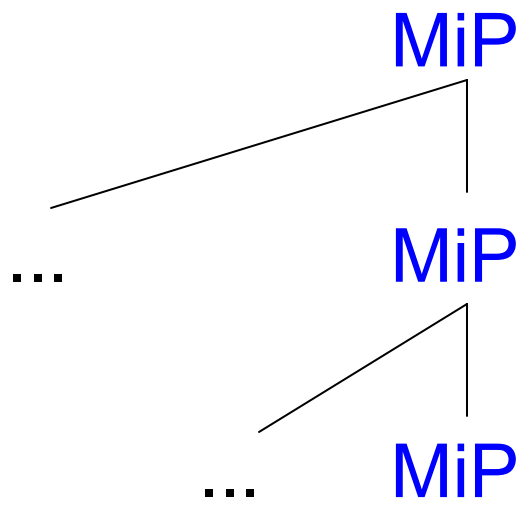
MiP/MaP vs. maximal-Φ/minimal-Φ

- 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.

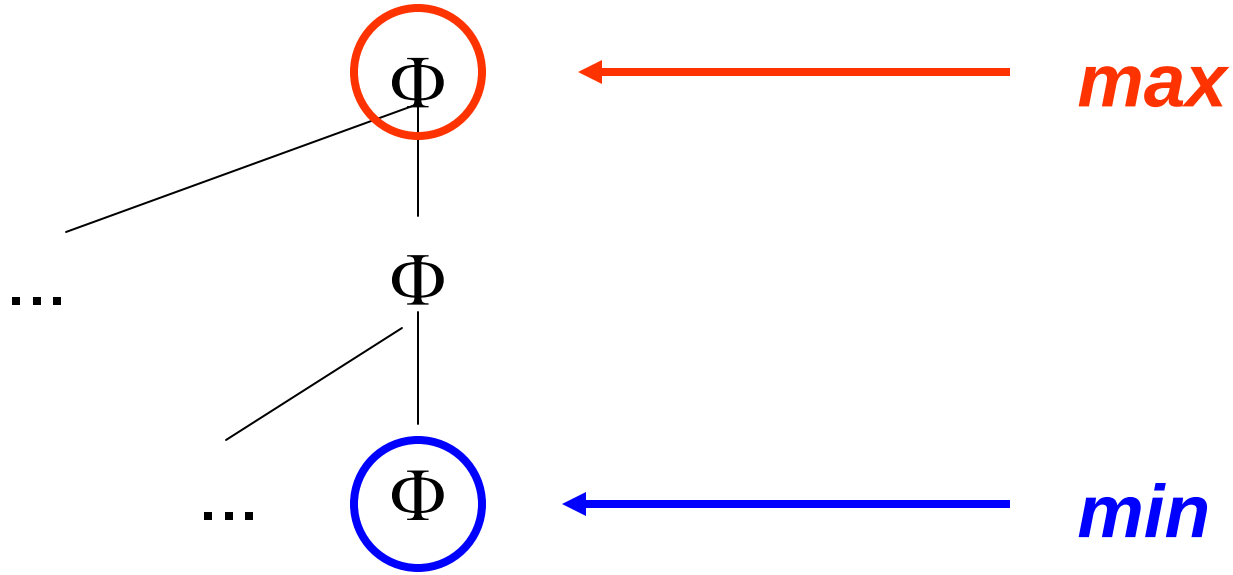




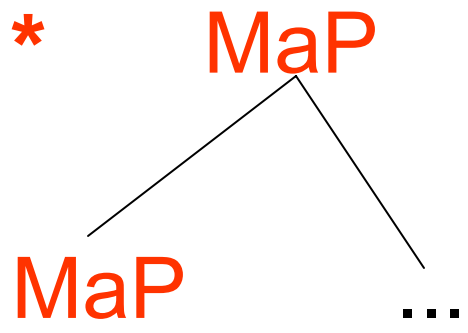
Inherent restrictiveness of the Φ-only model

No such possibility for maximal and minimal Φ.

There can only be **one maximal** and **one minimal** instantiation in every projection.



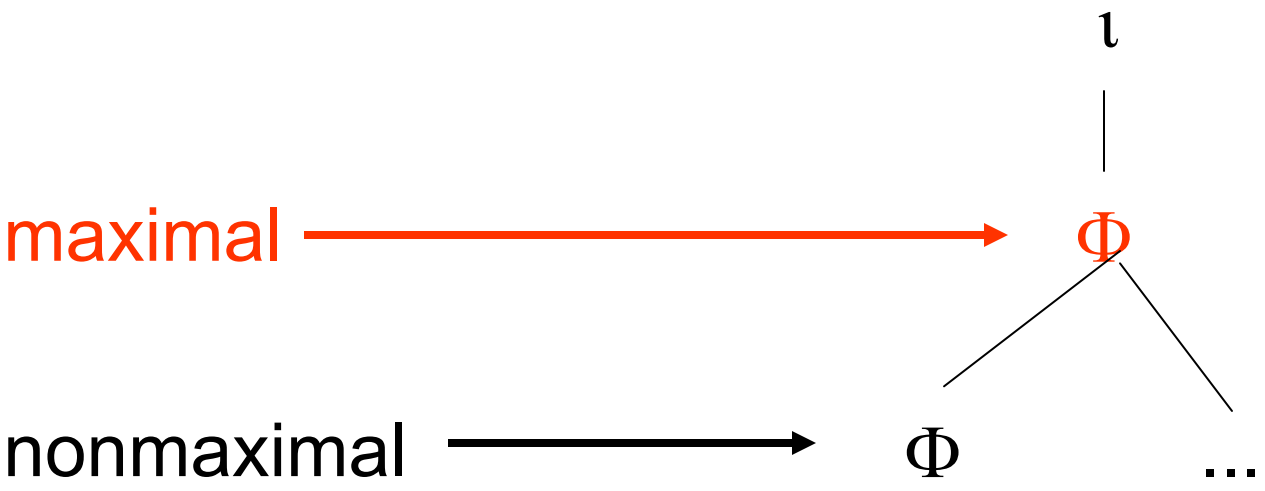
Nested MaP's disallowed in English



- 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" ≈ maximal Φ , this follows automatically without invoking other constraints or ranking.
- There can be no such thing as a "recursive maximal Φ."

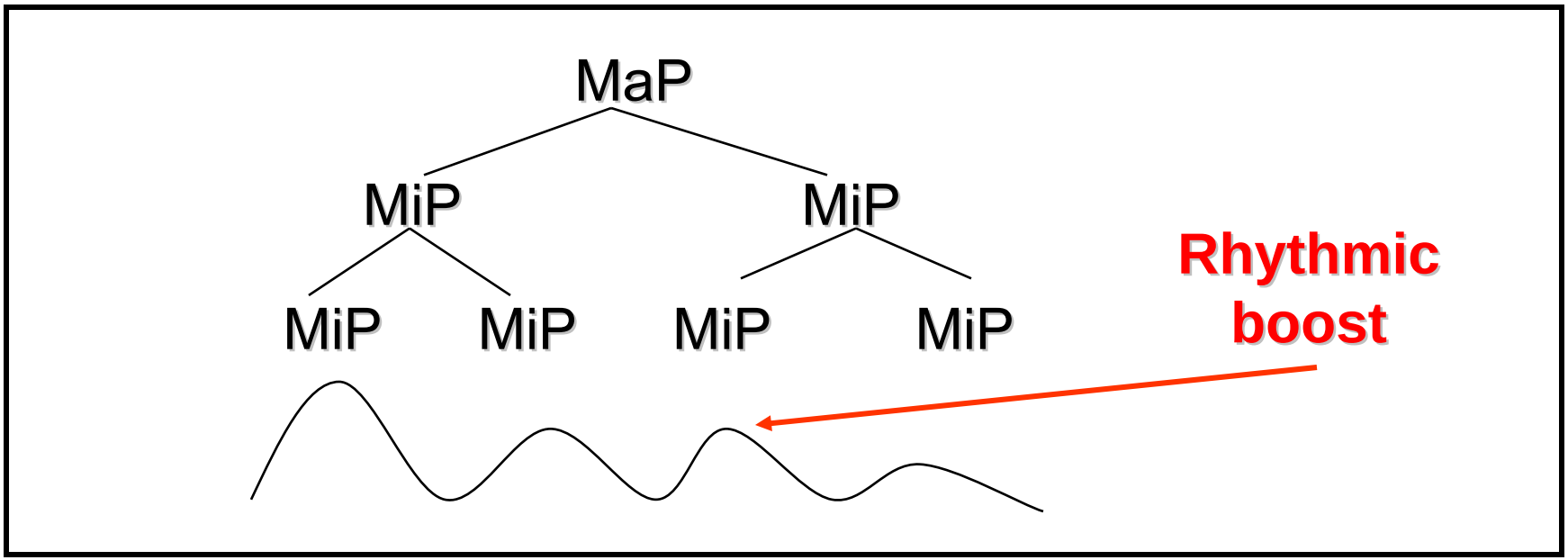


MiP-MaP approach provides too little structure

- 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.

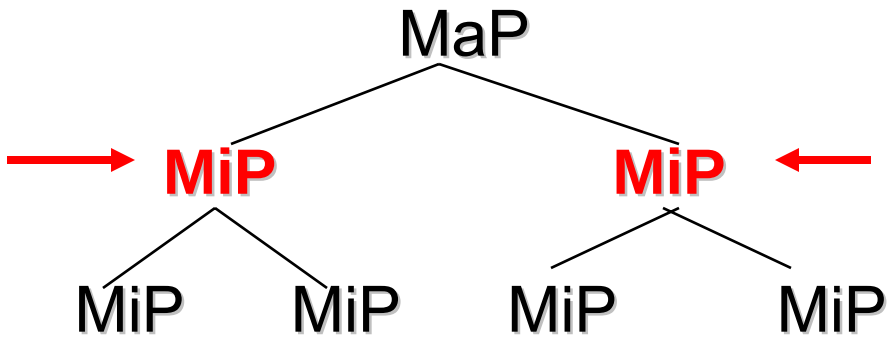
Recursive MiP in Japanese?



[[[náoko-no][áni-no]] [[aói] [erímaki]]]

‘(I saw) Naoko’s brother’s blue muffler’

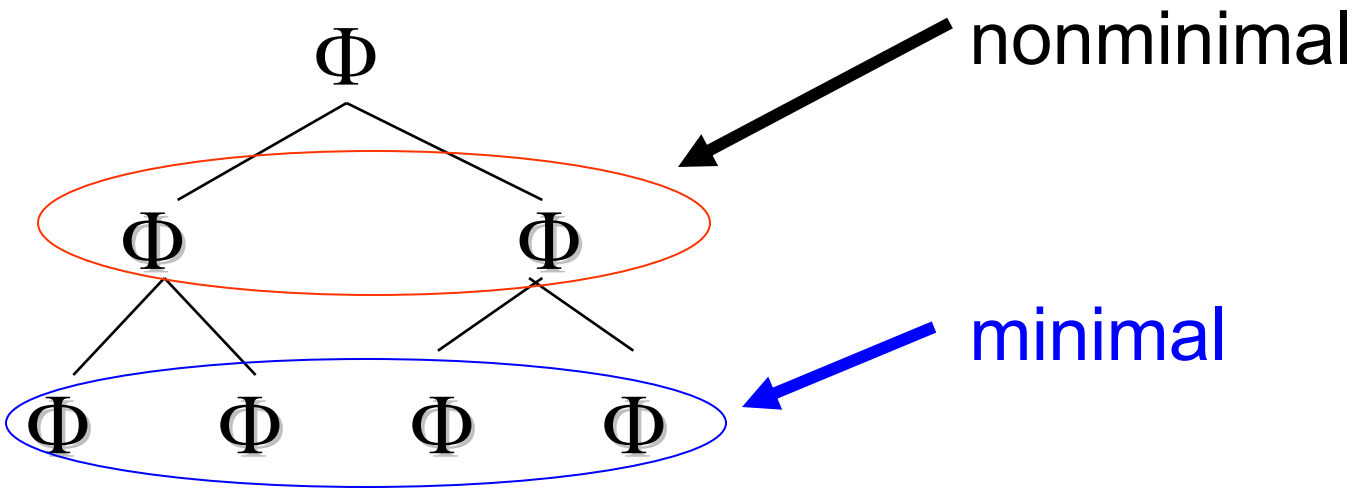
A problem for recursive MiP



- 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 Φ-only model

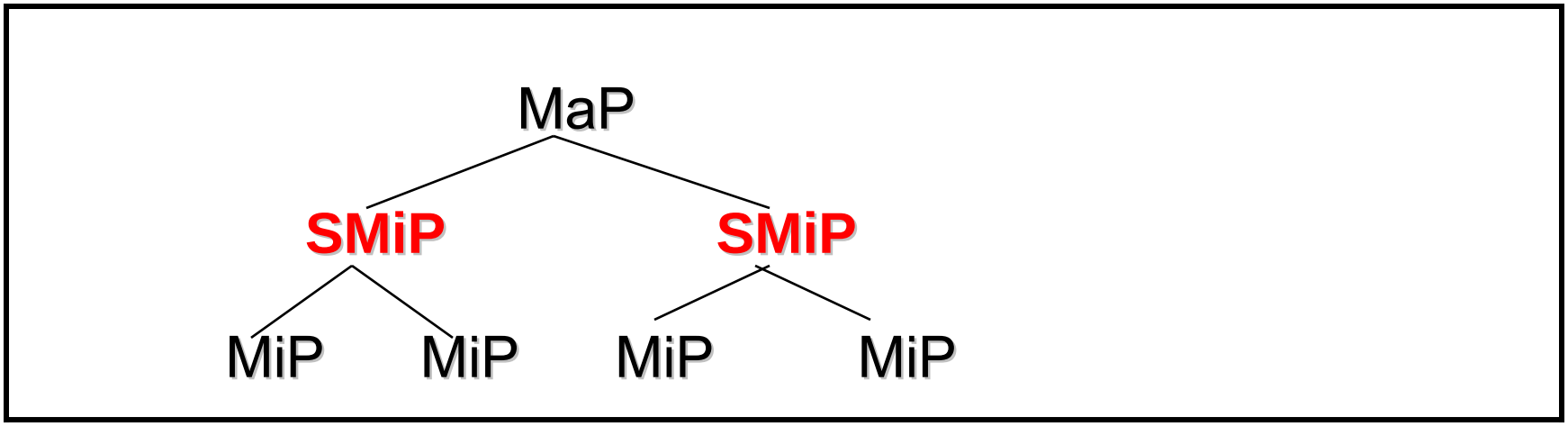
- In the **Φ-only model**, the issue does not even arise:
- The one-accent requirement holds of minimal Φ.
- The intermediate branching Φs are non-minimal,
- hence the requirement does not apply.



Reponse of MiP-MaP theory: add more categories

- Shinya, Selkirk, and Kawahara 2004 introduce an extra category, “SMiP” (“Superordinate Minor Phrase”), between MiP and MaP.

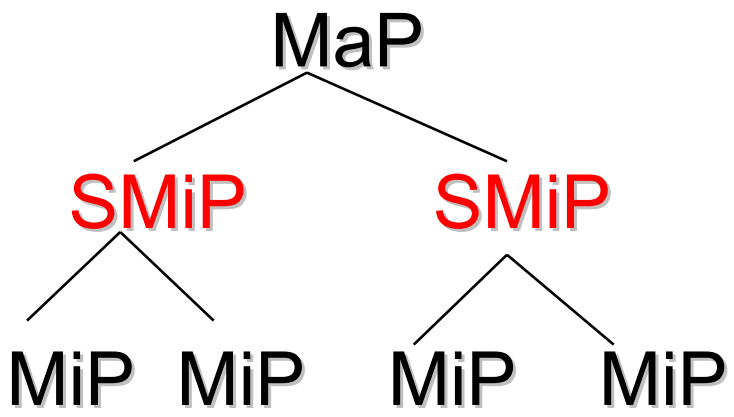
Reponse of MiP-MaP theory: add more categories



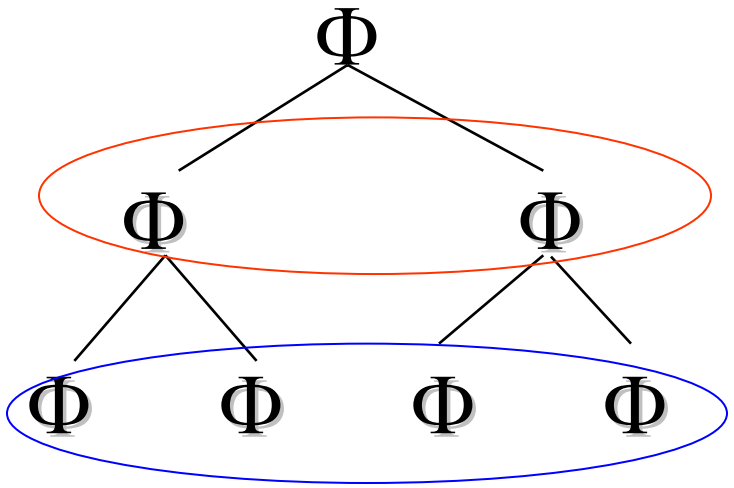
- SMiP = “Superordinate Minor Phrase”
- The one-accent requirement is assumed to hold only of MiP, not of SMiP.

