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Prosodic structure above the Phonological Word

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1. Introduction

- Clarify and revise the notion of recursivity (REC) of prosodic units.
- Argue that REC is restricted and arises from the morphosyntax-phonology interface:

  The grammar requires recursive morphosyntactic (e.g., complex predicates, adjuncts, etc.) structures to be mirrored in phonology in the most parsimonious way possible.
- Claim that main prosodic constituents that mediate the morphosyntax-phonology interface are the *Phonological Word* (PW) and the *Phonological Phrase* (PPh).

⌦ **PROPOSAL**:

- Recursive structures are accommodated by extending an already existing prosodic constituent. Thus, a two-segment prosodic category is created.
- The "extended" constituent is a recursive one, which exhibits an ambiguous behavior because (a) it inherits the properties of its mother (head category), and (b) being an additional layer of structure, it may develop properties of its own (especially in the context of rhythmic re-adjustment rules).

⌦ **OUTCOME**:

a. REC is constrained in a principled way.
b. Explains why REC in the levels below the PW and above the PPh is unmotivated.
c. Accounts for why the majority of rules that have been observed to apply within recursive domains often tend to be optional rules, and very frequently rules related to rhythmic re-adjustment.
d. Provides a room for processes that have been claimed to take place between the PW and the PPh (e.g., the Clitic Group; Minor Phrase, etc.)

2. Recursivity in phonology

2.1. Empirical motivation for REC at the PW level

2.1.1. The case of affixal clitics (Selkirk 1995)

(1) *prosodic structure of function words*

a. (fnc host)$_{PW}$ *internal clitics*
b. (fnc (host)$_{PW}$)$_{PW}$ *affixal clitics*
c. (fnc (host)$_{PW}$)$_{PPh}$ *free clitics*

Q: What sort of evidence has been put forward in order to motivate this typology?

Internal clitics

- Type of argument: if an element is subject to the rules of domain *n*, then it belongs to domain *n*.

Affixal and free clitics

- Type of argument: if an element is not subject to the rules of domain *n*, then it belongs to domain *n+1*.

Evidence #1: Selkirk (1995)

English:

(1) ((need)$_{PW}$ 'm) $_{PW}$ (vowel reduction)

Serbo-Croatian (Šrem, Mačva dialects, based on Zec 1993):

(2) (ú (gláavu)$_{PW}$)$_{PW}$ ~ (ú (glaavu)$_{PW}$)$_{PW}$ 'into the head' (default accent assignment within the innermost or outermost PW)

Evidence #2: Booij (1995, 1996) claims that there is an asymmetry between enclisis and proclisis: proclitics are affixal; enclitics are internal.

Dutch: Prevocalic ə-deletion applies within PW but not across PWs, (3a). The rule applies between a host and an enclitic, (3b) but crucially not in proclitic + host strings, (3c).

(3)	a.	/romə-ein/	[romɛin]	'Roman'
	b.	/haldə ɪk/	[haldɪk]	'fetched I'
	c.	/də avɔnd/	[də avɔnt]/*[davɔnt]	'the afternoon'

☞ Recursivity is used to induce rule blocking (an intermediate boundary within the same prosodic constituent blocks the application of schwa-deletion).

☞ **Inconsistency**: For Selkirk, the absence of a rule application (aspiration) suggests a free clitic, e.g. ([t]o_{σ} (*London*)$_{PW}$)$_{PPh}$. On the contrary, for Booij, the same suggests an affixal clitic.[1]

Evidence #3: Peperkamp (1996, 1997) argues that cliticization in Neapolitan is a post-lexical operation; the output of the lexical level contains words with their prosodic structure, which together with clitics form the input to cliticization.
Result: clitic adjunction (affixal clitic)

Neapolitan: Absence of primary stress weakening, blocking of mid vowel raising, (4a-b):

(4)	a.	pɔ́rta tə	'bring-IMP yourself'	(P 1997: 177-8)
	b.	pɔ́rtaténnə	'bring-IMP yourself of-them…'	
	cf.:	purtátə	'you (pl.) bring'.	

[1] See, however, Grijzenhout and Krämer (2000) who propose an alternative analysis where clitics are parsed by the PPh.

Important note: C-lengthening and unpredictability of the stressed vowel quality → combinations of enclitics are stored as allomorphs.

⌦ **CONCLUSION**: A single clitic adjoins recursively to the PW; a string of clitics forms a foot which recursively adjoins to the PW of the host. Clitics can never prosodify with unfooted material of the host because lexically built structure cannot be modified.

