An interface approach to prosodic word recursion

Barış Kabak and Anthi Revithiadou
University of Konstanz and University of the Aegean

1. Introduction

This paper addresses the issue of recursivity in prosodic phonology with special emphasis on the *prosodic word* (alias *phonological word*; henceforth PW) and brings attention to several conceptual and empirical problems and inconsistencies with the notion of recursivity as it has been applied to this phonological constituent.[1] Our purpose is to explore the nature of recursive prosodic words and how they are generated at the morphosyntax-phonology interface. In recent phonological theories, the constraint NONRECURSIVITY has been employed to account – presumably via its violation – for the emergence of recursive prosodic structures. It is not clear, however, under which conditions, where, and why recursive structures arise in prosody. For instance, it is still an open question whether there is recursivity below the level of the PW (see also Itô and Mester 2007).[2] In this paper, we argue that recursion is not an inherent property of phonology but arises by the mirroring of recursive structures at the morphosyntactic level. More specifically, we take a less explored approach towards prosodic recursivity whereby the grammar requires recursive morphosyntactic structures such as complex predicates and adjuncts to be mirrored in phonology in the most parsimonious way possible. Due to its genuine interface character, our approach limits recursivity to the PW as well as to higher prosodic levels such as the *phonological phrase* (henceforth PPh) since these are the main prosodic constituents that are involved in the morphosyntax-phonology interface. This is essentially the view proposed in Selkirk (1995) where the variety of PW structures falls out either from different constraint rankings (i.e., grammars) or from differences in morphosyntactic structures. Here, we explore and expand the latter source in an attempt to properly define and restrict the notion of recursivity in prosodic phonology.

Furthermore, we draw attention to various functional problems with the constraint NONRECURSIVITY (henceforth, NONREC; Selkirk 1995: 443) as it stands. First, we show that it does not do the job that it is intended to do because recursive structures do not emerge through the violation of this constraint but through the interaction of different constraint sets (e.g., ALIGNMENT » EXHAUSTIVITY) (see Section 3). Second, NONREC is not crucially needed to evaluate optimal recursive structures nor to derive Selkirk's (1995) clitic typology. Its effects can again be subsumed by other independently motivated constraints. Hence, we propose that NONREC should be dispensed with. Instead, we exploit already existing interface constraints such as ALIGNMENT and WRAP (McCarthy and Prince 1993; Selkirk 1995; Truckenbrodt 1995, 1999) to derive prosodic recursion.

In our analysis, recursion is essentially imposed in phonology by morphosyntax. Since it is not an intrinsic property of phonology, but rather is imported from its interface with another component of the grammar, we assume that recursive structures must be marked prosodic constructions. Formally, they result from the extension of an already existing prosodic constituent, yielding a two-segment prosodic category. Specifically, such an "extended" PW exhibits an ambiguous behavior because (a) it inherits the properties of its mother (head PW), and (b) by being an new entity, it may develop properties of its own. We show that since an additional layer of structure is created, the new properties of this constituent have the form of rhythmic re-adjustment rules. As such, our account provides an explanation as to 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

[1] The very focus of this paper, namely recursivity, suggests that we adopt a *Weak Layering* approach (Itô and Mester 1992, 2003) to prosodic organization.

[2] Although occasionally recursive feet have been proposed (e.g., Selkirk's 1980a dactylic foot), they are always subject to re-analysis (Dresher and Lahiri 1991; Kager 1994). Furthermore, the place of phonological units lower than the PW in the *Prosodic Hierarchy* (Selkirk 1980b, 1981; Nespor and Vogel 1986; Hayes 1989; among others) has been questioned. For instance, Inkelas (1989: 47) calls attention to an ordering paradox that results from the assumption that phonological rules construct moras, syllables and feet but, at the same time, they apply within a prosodic domain, which, strangely, is built on the very same constituents, namely moras, syllables and feet. In other words, these lower level constituents feed parsing into higher prosodic constituents which, nevertheless, are constructed on the assumption that moras, syllables and feet exist. Therefore, she proposes that constituents below the PW should be excluded from the Prosodic Hierarchy, which is thus confined only to constituents that serve as domains of phonological rules.

processes. Another positive aspect of this approach is that it constrains recursivity in a principled way and explains why recursion below the level of the PW and above the PPh is less motivated because, as we will show, (i) prosodic recursion derives from the interface with syntax, and (ii) the PW and the PPh are precisely the sites for this interface.