Comparison

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



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



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.

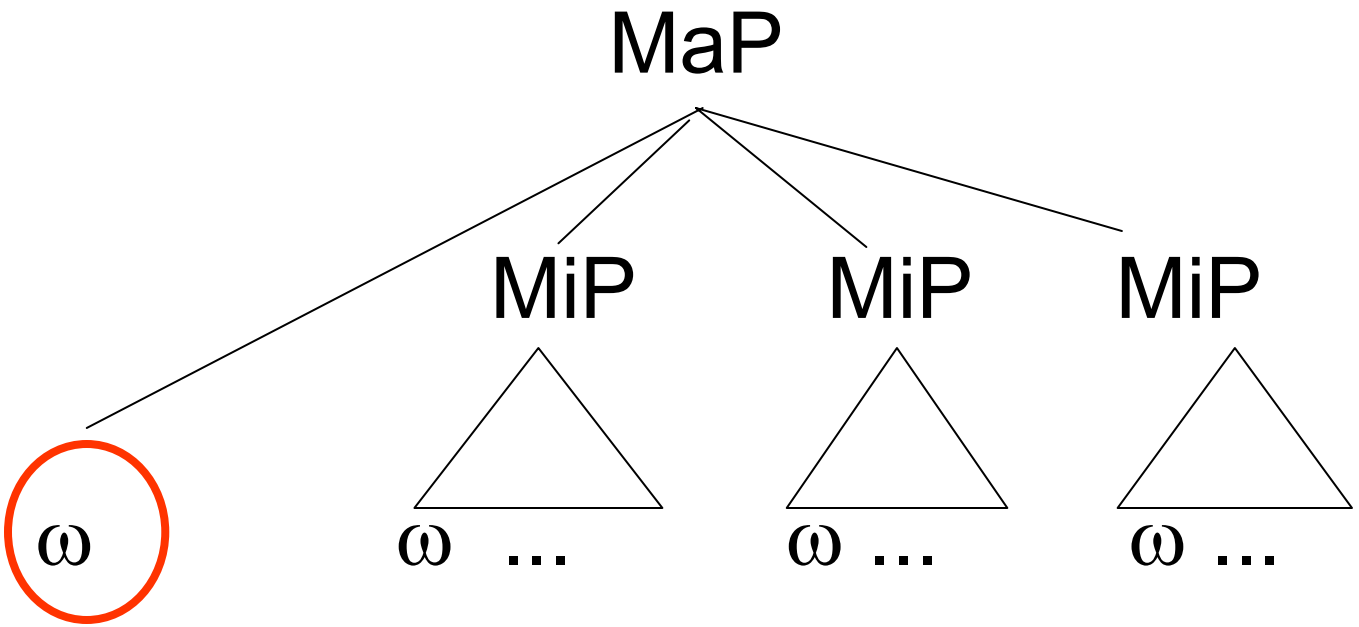
Initial Lowering

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

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

Initial Lowering

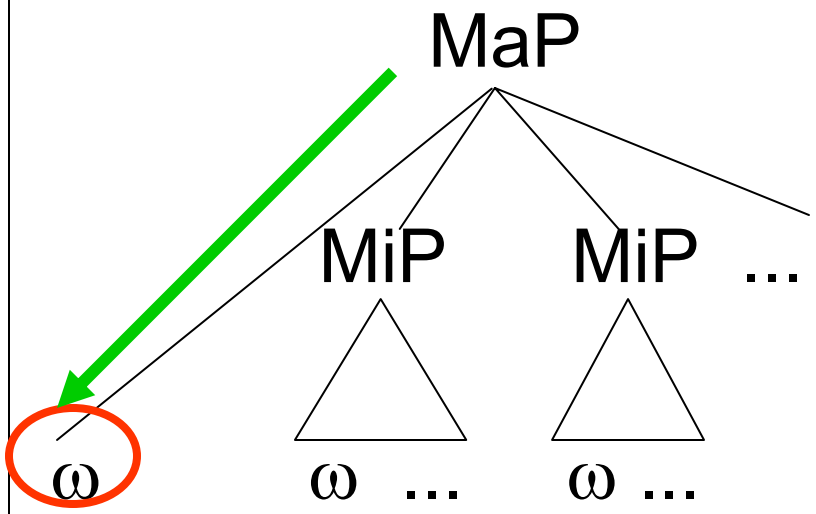
- The two theories make different predictions when MaP does *not* begin with MiP:



Initial Lowering predicted?

MiP-MaP:

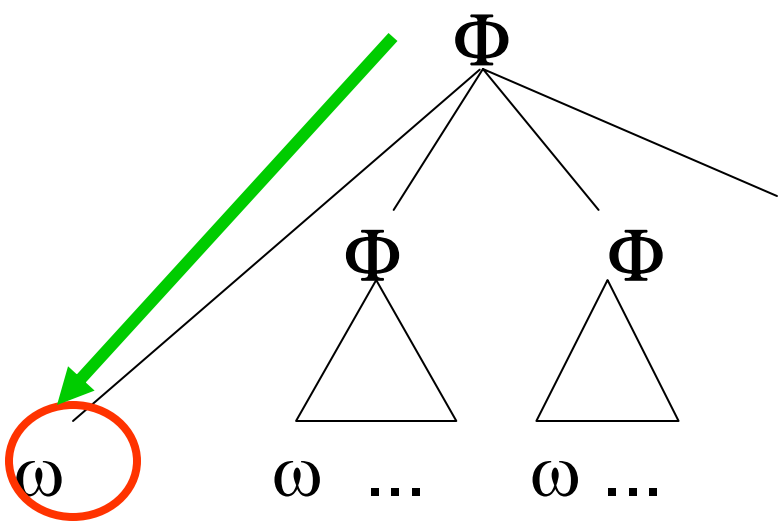
No, since *not* MiP-initial



☹ Incorrect prediction

Φ-only:

Yes, since Φ-initial



☺ Correct prediction

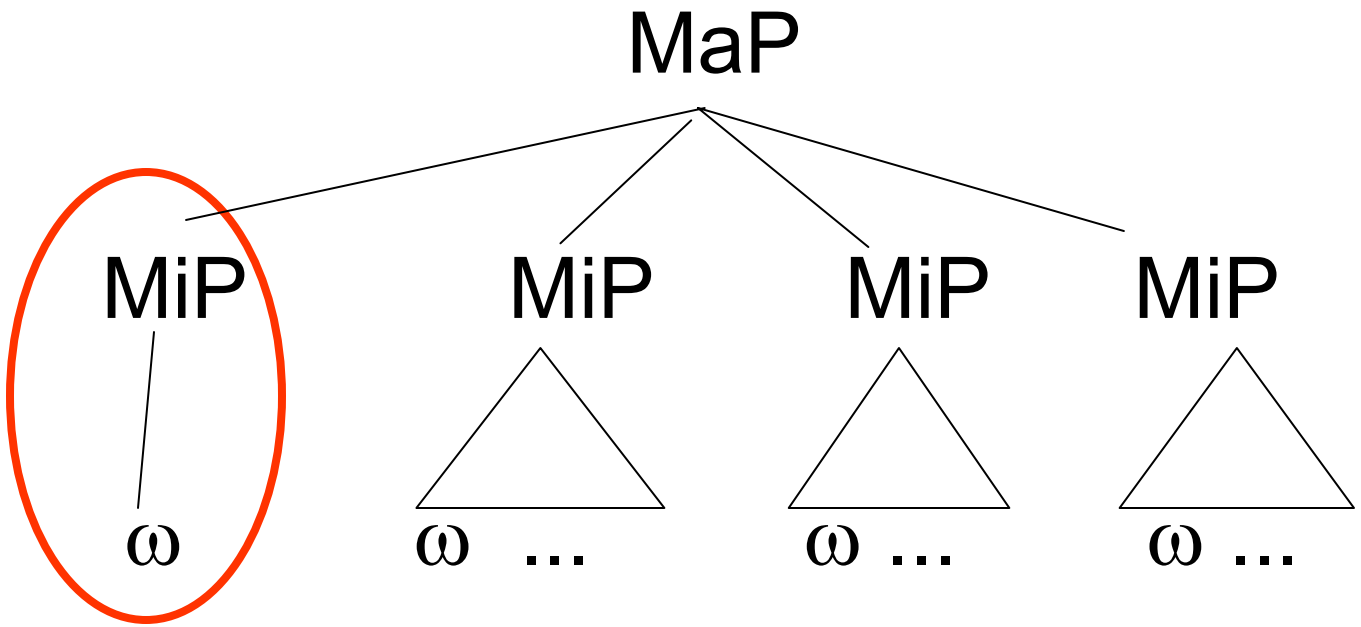
MaP-initial Lowering

- 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?
- **Φ-only approach**: Lowering occurs at the beginning of all Φ, and more strongly at the beginning of a maximal Φ.
- **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.

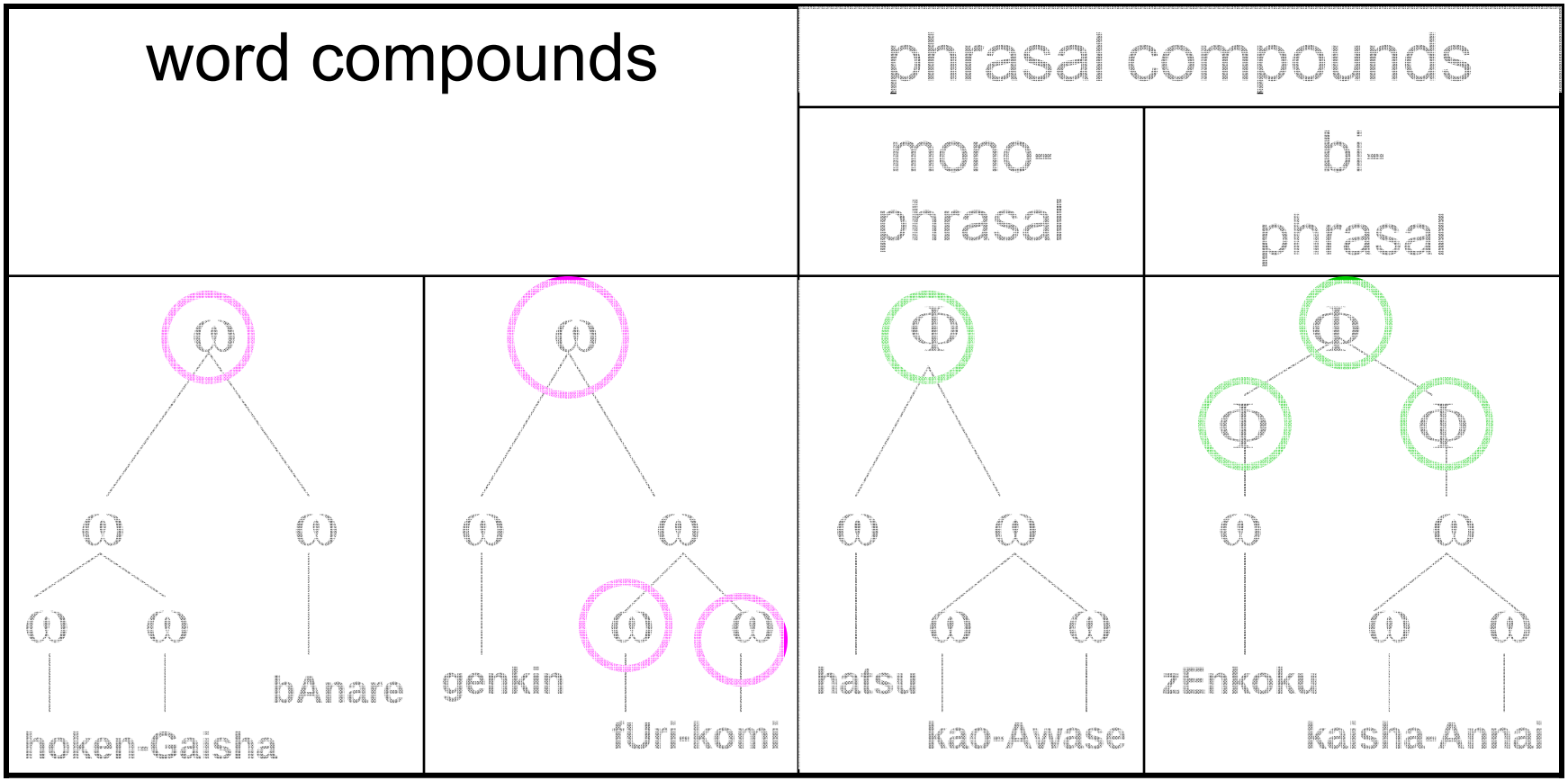
(iv) Stipulated left-alignment of MaP to MiP.

Note: (ii)-(iv) point to strict layering.

Case Study: Typology of Japanese compounds

- Adjunction to Φ and ω
- Minimal projections
- Maximal projections
- Heads
- Binarity constraints

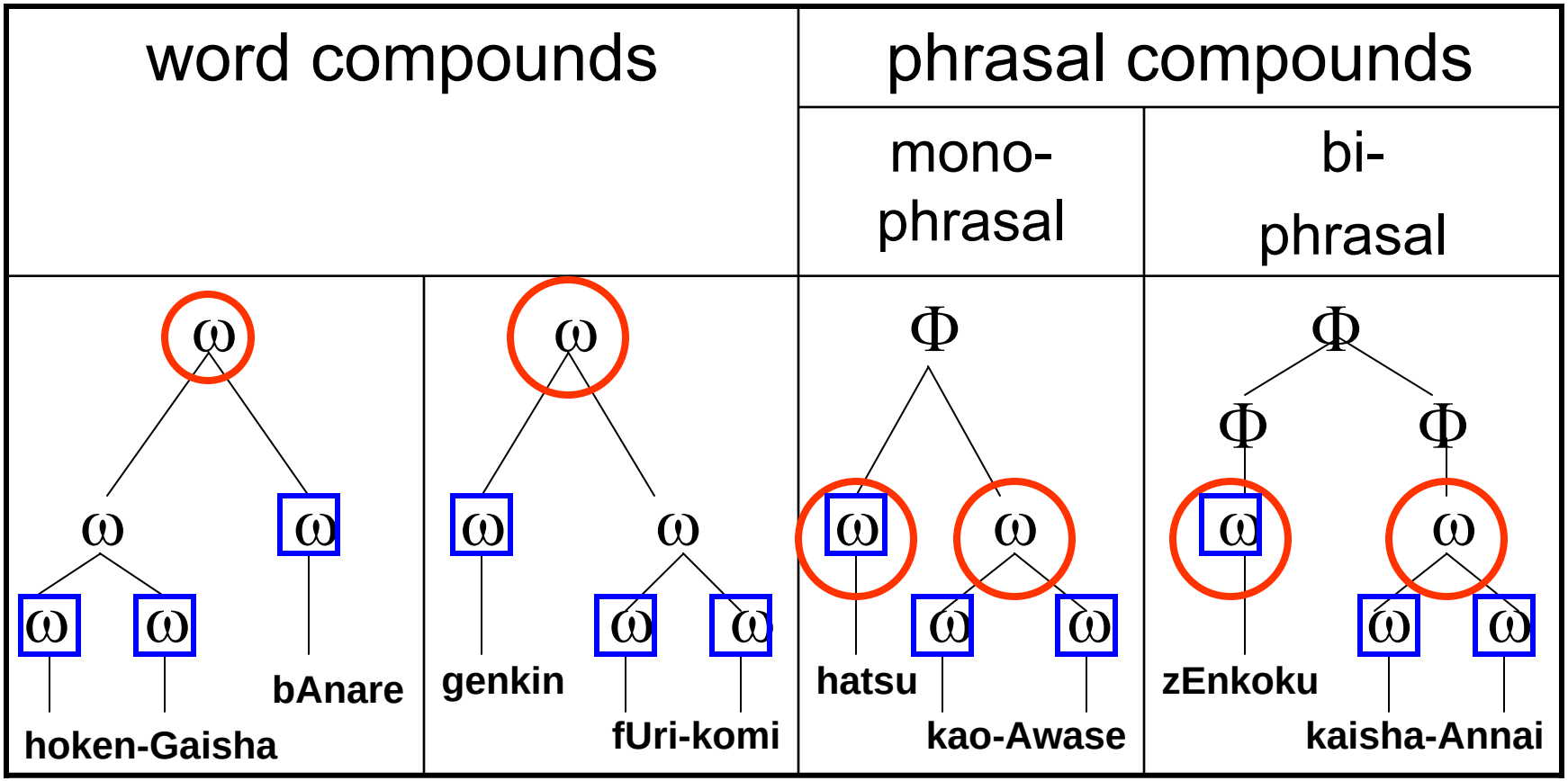
Prosodic typology of compounds



Properties of branching compounds

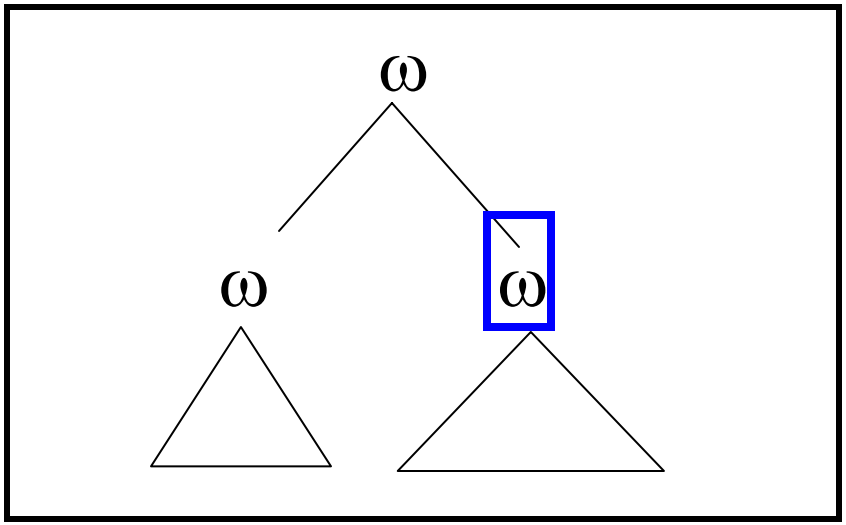
Compound Type	word compounds		phrasal compounds	
rendaku	Yes	No	No	No
junctural accent	Yes	Yes	No	No
deaccenting	Yes	Yes	Yes	No