⌦ **End-result**: The outer PW is the output of post-lexical phonology!

☞ **IMPORTANT OBSERVATION**: Clitic allomorphy takes place within the outermost PW. In other words, there is a rule that refers specifically to the outermost domain but not to the innermost one. Consequently, the recursive PW is subject to a different rule.

☞ **Yet another inconsistency**: Recursive domains are extended domains of existing categories, which in principle should not induce new rules.

> A subset of the rules should apply to the outermost PW than those applying to the innermost PW.

2.1.2. Interim summary

- Recursivity is used to distinguish affixal clitics from free (and internal) clitics.
- However, no convincing evidence for recursive domains. Emphasis is on showing that a clitic may not be part of a PW. Plus, inconsistent arguments to draw the distinction between affixal and free clitics.
- The only valid argument comes from Peperkamp who shows that a prosodic rule (stress) applies to both the innermost and the outermost (post-lexical) PW.
- Recursive PWs should not initiate new phonological domains. Rather, the REC domain is where a subset of PW-phonological rules applies.

2.2. Empirical motivation for REC at the PPh level

Evidence #1: Itô & Mester (2007)

Dutch (based on Schreuder and Gilbers 2004, Schreuder 2006): Multiple instances of the *Rhythm Rule* (signalling the left boundary of a PPh) in complex phrases created by iterative adjunction indicates recursive phonological phrasing.

(5) $_{PPh}$[ònafh**a**nkelijk $_{PPh}$[Àmsterd**a**ms $_{PPh}$[àardrijksk**u**ndig gen**oo**tschap]]]
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cf.: onafhánkelijk, Amsterdám, aardrijkskúndig

Evidence #2: Gussenhoven (2005)
English: independently proposes recursive structures for English prenominal modifier constructions:

(6) $_{PPh}$[Twènty-s**i**x $_{PPh}$[vèry n**i**ce $_{PPh}$[Jàpan**e**se CDs]]]

2.3. Theoretical and conceptual problems with REC

- Where, how, and how many times REC can apply are not clear.
- Whether it applies at every level of prosodic constituency is largely ignored. If it doesn't, what is the explanation?
- Recursivity is not discussed explicitly in the prosodic phonology literature. It emerges via constraint violation (NONRECURSIVITY). No principled motivation for such construction. Often, it results from theory-internal assumptions.
- The violation of NONRECURSIVITY is like opening Pandora's box. The constraint is negatively defined, therefore, what constitutes recursion is open to different interpretations.
- Itô & Mester (2007) offer a more restricted account of REC based on the notion of *adjunction* to two prosodic constituents, namely PW and PPh. We will come back to their proposal in section 7.

3. An interface perspective on REC

⌦ **ASSUMPTIONS:**

- Recursion is part and parcel of language; so it must also be present in phonology.
- However, it is not an inherent property of phonology, but rather the by-product of its interface with morphosyntax. More specifically, it arises from two types of constituents:

Inherently recursive morphosyntactic structures such as nominal and verbal compounds (e.g., complex predicates). Function elements that have to merge with the rest of the derivation at a later phase (clitics; Philippaki-Warburton & Spyropoulos 1999) ⇩ $[Y\ X]\ X \rightarrow PW_{REC}$ ADJUNCTION to an $X \rightarrow PW_{REC}$

Pieces of structure such as adjunct modifiers (i.e., elements that are assembled parallel to the main derivation at their own derivational workspace) that have to merge with the rest of the derivation at a later stage (by means of a discontinuous application of Merge.[2] ⇩ ADJUNCTION to an $XP \rightarrow PPh_{REC}$

☞ In short, morphosyntactically recursive structures or those created outside the main lexical or syntactic cycle.

⌦

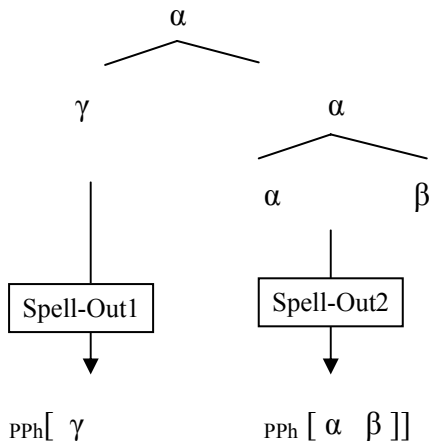
The interface gives us two main sites: the PW and the PPh. One cannot possibly have recursion at the level of the Foot or the Syllable, because these are not possible interface sites. Hence recursion of these constituents is not an available option.