The paper is organized in the following way. First, we discuss the notion of recursivity in phonology. We specifically focus on arguments that motivate recursive PWs in Selkirk (1995) and Booij (1995, 1996) and point out some inconsistencies in the way these arguments have been applied to motivate recursivity in various languages. Next, we lay out the fundamental assumptions of our proposal and define constructions that generate recursive structures in the phonological component. Our proposal is empirically substantiated with detailed evidence from Greek and Turkish. At the same time, we demonstrate how our approach maintains cross-linguistically attested types of PWs in the prosodization of function words. Finally, we discuss some cases of recursion that derive from lexical specification and propose some directions for future research.

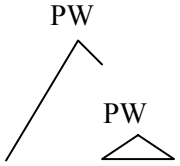
2. Recursivity in phonology

We identify two major sorts of arguments for recursion at the PW level. The first type of argument is phonological in nature and is primarily the view advocated in the work of Booij (1995, 1996) as well as many others (e.g., Peperkamp 1997; Vigário 1999, 2003). According to this view, the main motivation for the existence of a recursive PW is the blocking or the optional application of a PW-level phonological process. For instance, the evidence that proclitics in Dutch are parsed into a recursive PW (henceforth PW_{REC}) structure with their host comes from prevocalic schwa deletion. This rule normally applies within a PW (1a-b), but not across PWs. Crucially it is not enforced in proclitic plus host strings, (1c).[3] For Booij (1996), the blocking of schwa deletion in this environment suggests that proclitic recursively adjoins to its host, as shown in (2). As such, the left edge of the innermost PW serves as a buffer to block the application of the deletion rule in question.

(1) *Rule-blocking as evidence for PW_{REC}*

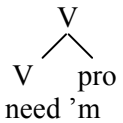
a.	/romə-ein/	[romɛin]	‘Roman’	(Booij 1996: 226)
b.	/haldə ık/	[haldık]	‘took I’	
c.	/də avɔnd/	[də avɔnt]/*[davɔnt]	‘the afternoon’	(Booij 1996: 231)

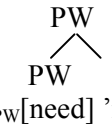
(2) *Recursive PW in Dutch proclisis*



Employing a morphosyntactic view towards recursivity, Selkirk (1995: 458-460) proposes that nested syntactic structures such as the one given in (3) are translated by phonology into a PW_{REC}.

(3) a. *syntactic structure* b. *phonological structure*





$_{PW}[_{PW}$[need] ’m] (cf. *Needham* $_{PW}$[nid m̩])

In this case, recursion is imposed by syntax forcing phonology to mirror the nested morphosyntactic structure by respecting the prosodic boundaries of the lexical word, i.e., the verb. This is ensured by a high-ranked alignment constraint (McCarthy and Prince 1993) which requires every edge of the

[3] Dutch clitics have been the topic of investigation of many researchers (Berendsen 1983; Gussenhoven 1985; among others). Recently, Grijzenhout and Krämer (2000) proposed an analysis where clitics are parsed by the PPh.

morphological word to be matched by a PW boundary. Unfortunately, the morphosyntactic argument was not really pursued fervently in the prosodic phonology literature and, as a result, it gradually lost strength and, eventually, it was silenced.

Essentially, the two views are not only diametrically different but also incompatible. For instance, the non-application of a rule has received different interpretations by different researchers. To give an example, for Selkirk (1995: 451-452), the failure of the PW-level rule of aspiration to apply to the initial voiceless stop in a phrase such as [[*t*]o_{σ} [*London*]$_{PW}$]$_{PPh}$ suggests that the function word in this position does not initiate a PW. Thus, it must be parsed at the level of the PPh, thereby constituting a *free clitic*.[4] On the contrary, for Booij (1995, 1996), the non-application of such a PW-level rule in similar cases is taken as evidence that the function word is adjoined to the PW forming an *affixal clitic* construction.