Minimal and maximal projections of ω



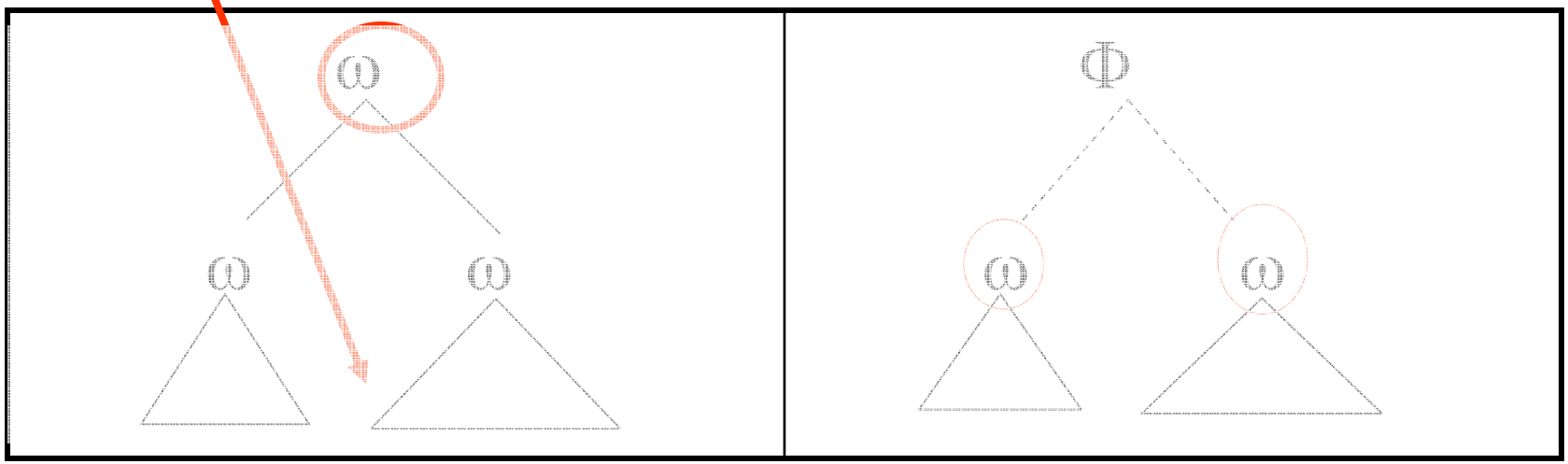
Minimal ω-projections : rendaku

- Rendaku is restricted to minimal ω-projections.
- It is excluded in higher projections—i.e., in positions which simultaneously initiate two ω-constituents.



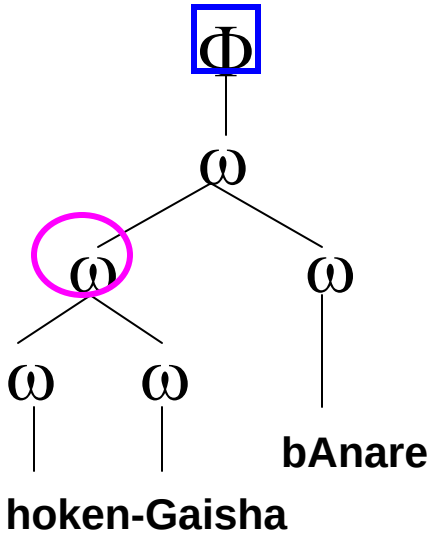
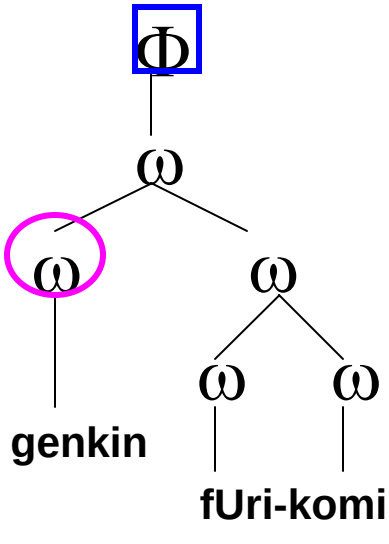
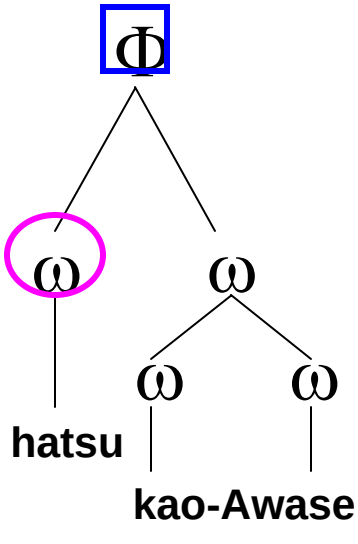
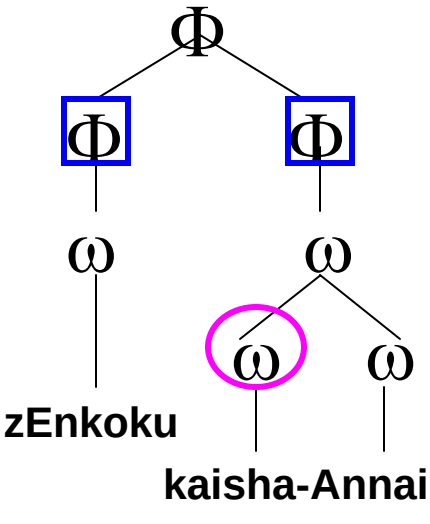
Maximal ω-projections: junctural accent

- Junctural accent is found in word compounds, not in phrasal compounds.
- The locus of the compound accent is the internal juncture of a maximal ω.



Minimal Φ-projections: deaccentuation

deaccentuation of dependent (non-head) member within minimal Φ

mono-phrasal			bi-phrasal
			

Summary

projection:

- minimal ω
- maximal ω
- minimal Φ
- Φ (any Φ)

domain of:

- ✓ rendaku
- ✓ junctural accent
- ✓ deaccentuation
- ✓ downstep, initial lowering

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 (4μ), the whole form is parsed as a phrasal compound.

  head ≤4μ: $_{\omega}$[nankyoku-tÁnken]

  'Antarctic exploration'

  head >4μ: $_{\Phi}$[*nankyoku-tankentai*¯]

  '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).

(iv) A 4μ-template defines the maximal size of Japanese truncations (Ito 1990, Ito and Mester 1992) and language game forms (Tateishi 1989, Ito, Kitagawa and Mester 1996).

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 κ, we distinguish MaxBin(κ) and MinBin(κ).

  (Mester1994, 6-8, Hewitt 1994, and Selkirk 2000, 244)
- As a derivative constraint, we refer to their combination as Bin(κ).
- For κ= σ , F, ω, Φ, etc., this yields a family of (independently rankable) constraints.
- Cautionary note: Need to make sure that this is not a mechanical and unmotivated proliferation of constraints. (More discussion later.)

Binarity constraints

Schema for binarity constraints

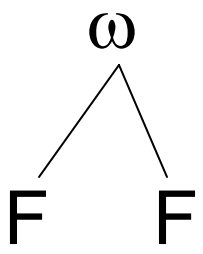
MaxBin(κ)	MinBin(κ)	Bin(κ)
κ is maximally binary.	κ is minimally binary.	κ is exactly binary.

Family of binarity constraints

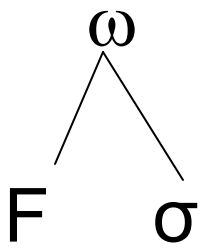
MaxBin(σ,F,ω,Φ)	MinBin(σ,F,ω,Φ)	Bin(σ,F,ω,Φ)

Evaluation of MaxBin(ω)

Fulfills MaxBin(ω)

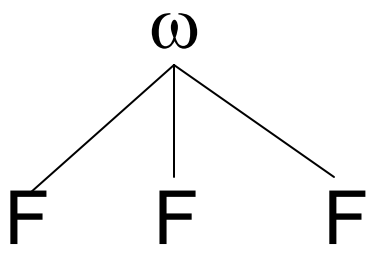


(kasu)(tera)

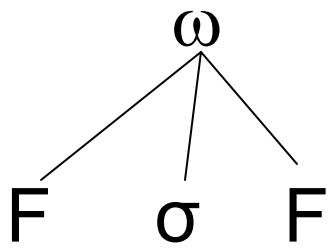


(tere) bi

Violates MaxBin(ω)



(asu)(para)(gasu)



(kuri)su(masu)

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 (ω, MWd): ω must begin a MWd.

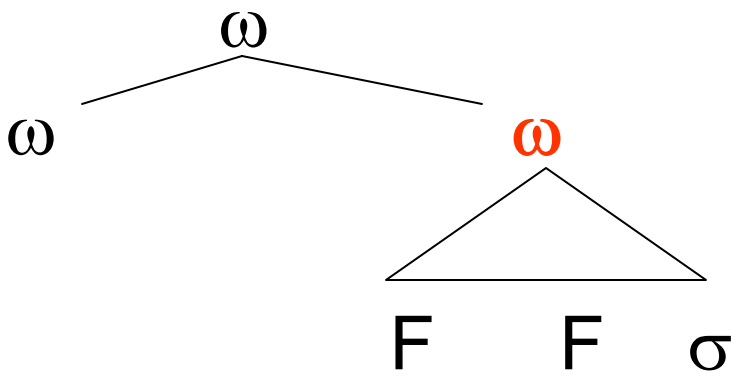
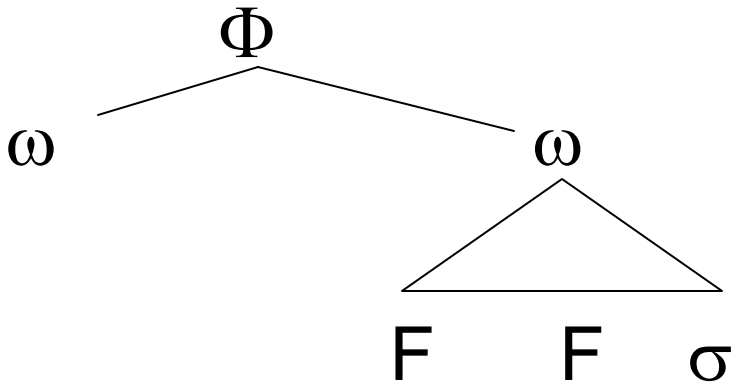
|

MaxBin(Head(ω)): ω-heads must be maximally binary.

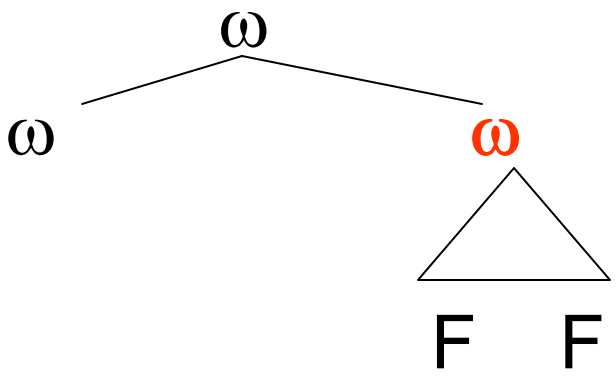
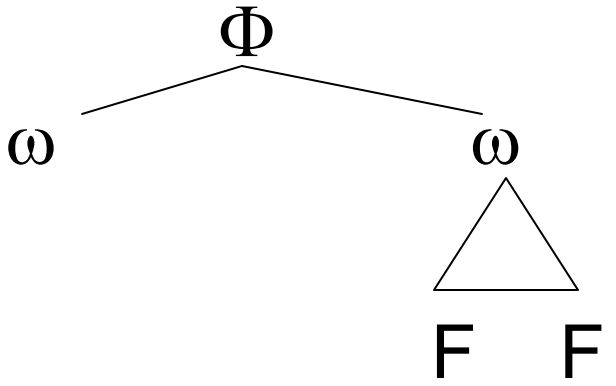
|

Wrap (MWd, ω): MWd constitutes a ω.

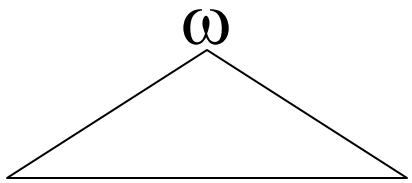
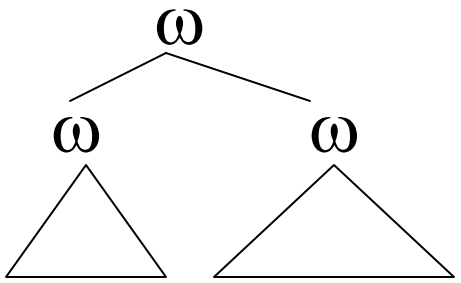
Violation of ω-head binarity yields phrasal compounds

	/ hatu - kao awase /	Al-L	MxBinHdω	Wrap
			*!	
⇨				*

Fulfilling ω-head binarity results in word compounds

	/ denki - kami sori /	Align-L	MaxBinHd	Wrap
⇨				
				*

Align-Left forestalls breaking up simplex words

	/ kurisumasu /	Align-Left (ω, MWd)	MaxBinHd	Wrap
⇨	 kurisumasu		*	
	 kuri sumasu	*!		

Adjunction in English

- Further evidence for singling out the maximal ω among the ω-projections:
- ***r*-sandhi** in varieties of nonrhotic English (NRE), where [r] has been lost in syllable codas (“I paak my caa in Haavaad Yaad,” etc.).

Nonrhotic dialects

- r-loss word-finally (actually, σ-finally)

underlying r	**no underlying r**
better	comma
star	law
soar	withdraw
star	Kafka

R-sandhi

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

R-sandhi

	underlying (linking) r	epenthetic (intrusive) r
at word juncture	bette-r-off	comma-r-in
	sta-r-is	law-r-of
word-internal juncture (level 2)	soa-r-ing	withdraw-r-al
	sta-rr-y	Kafka-r-esque

- after the non-high vowels [ə, ɔ:, ɑ:]

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 gsɑgd hɑb	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-ɑwa-r-aa-r-an ɑndasmɒi 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?

I wanna eat

*I wanna-r-eat

he went to eat

*he went to-r-eat

the apples

*the-r-apples

The function word gap

Let Wanda $\widehat{\sigma}$[reat]

*Let Wanda σ[eat]

*I'm gonna $\widehat{\sigma}$[reat]

I'm gonna σ[eat]

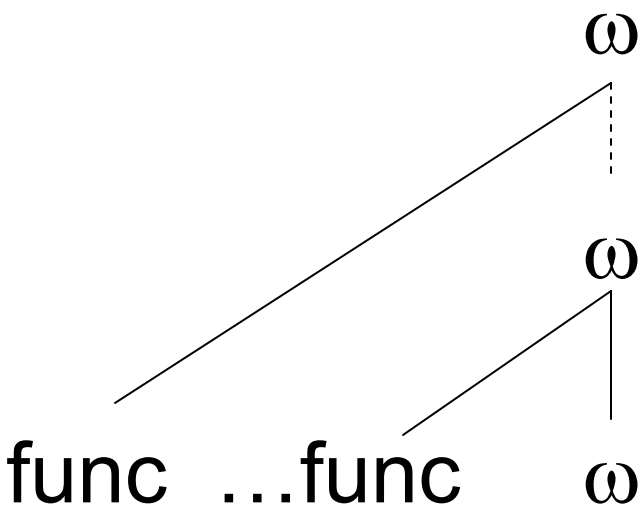
Proclitic status

- Such function words in English are not prosodic words by themselves, but rather proclitic:

- [gonna$_{fnc}$] [eat$_{\omega}$]
- *[gonna$_{fnc}$]‿[reat$_{\omega}$]

Prosodic adjunction

- Function words in English form adjunction structures with following prosodic words:



Prosodic adjunction

Using standard terminology:

κ_{max} =def κ not dominated by minimal

κ_{min} =def κ not dominating κ

– the resulting maximal projection is referred to as ω_{max} ("maximal prosodic word"),

– its innermost ω-subconstituent as ω_{min} (“minimal prosodic word").