In this paper, we focus on these two types of adjunct constructions. Specifically, we look at:

[2] See Revithiadou & Spyropoulos (2006) and the references therein.

☞	**COMPOUNDING:**		
a.	Complex Nouns	([N N] N)	PW_{REC}
b.	Complex Predicates	([N V] V) or ([V V] V)	
☞	**ADJUNCTION:**		
c.	Preverbal pronominal object clitics	(cl V) TP	
d.	Adjunct modifiers	(YP XP) XP	PPh_{REC}

(7) Multiple Spell-Out system with an adjunct (Uriagereka 1999)



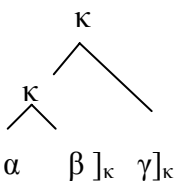
- Below we will illustrate each of these structures using data primarily from Greek and Turkish and show that:

  a. Adjunction at the level of PPh and PW creates a two-segment category that corresponds to an innermost and an outermost phonological layer at the PF.

  b. The outermost layer inherits properties of the mother constituent. Those properties may reiteratively or optionally apply within that layer of structure.

  c. As a separate layer, however, it is likely to be interpreted as triggering unique phonological properties though this is not mandatory. We argue that such properties are quite often related to rhythmic structure building/ re-adjustment.

(8)



- inherent properties of *κ* (κ, γ)
- properties inherited from κ

4. Empirical substantiation

4.1. PW-Adjunction

4.1.1. PW-rules and their optionality

A. Clitics forming REC structures with their host: [cl [host]$_{PW}$]$_{PW}$

Case study: Standard Greek pronominal clitics (Revithiadou & Spyropoulos 2006)

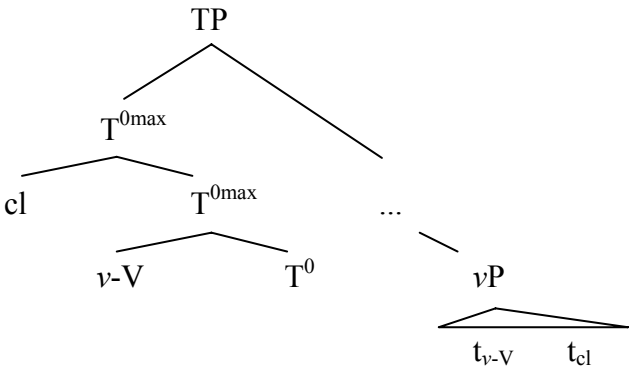
(9) *pro.cl (+pro.cl) + verb*

a.	/mas maɣirévi/	[ma**z.m**ajirévi]	'(s/he) cooks for us'
b.	/mas ðjavázi/	[ma**z.ð**javázi]	'(s/he) reads for us'

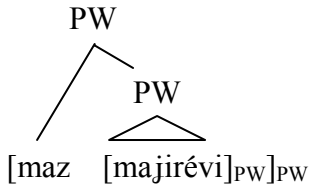
(10)

a.	/me afíni/	[meafíni]	~	[m**a**fíni]	'(s/he) leaves me'
b.	/me onomázi/	[meonomázi]	~	[m**o**nomázi]	'(s/he) names me'
c.	/me elénxi/	[meleɳçi]	~	[m**e**leɳçi]	'(s/he) controls me'

(11) a. *syntactic structure*[3]



b. *prosodic structure*



Evidence:

☞ **A SUBSET OF PW-RULES**: As evident from examples in (9), *s*-voicing applies (see description of rule in (12) below). However, no re-syllabification: *maz.majirévi/ *ma.zma.ji.ré.vi* (contrast with *zmí.nos* 'swarm', *i.zmí.ni.* 'fem. name', *ɣe.ra.zmé.nos* 'aged')

☞ **OPTIONALITY OF RULES**: As shown by the examples in (10), *e*-deletion optionally applies (see description of rule in (13) below).

[3] Philippaki-Warburton & Spyropoulos (1999), Spyropoulos (1999), Philippaki-Warburton et al. (2004) offer a cliticization analysis as adjunction to the T head.