Consequence of adjunction

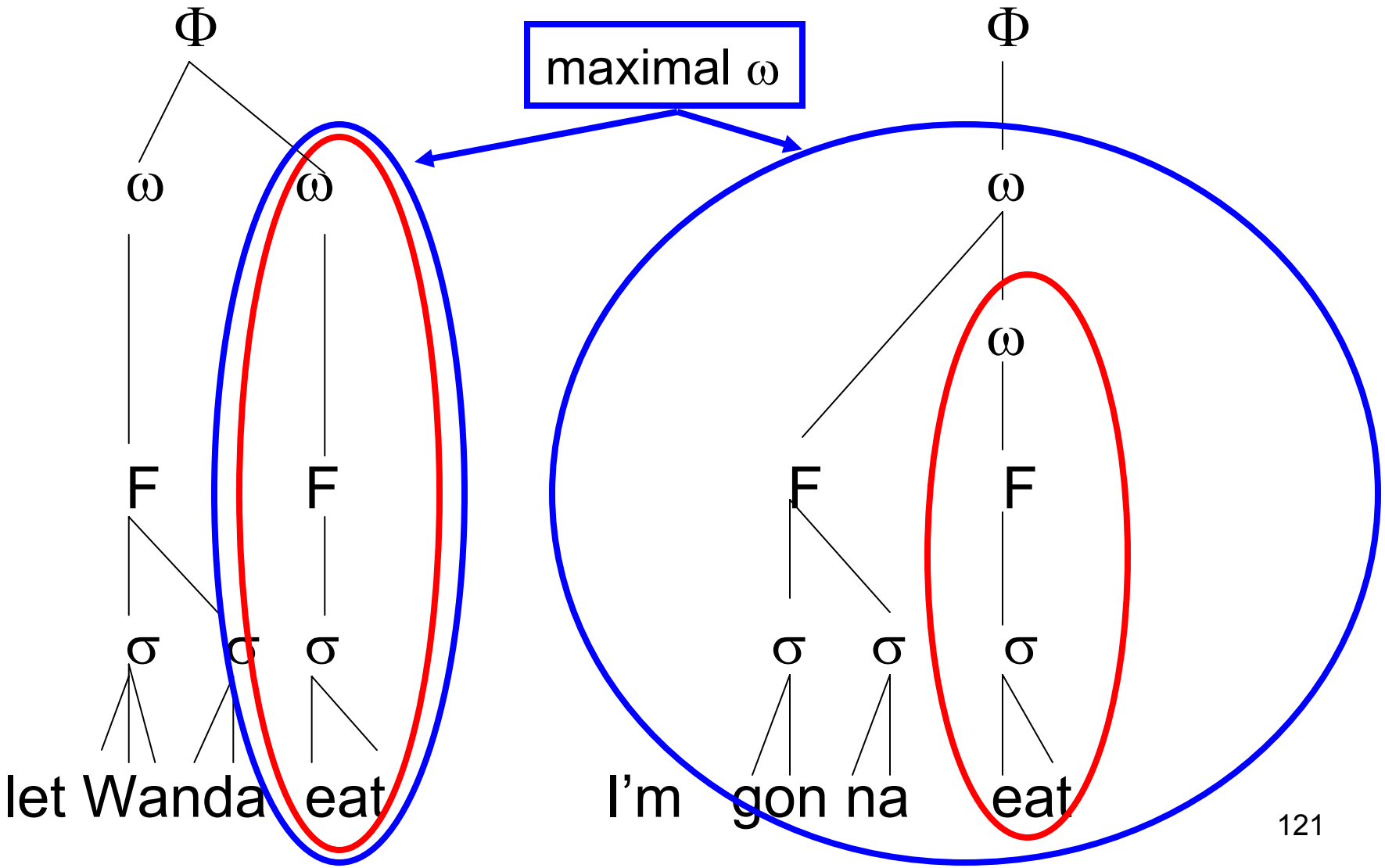
- *Eat* does not have the same prosodic status
- in *lex*+*lex*:

  Let Wanda $\widehat{\sigma[}$reat]

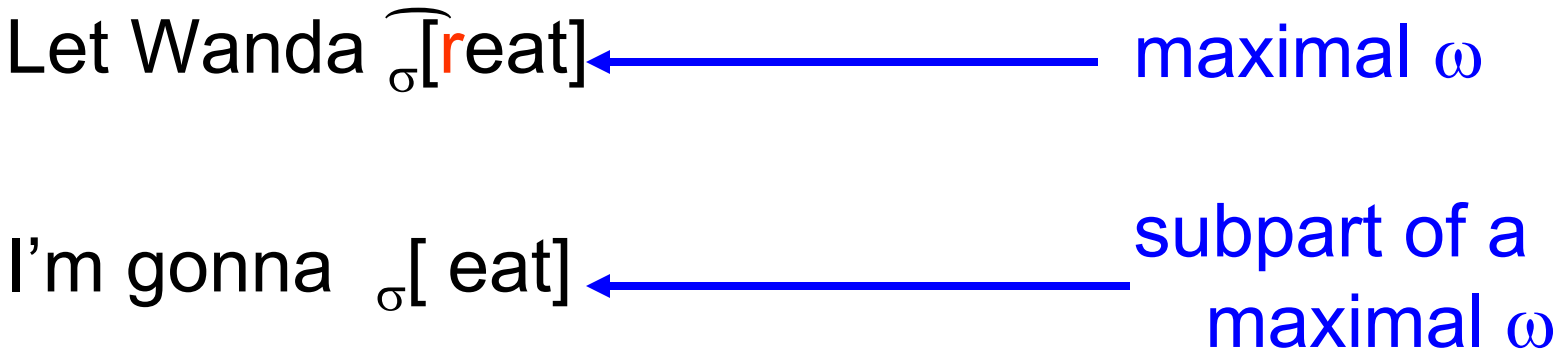
- and *fnc*+*lex*:

  I'm gonna σ[eat]

A structural difference

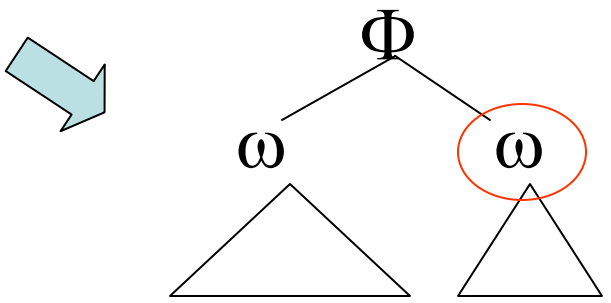


A structural difference

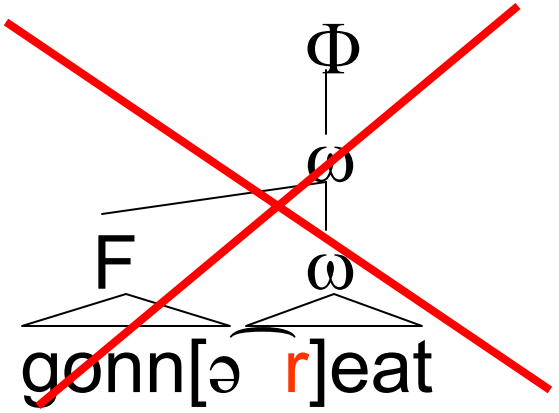


Consequences for *r*-insertion

r-inserting candidates

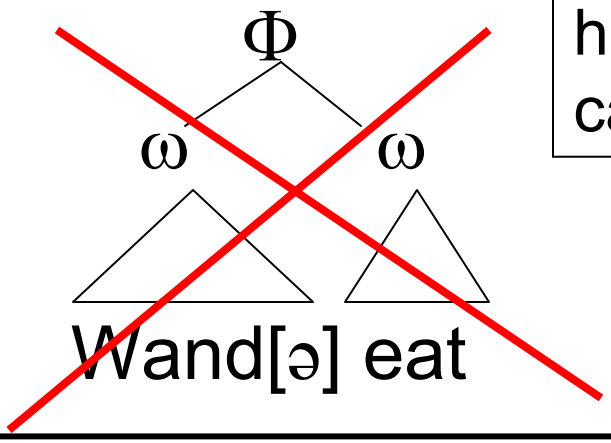


Let Wand[ə r]eat

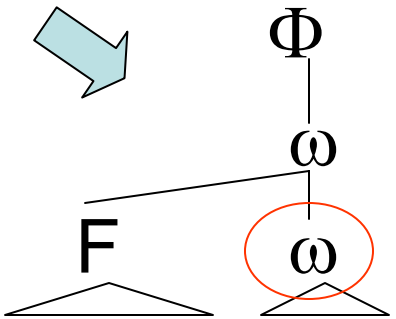


I'm gonn[ə r]eat

hiatal candidates



Let Wand[ə] eat



I'm gonn[ə] eat

Analysis

ONSET(ω_{max}) Special version of Onset-constraint for prominent positions (maximal projections of ω)	* [ω_{max} V

DEP-init(ω) 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 ω-initial position has an input correspondent.

Ranking

Onset(ω_{max})

|

Dep-init(ω)

|

Onset

|

Dep

(Let) Wanda eat

- Onset(ω_{max}) » Dep-init(ω)

... Wanda eat	Ons (ω_{max})	Dep -init(ω)	Ons	Dep
▶ [*Wanda*] [‿*reat*] ω_{max} ω_{max}		*		*
[*Wanda*] [*eat*] ω_{max} ω_{max}	*!		*	

(I) wanna eat

- Dep-init(ω) » Onset

… wanna eat	Ons (ω_{max})	Dep -init(ω)	Ons	Dep
[[w*anna*] [r*eat*]] ω_{max} F ω		*!		*
▶ [[*wanna*] [*eat*]] ω_{max} F ω			*	

Emergence of Onset

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

for eating	Ons (ω_{max})	Dep -init(ω)	Ons	Dep
▶ [[*fo*] $\widehat{[}$ r*eating*]] ω_{max} σ ω				
[[*fo*] [*eating*]] ω_{max} σ ω			*!*	

Side issue: Why insert *r*?

- R-insertion is a kind of diphthongization of the preceding vowel.
- Kahn (1976:69-70), Broadbent (1991), Gnanadesikan (1997:159-162), Bakovic 1999, Uffmann 2003, 2005, Rawlins 2004.

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.

saw Ed	Ons (ω_{max})	Dep-root -init(ω)
▶ [sɔ] [ɹ͡ɛd] ω_{max} ω_{max} Place		*
[sɔ] [ɛd] ω_{max} ω_{max}	*!	

*[r]*Ed*

- High-ranking DEP-PLACE prevents post-pausal epenthesis.

Ed	Dep-Place	Ons (ω_{max})	Dep-root-init(ω)
[rɛd] ω_{max}	*!		*
▶ [ɛd] ω_{max}		*	

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

tomato	tomat[ə͡r]and cucumber production
window	pull the wind[ə͡r]up
you how	I'll tell y[ə͡ræ:]
you a	Give [jə͡rə] job
not a hope	not [ə͡rəʊp]

- Sources: McMahon 2000, Sivertsen 1960, Trudgill 1974, Wells 1982

Norwich

to it	[tə r]it
by a	run over [bə rə] bus
of old	lot [ə r]old
to eat	out [tə r]eat
to eight	quarter [tə r]eight

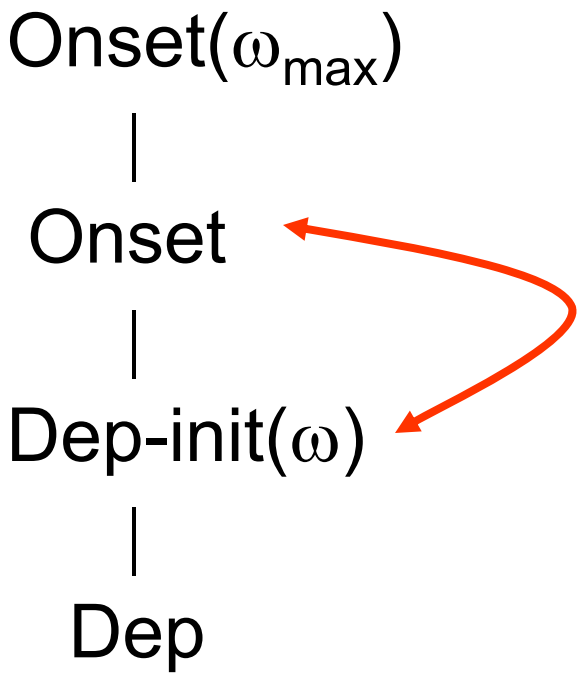
- Note insertion after function words (*to*-r-*eat*)

Analysis

- Standard non-rhotic:

Onset(ω_{max})
|
Dep-init(ω)
|
Onset
|
Dep

- Norwich, etc.:



Norwich *to*-r-*eat*

to eat	Ons (ω_{max})	Ons	Dep -init(ω)	Dep
▶ [[*t*ə] [rit]] ω_{max} σ ω			*	*
[[*t*ə] [it]] ω_{max} σ ω		*!		

Part III: Hierarchy

- The role of strict layering
- Adjunction sites for proclitic function words

The changing role of Strict Layering

- The Strict Layer Hypothesis (Selkirk 1984, Nespor & Vogel 1986):
- A prosodic constituent immediately dominates only constituents of the next level down in the prosodic hierarchy.
- No recursive structures, no skipping of levels.

The changing role of Strict Layering

- Weak layering theory of prosodic structure (Ito and Mester 1992):
- “Strict Layering” should be factored into more basic component constraints, such as
  - headedness,
  - exhaustive parsing,
  - word-to-foot alignment,
  - etc.

The changing role of Strict Layering

- Optimality-theoretic developments since the mid-90's: All constraints are violable and rankable in the grammar.
- Thus, constraints on "Strict Layering" are also violable if compelled by higher-ranking constraints.
- (Selkirk 1995, Peperkamp 1997, etc.)

Constraint families

- The violable and rankable view of the strict layering constraints has been very successful.
- But it has also raised some questions.

Constraint families and no end?

- Each general constraint has been broken up into a multitude of micro-constraints,
- each one specific to a particular level of the hierarchy, and
- each one separately rankable.

Constraint families and no end?

- E.g., for Recursivity:
  - Recursivity-ι
  - Recursivity-Φ
  - Recursivity-ω
  - Recursivity-F
  - Recursivity-σ
  - Recursivity-μ
- Similarly for layering/exhaustivity, headedness, etc.

Constraint families and no end?

- Are all of these truly necessary and motivated?
- Are all the members of these constraint families created equal?
- Why are some violated often, others hardly ever, if at all?

Constraint families and no end?

- Being able to stipulate a low or high rank for each of these individual constraints predicts that—
- Layering and recursivity characteristics should vary for each individual prosodic level from language to language.
- But this is not what we find.
- Is there a more principled solution?

Explaining strict layering effects

- Given the approach taken so far—sparse hierarchy with richer projection structure—we will attempt to account for the strict layering effects in a more principled way.
- As a reference point, we restate some of the constraints governing the prosodic hierarchy.

Hierarchical containment

For a hierarchy of categories

C_n

|

C_{n-1}

:

C_2

|

C_1

Containment:

A structure

C_k

|

C_i

violates containment if and only if $k<i$.

"Smaller categories cannot contain larger categories."

Layering

For a hierarchy of categories

C_n

|

C_{n-1}

:

C_2

|

C_1

Layering:

For a structure

C_k

|

C_i

assign one violation mark for each C_j intervening in the hierarchy between C_k and C_i.

"No skipping."

Recursivity

For a hierarchy of categories

C_n

|

C_{n-1}

:

C_2

|

C_1

Recursivity:

A structure

C_k

|

C_i

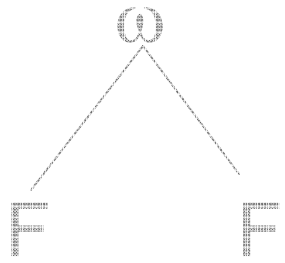
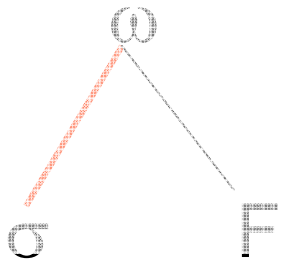
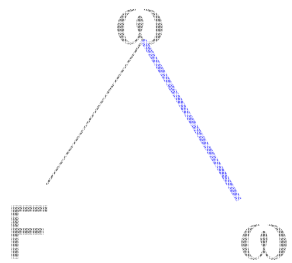
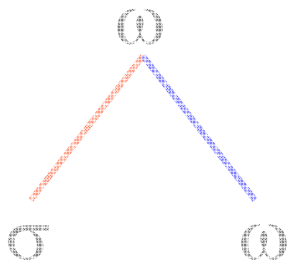
violates recursivity if and only if k=i.

Strict Layering

- Hierarchical containment is part of GEN. That is, the generated candidate set does not include, e.g., candidates with σ dominating ω.
- Other hierarchy constraints: HEADEDNESS, BINARITY.
- A prosodic structure is “strictly layered” when both LAYERING and RECURSIVITY are fulfilled.

Consequences

"strictly layered"

	Layering fulfilled	Layering violated
Recursivity fulfilled		
Recursivity violated		

Layering: phrasal vs. word-internal

- It is unclear whether layering is ever clearly violated at the phrase level, different from word-internal prosody.
- Cases where σ is demonstrably dominated by Φ are hard to find. (We return to this in more detail later.)