(12) *s-voicing: A PW rule*

s → z / ___m, v, ð, ɣ *obligatory*	1. *underived words*: zmínos ‘swarm’, izmíni ‘name’ 2. *prefixed words*: proz-moní ‘anticipation’ (/pros-/) 3. *suffixed words*: ɣeraz-ménos ‘aged’ (/ɣeras-/)

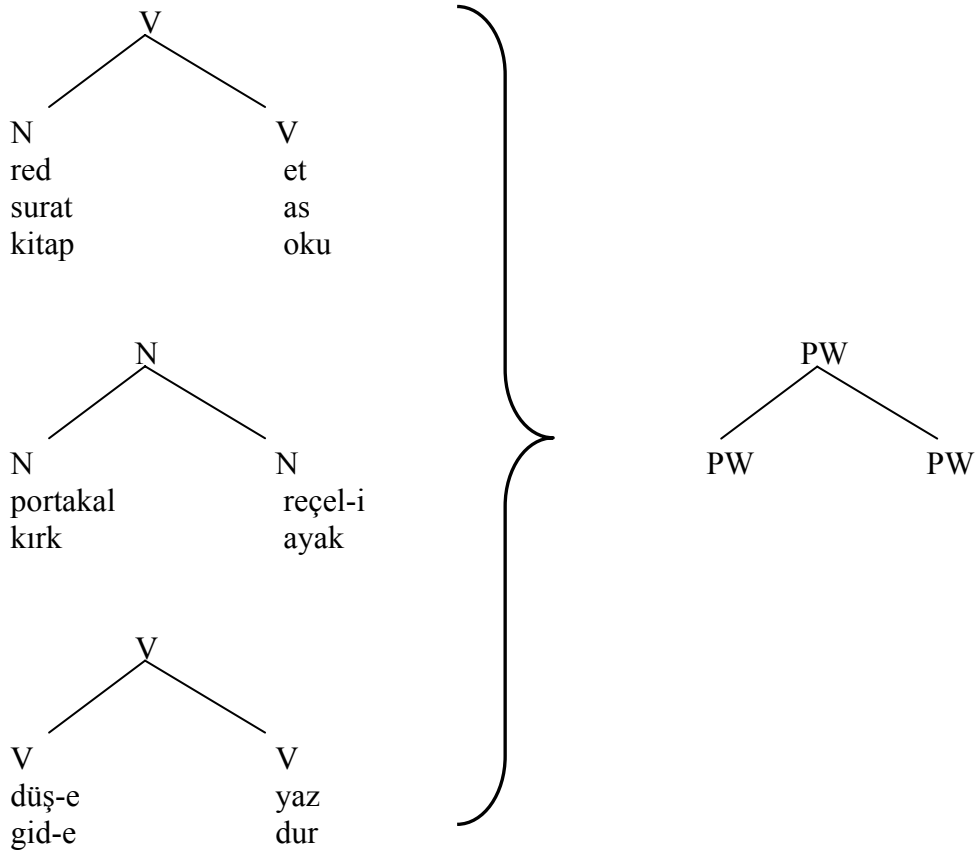
(13) *e-deletion in hiatus: A PW rule*

e → ∅ / __{a, o, e} *obligatory*	/e-a/ /e-o/	/kse-alázo/ /kse-onomázo/	[ksalázo] [ksonomázo]	‘change (clothes)’ ‘un-name s.o.’

B. Compounds and complex predicates forming REC structures: [[noun]$_{PW}$ [light verb]$_{PW}$]$_{PW}$

Noun-head incorporation for Turkish (e.g., Knecht 1986; Kornfilt 1995, 2003; Aydemir 2004; see Öztürk 2005 for a pseudo-incorporation analysis)[4]

(14) *syntactic structure* *prosodic structure*



Glosses: red et: (reject do) ‘to reject’; *surat as*: (face hang) ‘get upset’; *kitap oku* (book read) ‘read a book’; *portakal reçel-i* (orange jam-CPMRK) ‘orange jam’; *kırk ayak* (fourty feet) ‘caterpillar’; *düş-e yaz* (fall-CVM fall) ‘to almost fall down’; *gid-e dur* (go-CVM stop) ‘continue to go’

[4] Based on standard assumptions on incorporation (Baker 1988, 1996), one can claim that the moved element adjoins to the V. Thus, the analysis proposed here correctly predicts that this element will be parsed recursively to the head category.