Layering: phrasal vs. word-internal

- On the other hand, layering violations are common at the word-foot level due to non-exhaustive parsing (unfooted σ directly dominated by ω).
- See Hayes 1995, Ito and Mester 1992, Kager 1993, McCarthy & Prince 1993, Mester 1994, Prince & Smolensky 1993, and many other refs.

Recursivity: phrasal vs. word-internal

- The opposite holds for recursive structures:
- They are quite common for ω and higher constituents (as discussed above: Ladd 1986, etc.)
- But recursive foot and syllable structures have rarely been proposed, and are not solidly motivated.

Summary of properties

Below the word level:

F, σ

- No Recursivity violations
- Layering violations

Word and higher levels:

ω, Φ, ι

- Recursivity violations
- No Layering violations

Similar difference in binarity violations

- Binarity is usually observed below the word level:
- Ternary feet or trimoraic syllables often lead to ungrammaticality.
- But at higher levels, ω, Φ, ι, there are usually only *tendencies* 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:

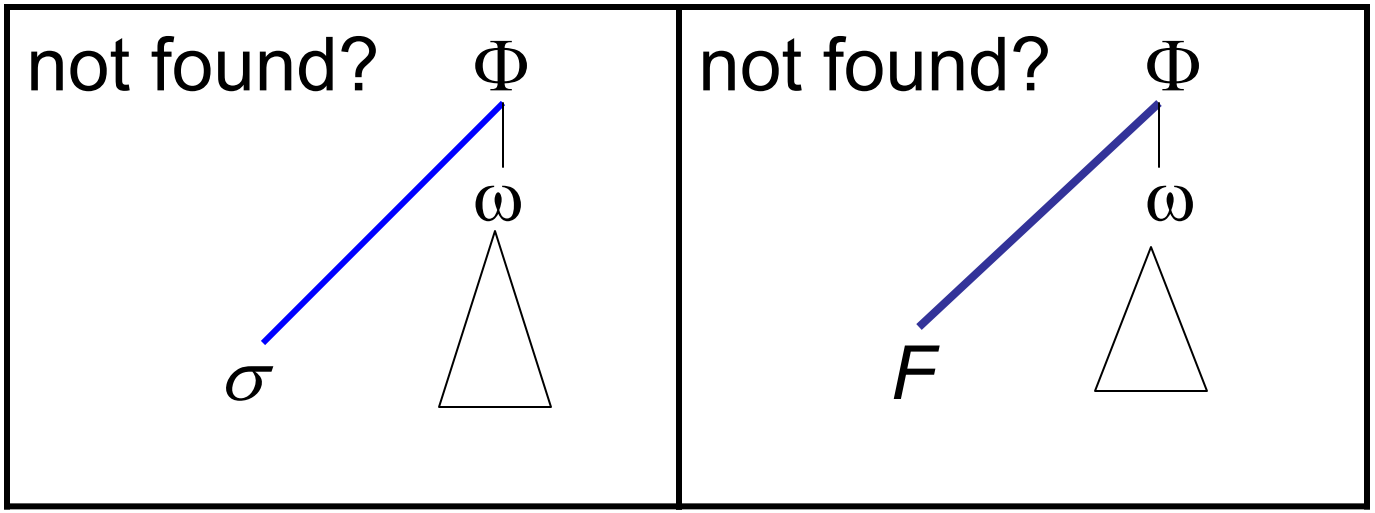
- Higher-level units are largely governed by syntax-phonology mapping constraints (Alignment, Wrap, etc.).

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.

Phrasal structures observe layering

- We hypothesize that phrasal structures violating layering are non-existent (or marginal). Φ can only dominate ω (or another Φ, recursively).



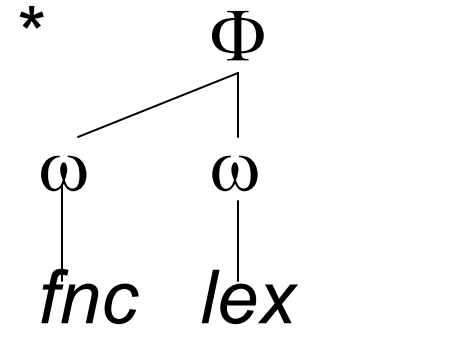
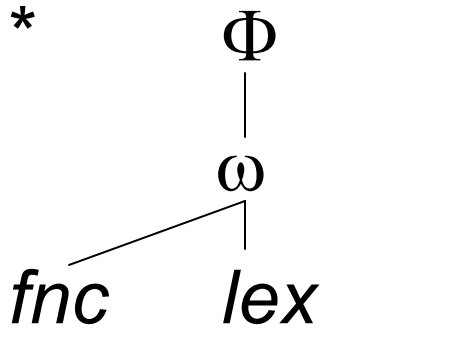
Conjecture

- This is most easily explained in OT if there is only ONE Layering Constraint and ONE Recursivity Constraint.
- I.e., NOT a multitude of specific Layering and Recursivity constraints for every level, which are all individually rankable, resulting in a loss of explanation.

Case Studies on Adjunction

Fnc words in English and German

- Well-established prosodic and phonotactic reasons that they are NOT:

• structured as independent ω's	• simply incorporated into neighboring ω's
	

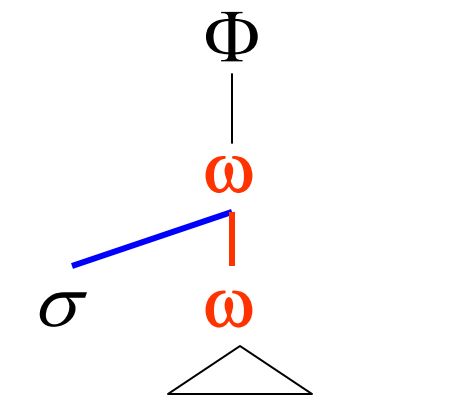
(E) to Rhodes
(G) nach Rhodos

to Rhodes
nach Rhodos

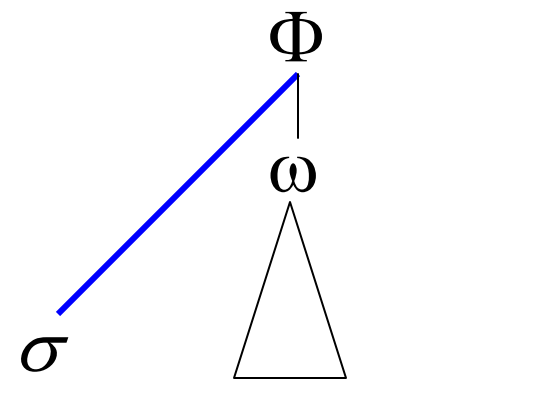
Fnc words in English and German

- Two other possibilities, violating recursivity and layering:

ω-adjunction:

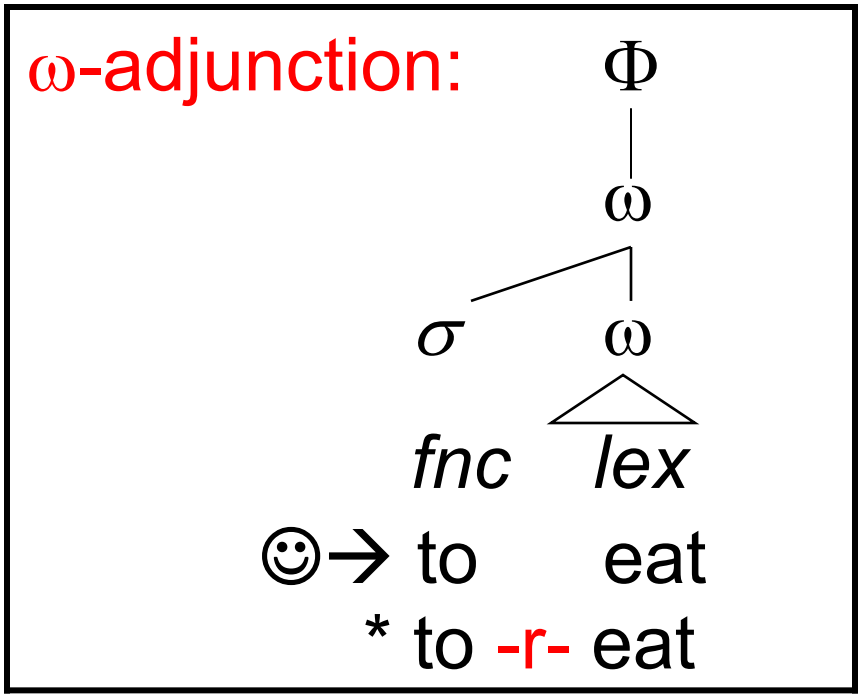


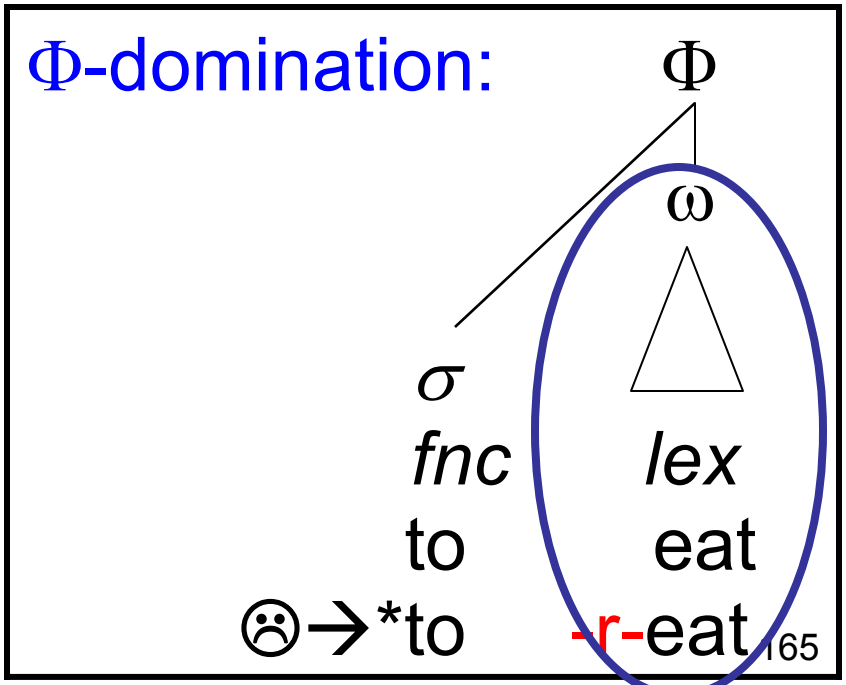
Φ-domination:



Argument from r-sandhi

- The ω-adjunction structure can account for the lack of epenthetic -r- after fnc words.
- The Φ-domination structure cannot: *eat* is parsed as a maximal word.

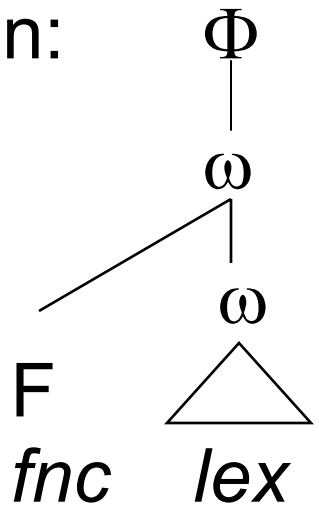




Argument from r-sandhi

- The same argument can be made with bisyllabic (footed) *fnc* words like *gonna.*

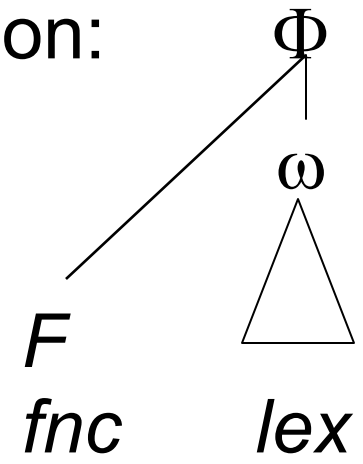
ω-adjunction:



☺→ gonna eat

* gonna-r-eat

Φ-domination:

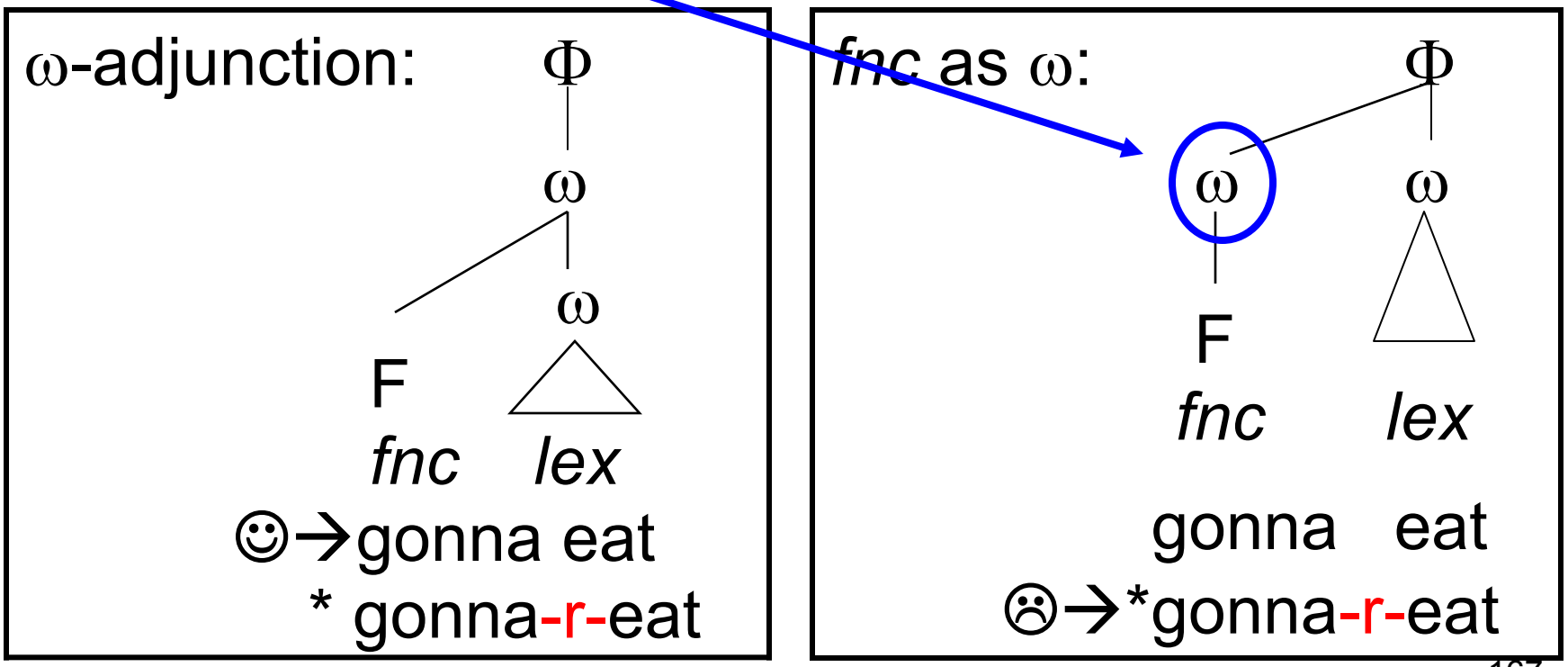


gonna eat

☹→*gonna-r-eat

Argument from r-sandhi

- Neither can bisyllabic *fnc* words be ω by themselves: This wrongly predicts r-epenthesis.

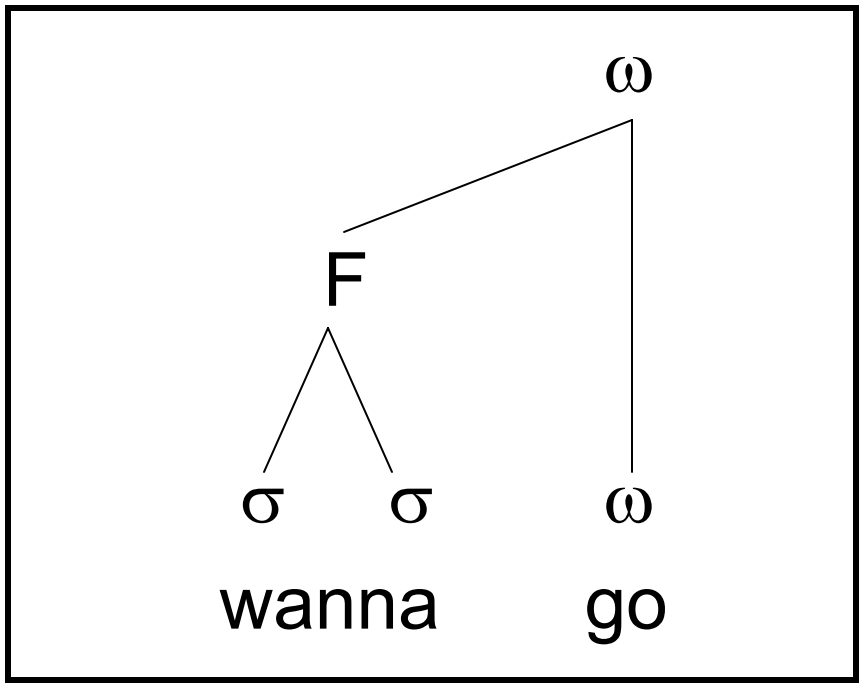


Adjoined feet in English

Portemanteaux like--

- *wanna* want to,
- *gotta* got to
- *shoulda* should have
- *didya* did you
- *lotta* lot of

have the adjoined foot structure:



Adjoined feet in German

- Kabak & Schiering 2006 on [fnc fnc lex] contractions:
- *auf dem Auto* > *auf'm Auto* *'on the car'*
- The two function words form a foot.
- This foot is prosodically grouped with the following word.
- It provides the context for specific phonological processes and allomorphy.