Case study: Light verbs (LV) in Verbal Compounds in Turkish

LVs ARE THEMSELVES PWs	LVs FORM PWs WITH THEIR HOSTS
a. They do not harmonize with the preceding vowels; rather they initiate their own harmony domain (15) b. All are at least bimoraic and have final stress just like a word (e.g., içín 'for') c. They can be reduplicated just like any other words (16). d. All can occur in isolation (17) and can get inflected.	a. They are syllabified with their hosts unlike syntactic phrases. b. Consonant cluster resolution (18) c. Degemination (19) d. Long vowel shortening (20)

(15) a. telefon et-mek 'to phone'
telephone do-INF

b. tıraş ol-mak 'to shave'
shave be-INF

(16) a. hasta ol-du-m **m**ol-du-m 'I was sick and such'
b. kahvaltı et-ti **m**et-ti '(s)he had breakfast and such'

(17) A: telefon et-ti-n-mi? 'Did you phone?'
telephone do-PAST-2P-INTER

B: et-tí-m 'I did'
do-PAST-1S

(18) Consonant cluster resolution:

Compound Verbs:
a. /haps ol-mEk/ ha**ps** olmak 'to be imprisoned'
prison be-INF

Syntactic Phrases:

b. /haps iste-mEk/ ha**pis** istemek (*haps) 'to ask for imprisonment'
prison want-INF

(19) Degemination:

Compound Verbs:
a. /redd et-mEk/ re**dd** etmek 'to reject'
rejection do-INF

Syntactic Phrases:

b.	/redd al-mEk/	red	almak (*redd)	'to receive rejection'
	increase want-INF			

(20) Long vowel shortening:

Compound Verbs:

a.	/haraːm et-mEk/	har**aː**m etmek	'to take the pleasure out of s.th.'
	forbidden Aux-INF		

Syntactic Phrases:

b.	/haraːm et/	haram (*haraːm) et	'religiously forbidden meat'
	forbidden meat		

(21) Absence of CC-resolution and degemination can also be observed in certain compounds: (e.g., *kayn+ana* 'mother-in-law'; *kayn+ata* 'father-in-law'; see Kabak & Vogel 2001: 350-352)

⌦ **CONCLUSION**: PW-rules are observed in the outermost domain.

4.1.2. Unique PW_{REC} processes: Segmental rules

A. Clitics forming REC structures with their host: [cl [host]$_{PW}$]$_{PW}$

Case study: Patras Greek (Peloponese) and Cargese (Corse) Greek (Blanken 1951)

Intervocalic *t*-voicing optionally applies only within sequences of clitics (22) but not within PWs (23) or across PWs (24):

(22) *Patras Greek*

a.	θa **d**a púme (Patras)	θa ta púme (StGr)	'(we) will discuss them'
b.	na **d**o ðjavásume	na to ðjavásume (StGr)	'(we) will study it'
cf.	to ðjavázume	to ðjavázume (StGr)	'(we) read it'

(23)

a.	káti / *kádi	'something'
b.	ana-tinázo /*ana-dinazo	'(I) blow up'

(24)

a.	pézo távli /*dávli	'(I) play backgammon'
b.	tróo taramá /*tróo daramá	'(I) eat tarama'

In Cargese, inter-vocalic *t*-voicing is enforced within clitic clusters (25) but not within PPhs (26a) or within PWs (26b):

(25) *Cargese* (Blanken 1951: 70)

a.	θé na **d**i jeráso	/θé na ti jeráso/	'to make her grow old'
b.	ta mátja **d**u	/ta mátja tu/	'his eyes'
c.	vlépo **d**óne	/vlépo tone/	'(I) see him'

(26) a. θéli t̲us ðókun ‘(s/he) wants to given them’ (Blanken 1951: 141)
b. exánat̲e ‘you were losing’ (Blanken 1951: 123)
kát̲ina ‘something’ (Blanken 1951: 256)

4.1.3. Unique PW_{REC} processes: Rhythmic structure building and re-adjustment

A. Clitics form REC structures with their host: $[(cl\ cl)_F\ [host]_{PW}]_{PW}$

Case study #1: Greek clitic clusters form F and adjoin to PW[5]

☞ Development of rhythmic/secondary stress

(27) a. /mas tus maɣirévi/ [màstu**z. m**aʝirévi] ‘(s/he) cooks them for us’
b. /mas tus ðjavázi/ [màstu**z. ð**javázi] ‘(s/he) reads them for us’