German [fnc fnc lex] contractions

weil das Haus	weil's Haus
für das Haus	für's Haus
Ich will ein Buch lesen	Ich will'n Buch lesen
wenn es geht	wenn's geht

- 'because the house'; 'for the house'; 'I want to read a book'; 'if it is possible'

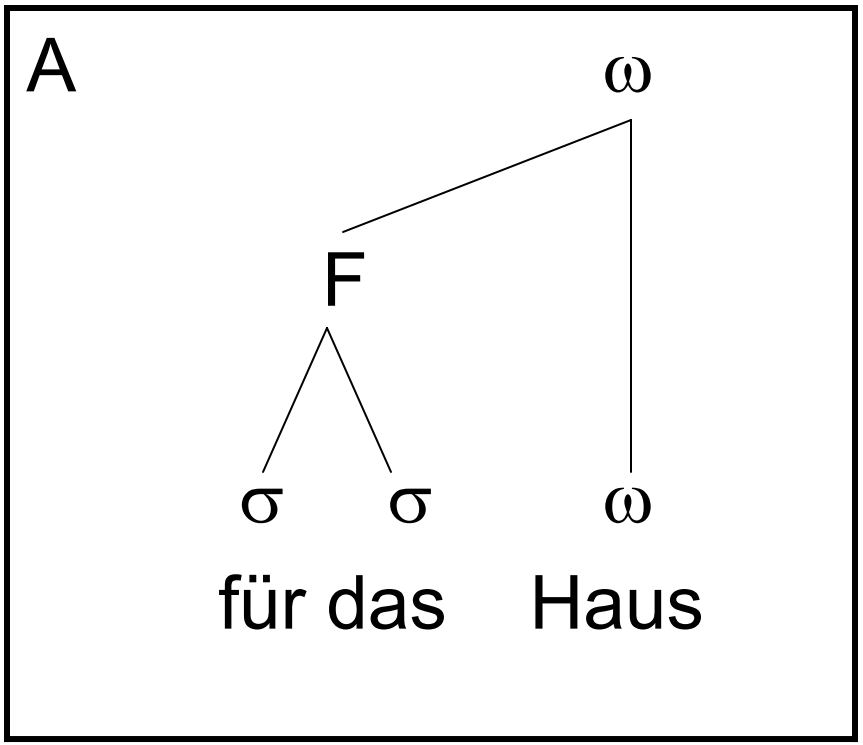
German [fnc fnc lex] contractions

- Analysis here:
- The fnc+fnc foot is adjoined to the following ω within an extended ω-projection.

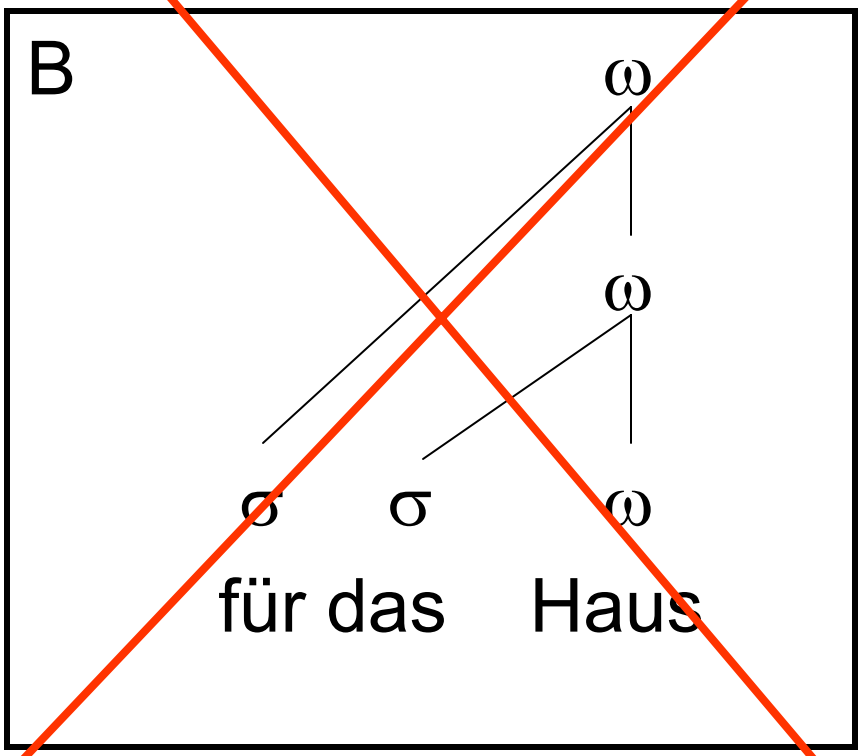
- Kabak & Schiering 2006 make the foot an immediate daughter of Φ, but also suggest the recursive ω-structure as an alternative.

[fnc fnc lex] contractions

- The correct structure is A:



not B:



Evidence for [$_F$ fnc fnc]

- “[T]he initial syllable of [Fnc Fnc] contractions [...] has more prominent stress and more substance than the subsequent Fnc in the same complex.” (Kabak & Schiering 2006, 79)

Evidence for [$_F$ fnc fnc]

- Middle Frankish:

'gɛç.əs	gegen das ...	‘against the ...’
'vɛ.nɪ	wenn ich ...	‘when I’
'tsʊ.ɐ	zu der ...	‘to the ...’

Evidence for [$_F$ fnc fnc]

- Ruhrdeutsch:

'aɔ.fə	auf die	‘on the ...’
'vɛ.nə	wenn du	‘when/if you ...’
'hɪn.tɐm	hinter dem	‘behind the ...’

- Similar evidence in Middle Frankish.

Flapping in Middle Frankish

- Optional posttonic flapping process (p.74):

'muɾə	*Mutter*	‘mother’
‘buɾə	*Butter*	‘butter’

Flapping in Middle Frankish

Applies in [$_F$fnc fnc] feet:

tsʊ də fraʊ majɐ	*zu der Frau Mayer*
~ɾ	
tsʊ də ʃu:L	*zu der Schule*
~ɾ	
vou də boʊ	*wo der Junge*
~ɾ	

‘to (the) Frau Mayer’; ‘to the school’; ‘where/who the boy’

Difference in prosodic organization

- Contrast corresponding [fnc fnc lex] constructions in English:

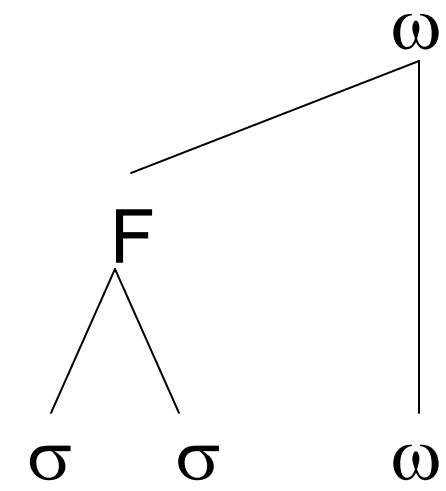
  fŏr ă message

  tŏ hĭs troubles

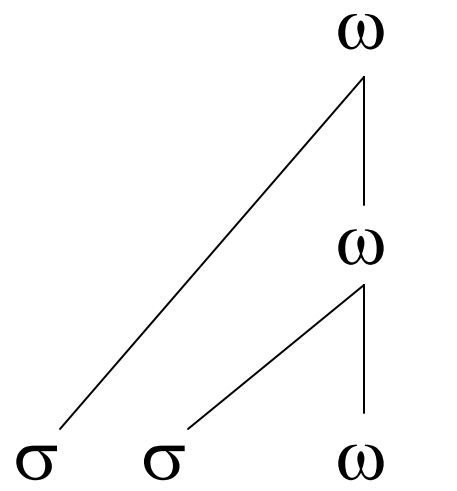
- Such *fnc fnc* sequences consist of a string of stressless syllables (Selkirk 1995).

Difference in prosodic organization

German: adjoined foot	English: doubly recursive ω-structure



✓fürs

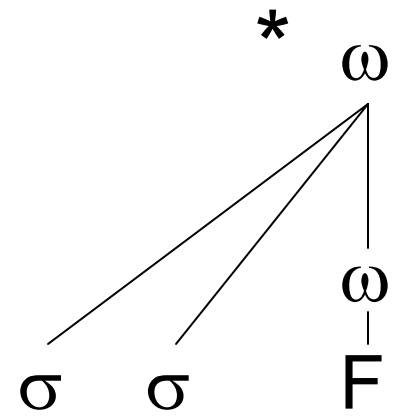


*forth

*[$_{\omega}$ σ̆ σ̆ ...

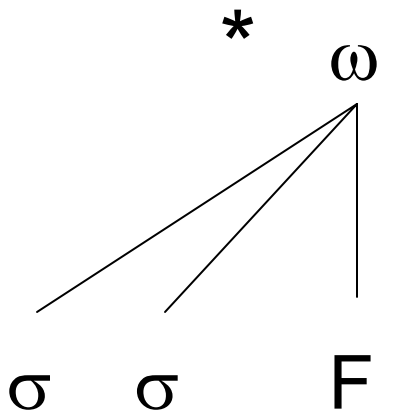
- English (and German) prosody demands a left-aligned foot in ω and does not allow singly-recursive and non-recursive structures for [fnc fnc lex].

Singly-recursive:



fŏr thĕ house

Non-recursive:



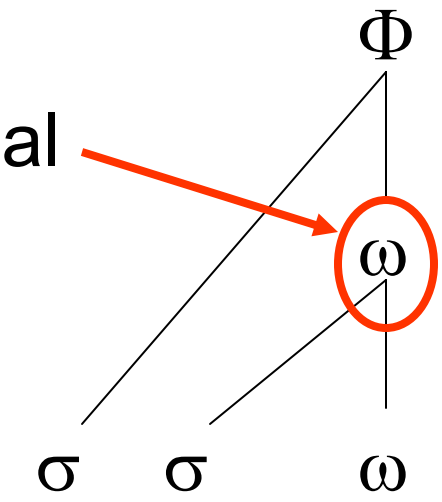
fŏr thĕ house

Top node phrasal possibility?

Φ-dominated: wrongly predicts r-epenthesis

Doubly recursive ω: correctly rules out r

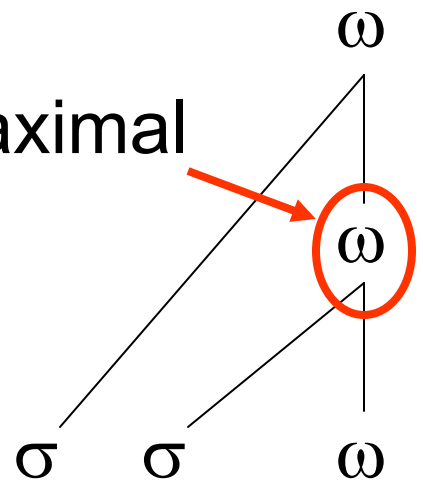
maximal



tŏ (h)ĭs troubles

*[-r-]

non-maximal



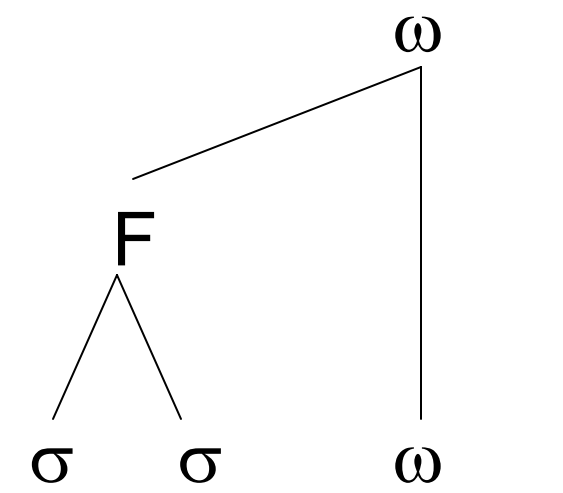
tŏ (h)ĭs troubles

*[-r-]

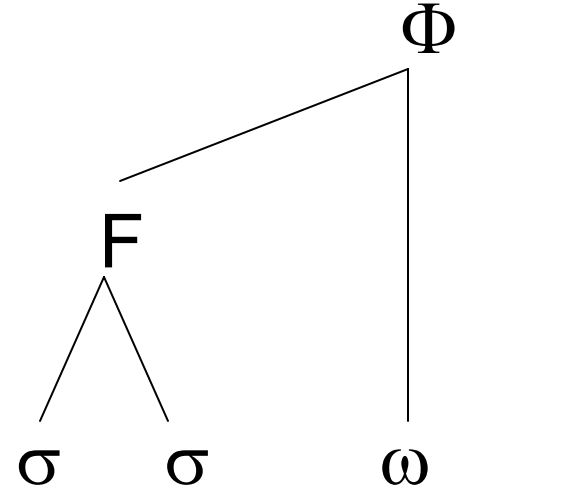
Placement of $_F$[fnc fnc] in German

- Kabak & Schiering 2006 suggest both possibilities:

ω-adjoined foot

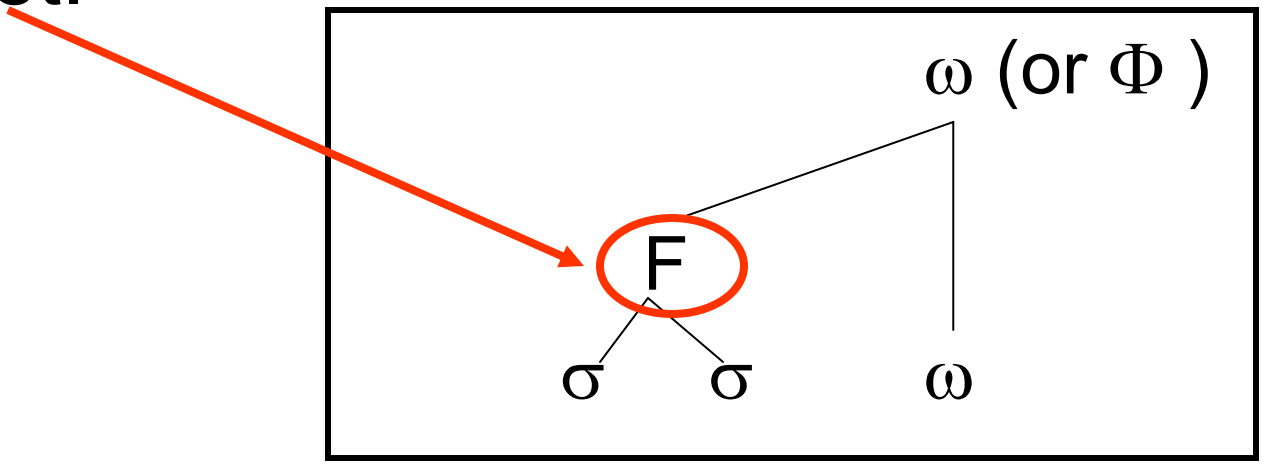


Φ-dominated foot



Placement of $_F$[fnc fnc] in German

- Special status of F in this position: (whether ω-adjoined or Φ-dominated)
- There are phonological processes / allomorphy occurring **only** in the context of such feet.



Consonant deletion in Ruhrdeutsch

[aufm] > [aum] auf'm 'on (masc./neut.)'
[naxm] > [nam] nach'm 'to (masc./neut.)'
[mɪpm] > [mɪm] mit'm 'with (masc./neut.)'
Compare:
[kaʊfm] > *[kaum] kaufen 'buy'
[flaxm] > *[flam] flachem 'flat (masc.dat.)'
[vɪpm] > *[vɪm] wippen 'swing'
(Kabak & Schiering 2006, 75)

(Similar evidence in Middle Frankish.)

Consonant intrusion in Middle Frankish

[ω [F gɛçə(-ʀ-)ən] glaʊs]	gegen den Klaus
[ω [F tsʊ(-ʀ-)ənɐ] ʃu:L]	zu einer Schule
[ω [F nevə(-ʀ-)əs] haʊs]	neben das Haus
[ω [F voʊ(-ʀ-)ɪ] bin]	wo ich bin

(p. 70)

'against Klaus'; 'to a school'; 'beside the house'; 'where I am'

Consonant intrusion in Middle Frankish

- This optional -ʀ- is restricted to the environment [$_{\omega}$ [$_{F}$ ..._v...]].

- It is not found in other hiatus situations:

  *[ka-ʀ-ɔs] *Chaos*

  *[audɔ-ʀ-ɪnʃɛnjøə] *Autoingenieur*

  ‘chaos’; ‘automobile engineer’

Consonant intrusion in Middle Frankish

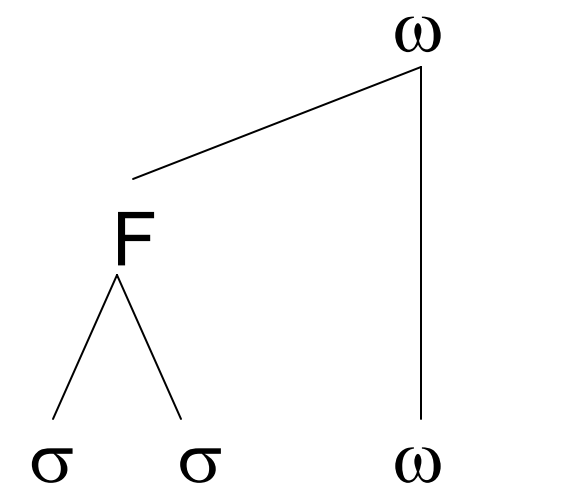
- Not even at *fnc-lex* junctures:
  *[dɪ-ʀ-ɔʀɔʃn] *die Orangen* ‘the oranges’

- Similar properties are found with intrusive -n- (“Binde-n”) in Higher Alemannic (p.73).

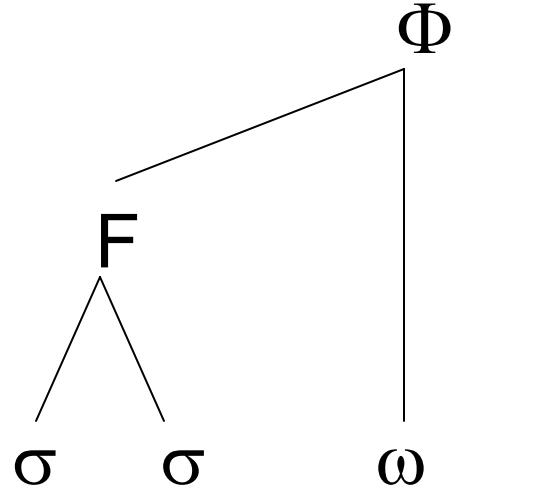
A point in favor of ω-adjunction?

Consider the structural position of the foot that is the domain for special processes:

ω-adjunction

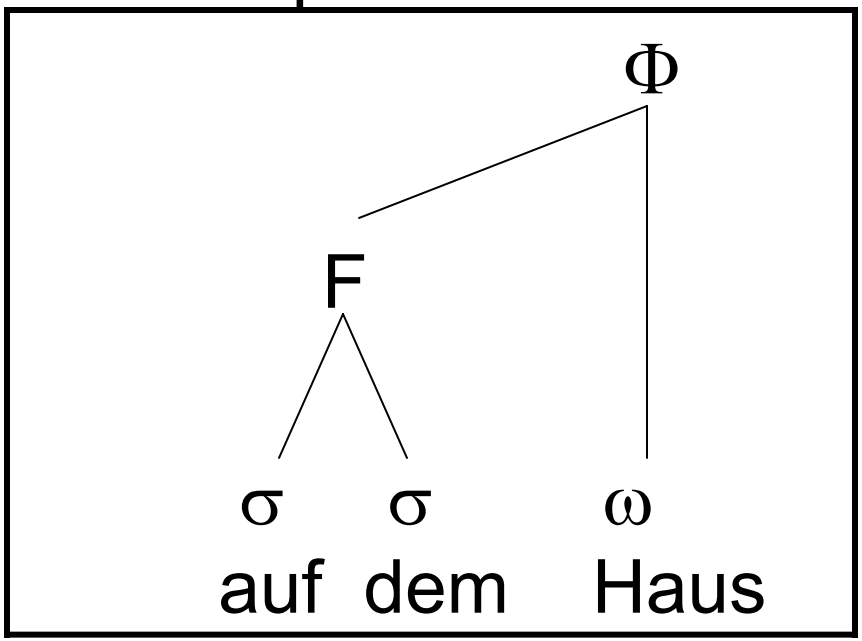


Φ-domination



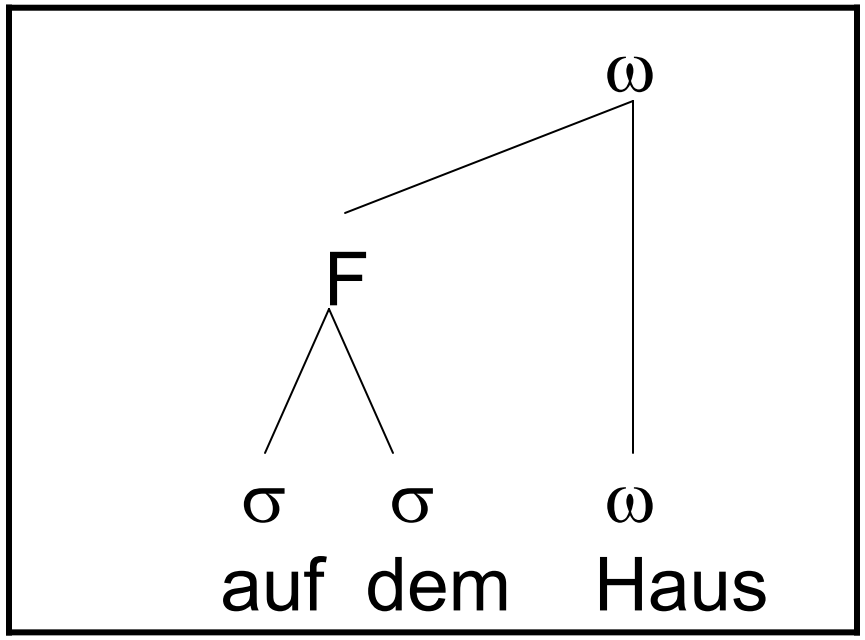
A point in favor of ω-adjunction?

- The special F-status as “F immediately dominated by Φ” (or “F not dominated by ω”) describes a phonological environment by a violation of an aspect of wellformedness.

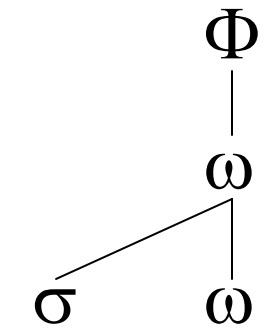
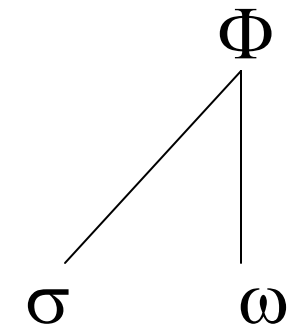


A point in favor of ω-adjunction?

- On the other hand, adjunction sites are often special phonological environments—e.g., the special status of appendix consonants (only anterior coronals).



Recapitulation: Two possible sites for proclitic *fnc*

ω-adjunction:	Φ-domination:
	

Selkirk 1995 adopts the Φ-domination view.

Prosodic adjunction of *fnc* words

Considerations in favor of ω-adjunction:

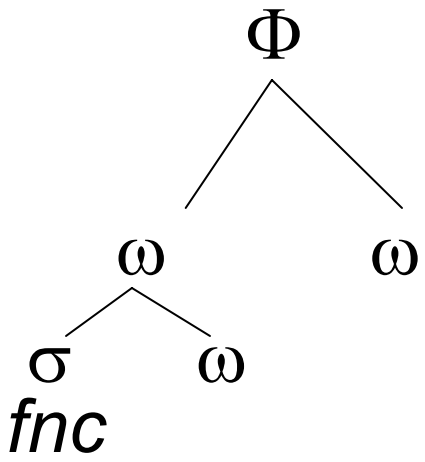
- Argument I: r-sandhi (already discussed)
- Argument II: Φ-Binarity
- Argument III: Φ-final *fnc*

Argument II: Φ-binarity

- Φ-domination of *fnc* leads to violations of binarity whenever Φ already contains two ω.

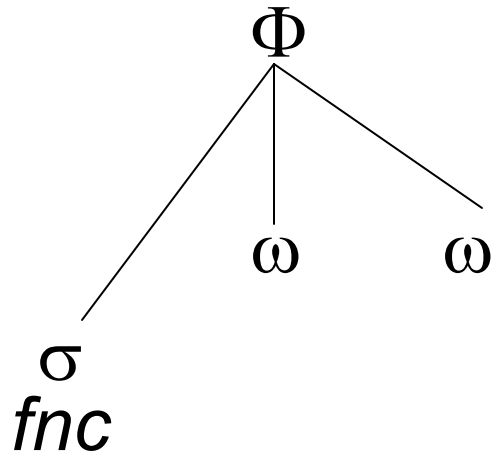
ω-adjunction:

binary Φ



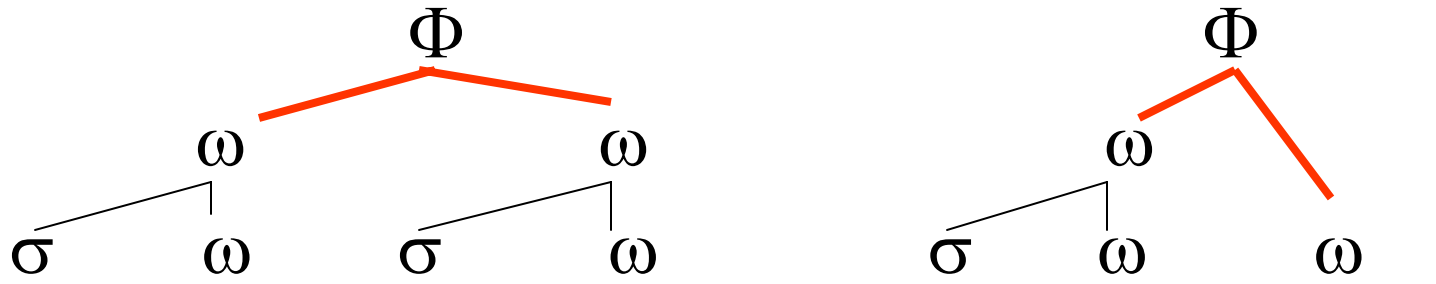
Φ-domination:

nonbinary Φ



Φ-binarity

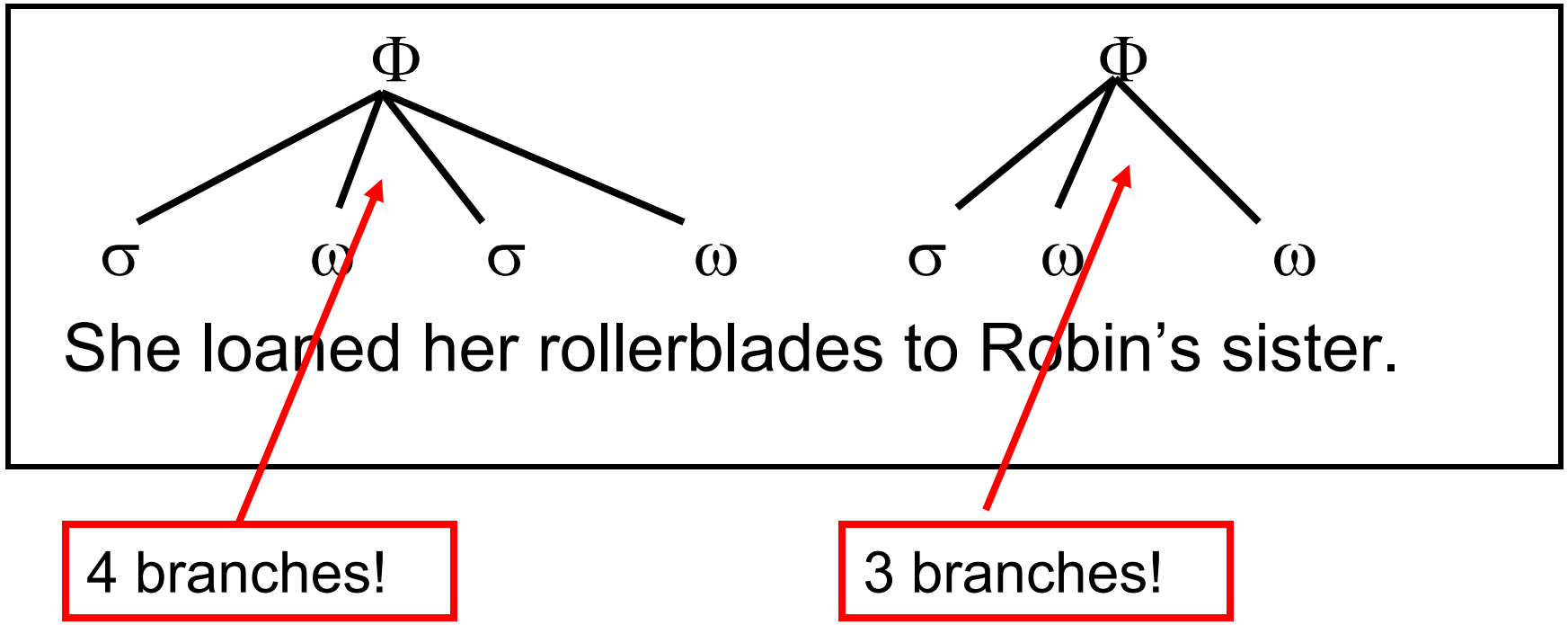
- Why does this matter?
- (Strict) Binarity motivated as a (violable) constraint in Selkirk 2000.
- Illustrative example (slightly modified):



She loaned her rollerblades to Robin's sister.

Φ-binarity

- If proclitic *fnc* σ's are directly dominated by Φ, binarity is violated.



Redefining “binarity”?

- To save the Φ-domination theory, the definition of Binarity could be modified, as in Selkirk’s (2000) “BinMaP”:

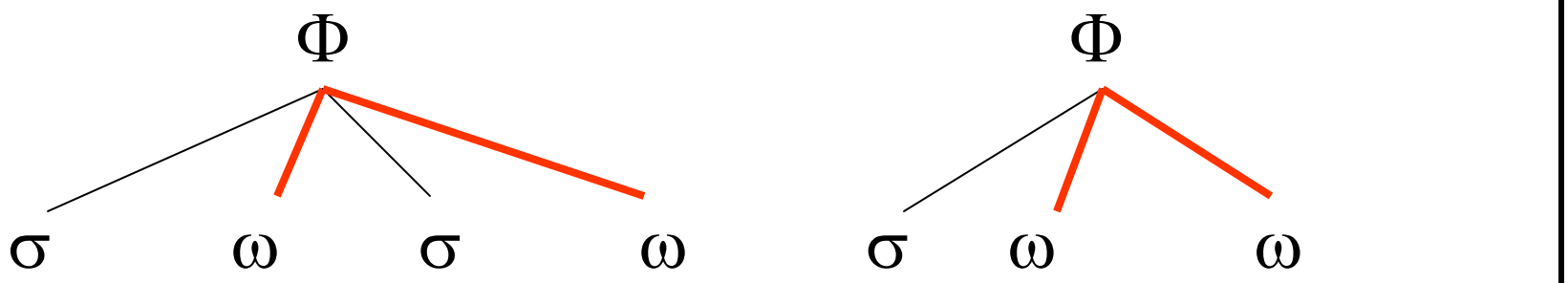
  “A Major Phrase requires two Minor Phrases”.

- So how about BINARITY(2ω):

  “A Φ requires two ω’s”?

Redefining “binarity”?

- BINARITY(2ω) tells us to only look at the lines that are highlighted:



She loaned her rollerblades to Robin’s sister.

Redefining “binarity”?

- However: Having to have recourse to complications such as “BINARITY(2ω)” is a counterargument in itself.
- The constraints repeats part of the prosodic hierarchy.
- It is just an accident that it mentions Φ and ω, and not Φ and σ, e.g.

Redefining “binarity”?

- The simple everyday conception of binarity based on branching works fine—
- —provided the prosodic structure is correctly understood, i.e., as ω-adjunction.

Argument III: Φ-final *fnc* words

- They are never reduced:

(He wanted [tu] _,)$_{\Phi}$ (but he couldn't.)

*(He wanted [tə] _,)$_{\Phi}$ (but he couldn't.)

vs. (He wanted [tə] go)$_{\Phi}$

Φ-final *fnc* words

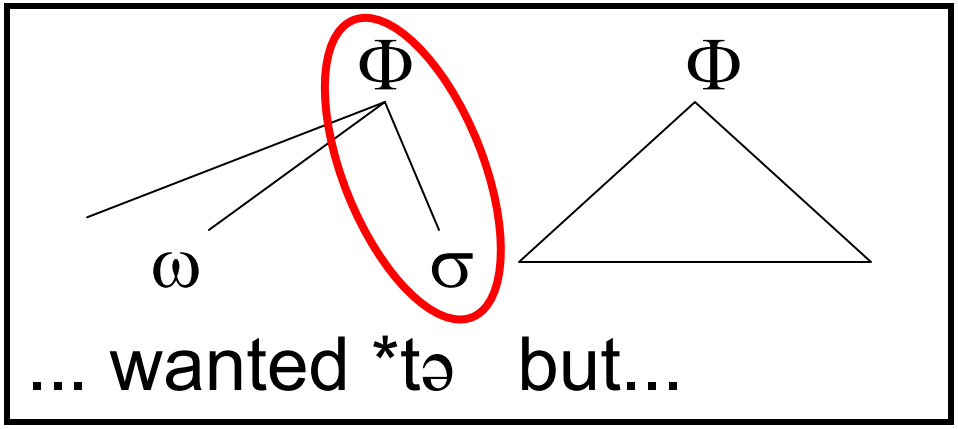
- r-epenthesis occurs:

  (I said I was gonna)$_{\Phi}$, ⁀(r if he ...)

vs. *I was gonna-r-eat.

Φ-final *fnc* words

- Φ-domination theory allows *fnc*-syllables to become immediate daughters of Φ, in violation of layering at the phrasal level.