B. Compounds and reduplicative formations creating REC structures: $[[modifier]_{PW}\ [head]_{PW}]_{PW}$

Case study #2: Reduplication in Turkish

☞ Leftmost stress prominence

(28) a. káp-kara ‘pitch black’ (*kap-karά)
b. pés-pembe ‘very pink’ (*pes-pembé)

(29) a. yaváş yavaş ‘slowly’
b. güzél güzel ‘beautifully’
c. koş-á koş-a ‘by running’

Case study #3: Compounds and Complex Predicates

☞ Compounds have different prosodic properties compared to phrases:

Turkish:

(30) a. kɨ́rk ayak ‘caterpillar’ b. kɨ́rk ayàk ‘fourty feet’

Kabak & Vogel 2001

PPh	*			*	
CG	*			*	*
PW	*	*		*	*
	kɨrk	ayak		kɨrk	ayak

[5] The same phenomenon is also observed in dialects of German (see Kabak & Schiering 2006).

Greek:

(31)

	Adj+N Compounds (Rightmost prominence)		Adj+N Phrases (Leftmost prominence)	
a.	pirinikòs pólemos	'nuclear war'	irakinós pòlemos	'Iraqi war'
b.	ðiplomatikò sóma	'diplomatic body'	ðiplomatikí apàndisi	'diplomatic answer'

Turkish:

(32)

	Complex predicate (no secondary stress)	Phrase (secondary stress)
a.	koş-**úp** dur-du 'he continued to run.' run-CNV Aux-PAST	koş-**úp** dur-dù '(s)he ran and stopped.' run-CONJ stop-PAST
b.	at-**ɨ** ver-di '(s)he suddenly threw it' throw-CNV Aux-PAST	at-**ɨ** ver-đì '(s)he gave the horse.' horse-ACC give-PAST

⌦ **CONCLUSION**: Metrical Phonology interprets outermost domain (PW_{Rec}) as an independent layer. Stress prominence is decided on a language-specific basis.

4.2. PPh-Adjunction

syntactic structure *phonological structure*

☞ *Dutch* (Schreuder 2006): Multiple instances of the *Rhythm Rule* (signaling the left boundary of a PPh) in complex phrases created by iterative adjunction indicates recursive phonological phrasing.

(33) $_{PPh}$[ònafh**a**nkelijk $_{PPh}$[Àmsterd**a**ms $_{PPh}$[àardrijksk**u**ndig gen**oo**tschap]]]
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cf.: onafhánkelijk, Amsterdám, aardrijkskúndig

☞ Gussenhoven (2005: 189): PPhs can be multiply nested in prosodic structure.

(34) $_{PPh}$[Twènty-s**i**x $_{PPh}$[vèry n**i**ce $_{PPh}$[Jàpan**e**se constrúctions]]]

⌦ **CONCLUSION**: Iterative adjunction results into PPh_{REC} which are signaled by a specific rhythmic rule.

5. REC in the Lexicon

- Finally, besides the purely morphosyntax-driven account of recursivity, we also argue that recursion can also be lexically encoded. That is, morphosyntactic elements can have a templatic specification as to where they adjoin. Such elements have been argued to develop from independent compound-like constructions (see Kabak and Revithiadou 2006).

Examples:

⌦ **PW-adjoiners** (Kabak & Vogel 2001: 328):

-mE *negative*
-y/0 *copula*
-yken *'while'*
-ylE *instrumental/commutative*

(35) a. [bıçák]-la$_{(PWA)}$ 'with a knife'
b. [yáz] $_{(PWA)}$-ma-dı-nız 'you did not write'

⌦ **PPh-adjoiners** (Revithiadou & Spyropoulos 2006)

- In Greek, fill-words such as *ré*, *re sí*, *moré*, and parentheticals, e.g. *léj* '(s/he) says', *as púme* 'let's say', and so on, which in Greek are placed after the first PPh: {[…]PPh ___ […]PPh …}IP.

(36) *fill-words after a PPh*
a. [to éfaγan]$_{PPh}$ *léj* [to axláði]$_{PPh}$
it eat-3PL.PAST (s/he) say-3SG.PRES the pear-ACC.SG
'They ate, says he, the pear.'

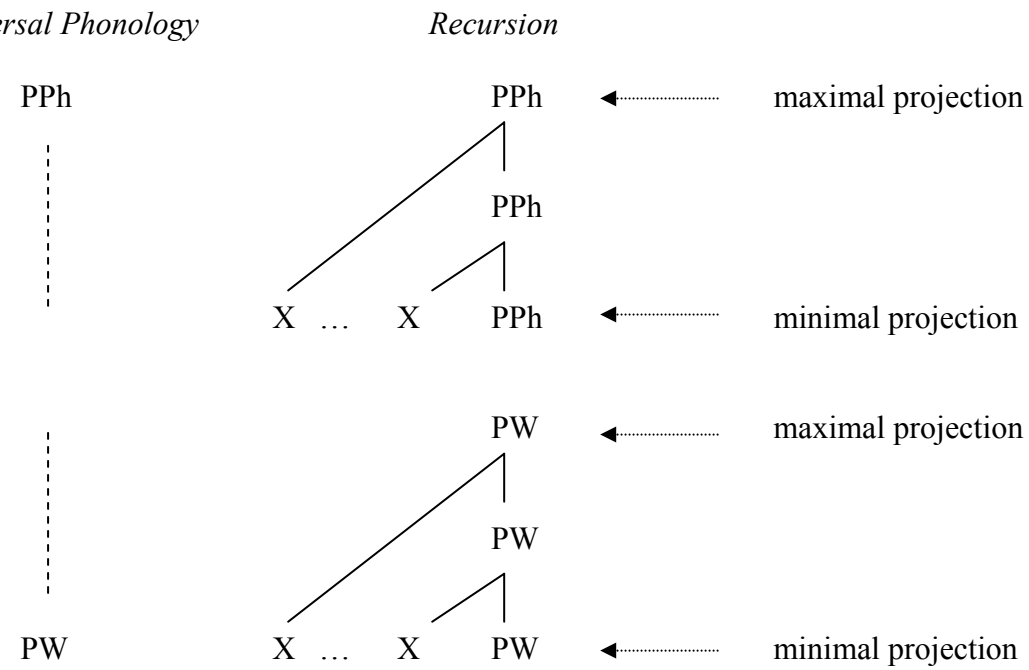
b. [o jánis]$_{PPh}$ *re* [kérðise to laçío]$_{PPh}$
the John-NOM.SG re win-3SG.PAST the lottery-ACC.SG
'John, hey you, won the lottery'

- That these elements fall outside the PPh is supported by several segmental and metrical rules. For instance, blocking of s-voicing, (36b).

6. An alternative account: Itô & Mester (2007)

- Itô & Mester (2007) address the issue that the prosodic hierarchy has too many categories but too little structure and propose a radical simplification by introducing minimal and maximal projection of heads.

- Universal Phonology provides only two prosodic categories (besides the word internal units such as the syllable).



- Inherent restrictiveness of the model: There can only be one maximal and one minimal instantiation of every category.

⌦ **POSITIVE OUTCOME**:

- Prosodic adjunction is accommodated by such projections, resulting in recursive (but limited) phonological structures.

⌦ **CRITICISM**:

- Although it is a very significant advancement towards understanding of the prosodic hierarchy and the notion of recursivity in phonology, we observe the following weaknesses, which raise questions for future research:

1. Why are projections limited to PW and PPh? And not, let's say, to IPs and Us. They don't provide a viable explanation for that.

2. Imagine a rule that applies to PWmax, and there is a sequence where the rule is observed but there is not enough material to build up PWmax. Does the rule apply? If yes, then the rule has to be specified as applying to PW min/max. Weird rule: Apply the rule up to the topmost PW layer (PWmax) provided that this layer is constructed; otherwise, apply it to the next lower level. The rule refers to structures that do not have to be constructed. For instance, t-voicing in Peloponese Greek applies between clitics – in our terms the PW_{Rec}. For I&M this should be a PWmax rule but then it will also have to apply to a PW without clitics, since for a construction without additional material, i.e. clitics, this will be the maximal projection of that particular PW. In other words, this approach incorrectly predicts t-voicing to take place within the phonological word.

7. Conclusions

- REC arises primarily from a requirement to mirror recursive morphosyntactic (e.g., complex predicates, adjuncts, etc.) structures.
- REC at *Phonological Word* (PW) and the *Phonological Phrase* (PPh) is principled since these are the main prosodic categories that participate in the morphosyntax-phonology interface.
- Our analysis incorporates recursion from a necessity, rather than through constraint violation.
- The analysis provides a room for processes that have been claimed to take place between the PW and the PPh (e.g., the Clitic Group; Minor Phrase, etc.). REC is able to accommodate these processes in a simple and straightforward fashion.

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