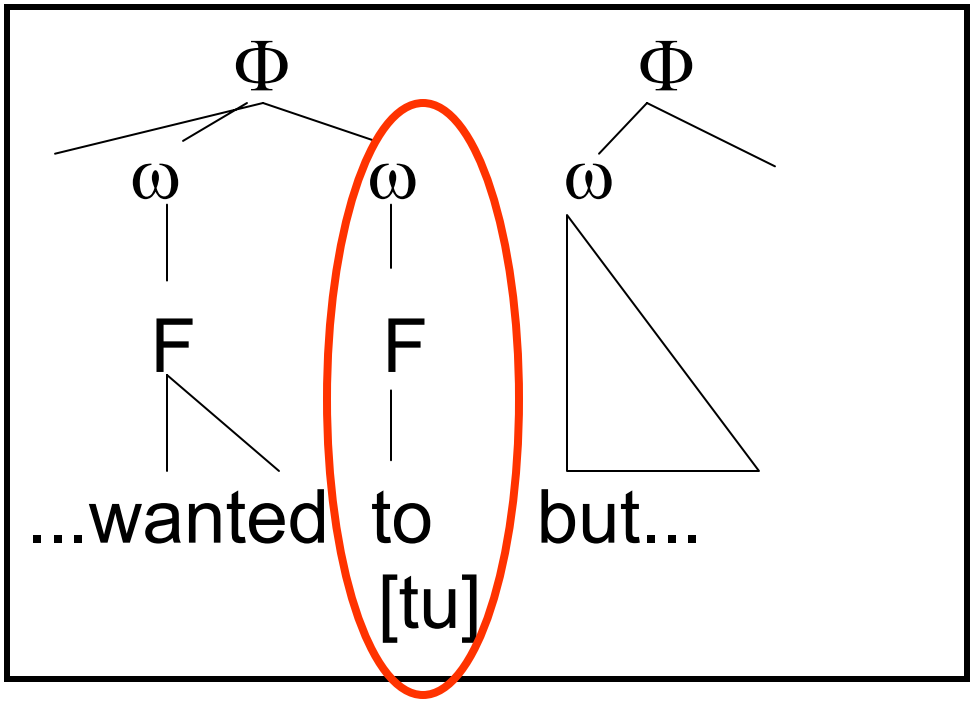
- Given this prosodic structure, there is no reason why reduction should be impossible.

Φ-final *fnc* words

- On the other hand, ω-adjunction theory makes it possible to require phrasal structures to observe layering.
- This provides a straightforward explanation for the irreducibility of *fnc* in Φ-final position.

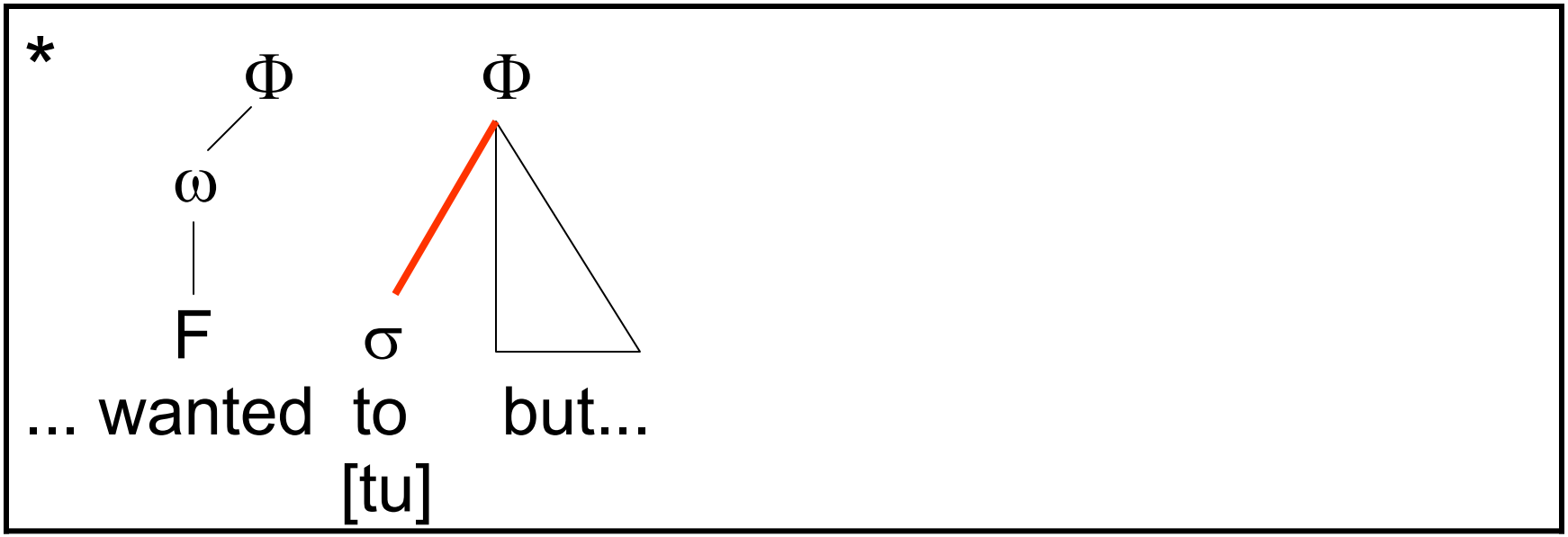
Φ-final *fnc* words

- Goal: It should be a consequence of the theory that only the following structure is possible in Φ-final position, with full ω-status for *to*:



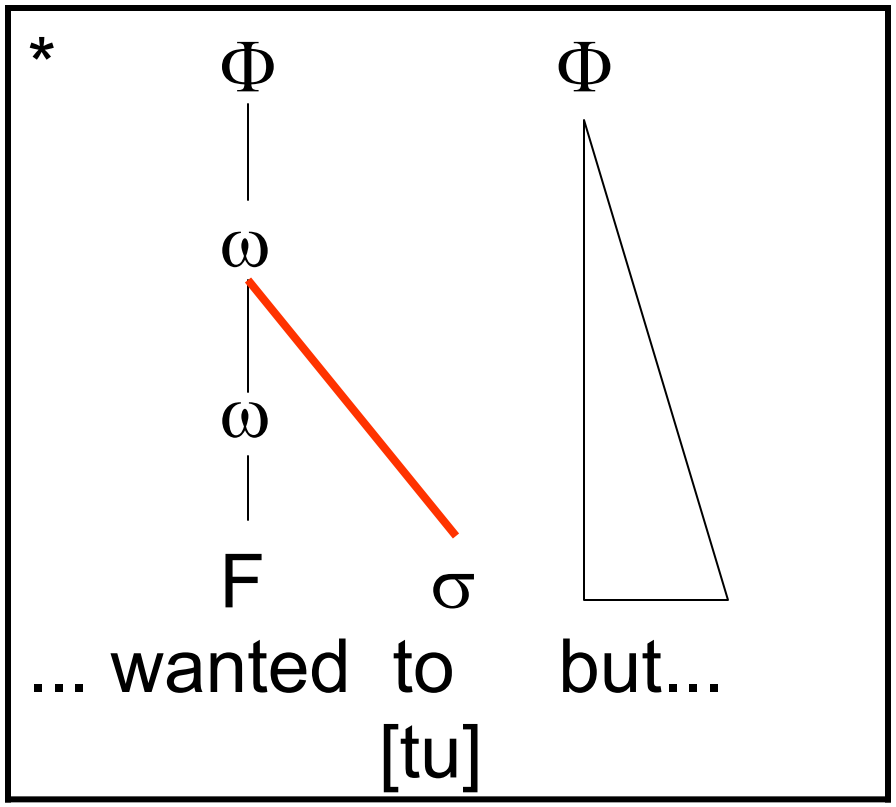
Step 1: No association to the right

- Association to the following Φ is ruled out: The *but*-clause has to be left-aligned with ι, hence with Φ:



Step 2: No adjunction to the left

- Adjunction of *fnc* to the preceding word is in general ruled out in English:

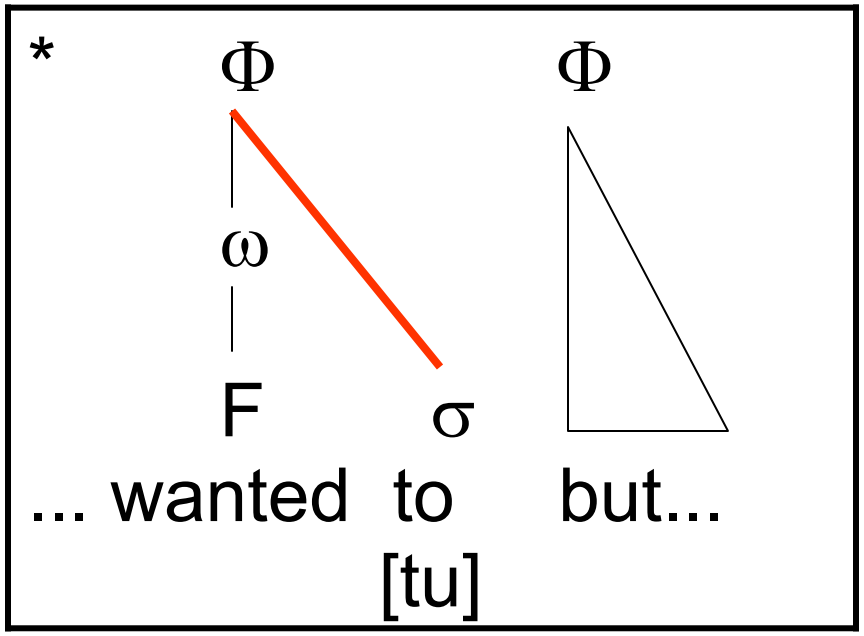


Aside: *We got'm*

- What about (pronominal object) enclitic forms like *gimme, got'm*, or *need'm*?
- They go against the general proclitic behavior of English function words, and have a special morphosyntactic status (Selkirk 1995, 459-460).

Step 3: Phrasal layering

- Phrasal layering rules out structures where the σ that constitutes a *fnc* is directly dominated by Φ.

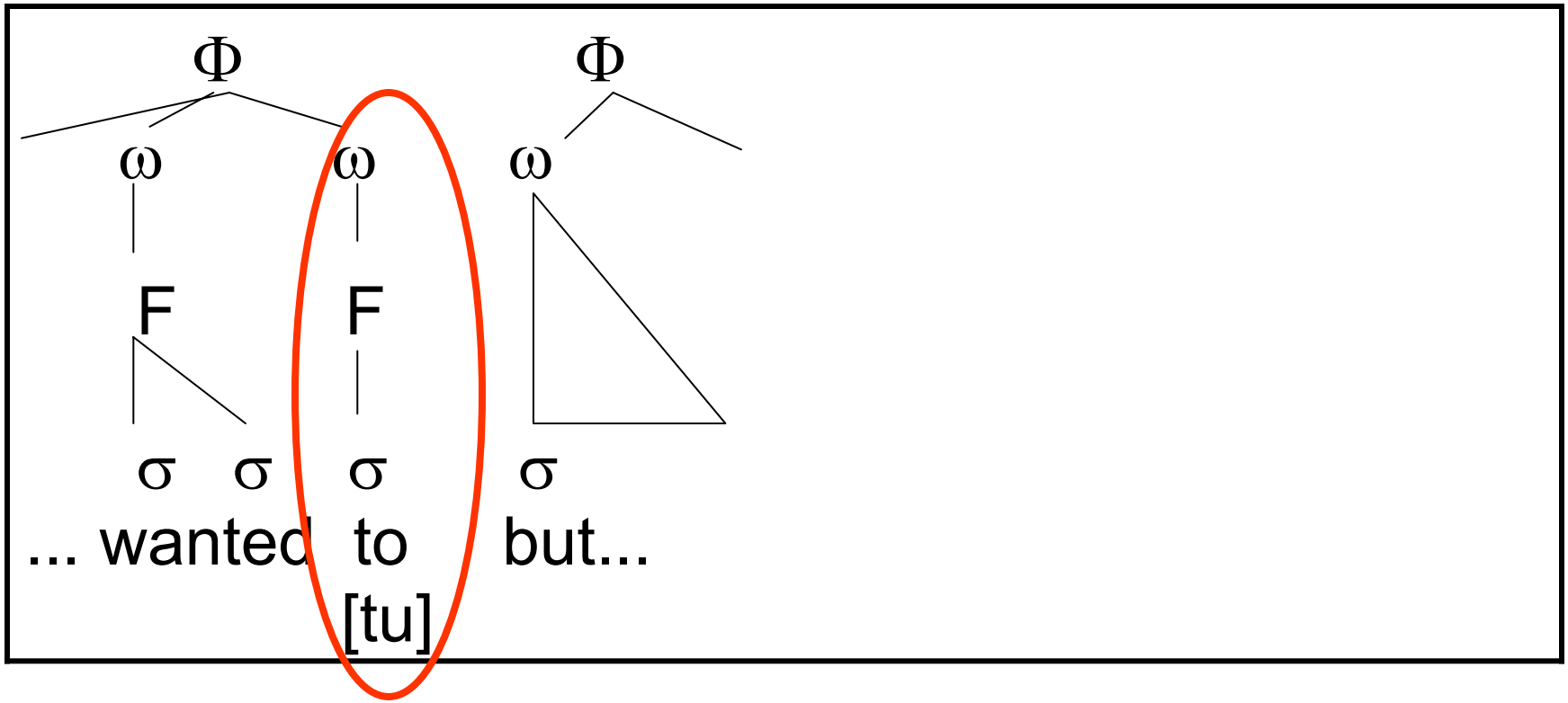


Consequence: final *fnc* parsed as ω

- Therefore, since all subordination to the right and to the left is ruled out, as is immediate domination by Φ, *fnc* must be a ω by itself.
- Headedness then requires this ω to be headed by F.

Consequence: final *fnc* parsed as ω

- ω-status of fnc means irreducibility:

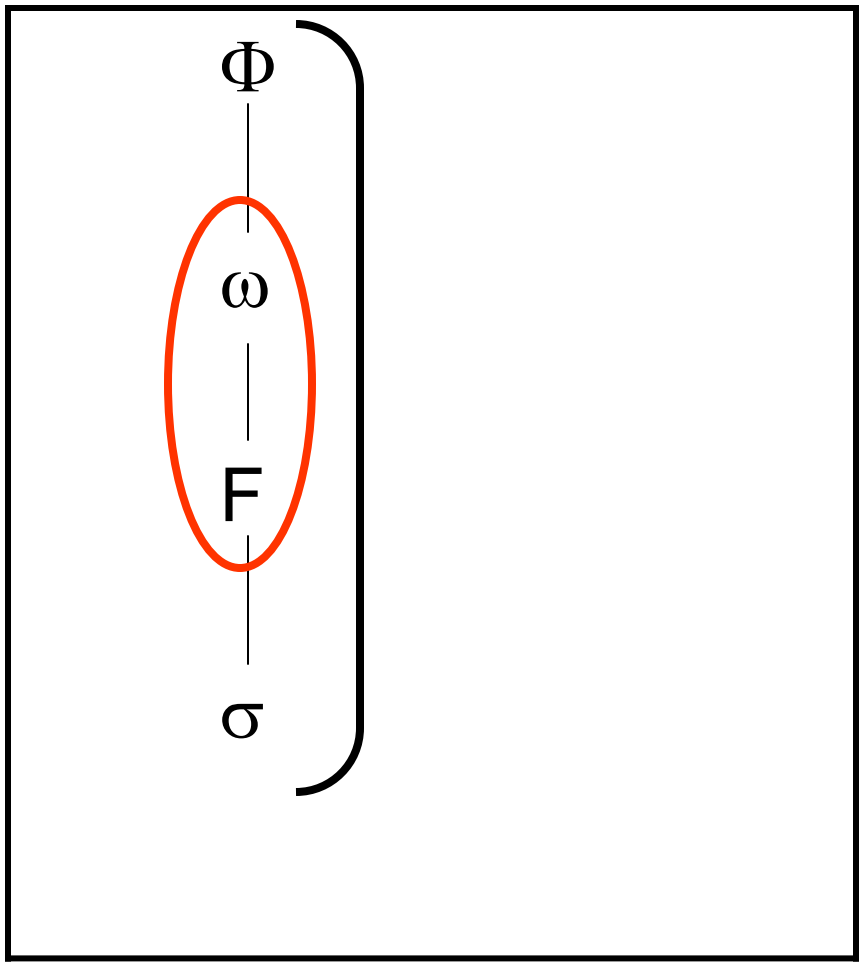


Φ-domination again

- On the other hand, the Φ-domination theory is built on the assumption that phrasal layering is violable.
- It has therefore no direct explanation for the non-reducibility of Φ-final function words.

Φ-domination again

- Φ-domination theory needs to add further constraints on right edges of Φ—requiring strict layering in this specific location.
- But this is a stipulation of the observation, not an explanation.



Conclusion

- We have proposed a minimal prosodic ontology at the phrase level distinguishing only ω and Φ as categories,
- but with crucial use of adjunction structures, and relational notions such as maximal and minimal projections of categories.

Conclusion

- Finally, we have presented some thoughts towards a new conception of the constraints concerning layering in prosodic structure,
- and have put these ideas to work in considering some questions regarding the phonology of clitics.

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