Yet another veil of uncertainty that surrounds the notion of recursivity lies in the precise phonological behavior assumed to be displayed by recursive structures: Should the application of the new set of rules be legitimately used to argue for recursive structures, or should it constitute evidence for the existence of another domain (e.g., CG (Nespor and Vogel 1986; Hayes 1989), or any other domain within the Prosodic Hierarchy; see Vogel [this volume] for a discussion)? Analyses differ on this issue. For instance, Peperkamp (1997) makes a crucial distinction between the innermost and the outermost PW in Neopolitan, where the latter is reserved for post-lexical phonological allomorphy. In particular, while prosodic structure up to the level of the PW is built at the lexical level, cliticization in this Italian dialect operates at the post-lexical level. Since prosodic structure built at the lexical level cannot be modified, Peperkamp has to resort to recursion for constructions involving clitics. Another set of argument for the assumption that the relevant domain must be an extended PW, but nothing else, comes from the fact that enclitic clusters develop their own stress under the pressure of the three-syllable window restriction, which crucially holds at the PW level (see Peperkamp 1997: 187-191 for complete argumentation and further details). As a result, the word appears to have two stresses, one assigned at the lexical level and the other one at the post-lexical level. Furthermore, Peperkamp observes that these clitic combinations exhibit consonantal lengthening and an unpredictable quality of the stressed vowel, as shown in (4b). We take this to suggest that the surface form of enclitic clusters is subject to an allomorphic rule, which crucially takes place within the outermost PW structure. This analysis then implies that the recursive PW is not only an extended domain that inherits PW-specific rules, but also the one that initiates its own unique set of rules. As such, Peperkamp has to assume that the PW_{REC} hosts the allomorphic rule in question. Strikingly, the same type of evidence could lay support for approaches that adopt an extra prosodic constituent above the level of PW (e.g., the CG), or even a higher prosodic constituent such as PPh, where phrasal allomorphic rules have been argued to exist (Vigário 2003). Likewise, the emergence of another primary stress in (4b) can fall out from some form of binarity requirement (Hayes 1995) which forces the two function words to form a (trochaic) foot. Peperkamp does not address these alternative analyses. However, we believe that such language-specific cases raise significant questions as to under which circumstances we need to assume recursive PWs, and which phonological properties they should exhibit, which we aim to address in the remainder of this paper.

(4) *Stress and consonantal allomorphy in Neapolitan* (Peperkamp 1997: 177-178)

a.	pɔ́rta tə	'bring-IMP yourself'	(cf. purtátə 'you (pl.) bring')
b.	pɔ́rtaténnə	'bring-IMP yourself of-them…'	

To sum up, recursivity is primarily used in the literature to distinguish affixal clitics from free clitics, as well as for rule blocking. The primary emphasis so far has been on showing that a clitic may not be part of a PW, and the PW_{REC} primarily arose from a necessity to prosodify such elements. Moreover, it is often the case that the phonological argumentation is characterized by circularity and is surrounded by a veil of vagueness. Much less attention has been paid to defining the properties associated with this constituent.

[4] Alternatively, one could claim that the constructions here as well as the ones in (3-4) are subsumed under the *clitic group* (henceforth CG) à la Nespor and Vogel (1986).

3. Deriving recursive prosodic constituents in Optimality Theory

In Optimality Theory (Prince and Smolensky 1993), the source for recursion is standardly assumed to fall out form the violation of the constraint NONRECURSIVITY (NONREC), which militates against the propagation of recursively built prosodic structures. Closer inspection, however, reveals that there are several technical and conceptual problems with the way NONREC is employed in the literature.

First, closer inspection reveals that recursive structures in fact result *not* from the violation of NONREC but crucially from a ranking which requires top-ranking of some other constraint. According to Peperkamp (1997: 189), for instance, this constraint is FAITHFULNESS which states that lexically built structure should not be modified. On the other hand, for Selkirk (1995), what derives recursivity is having an alignment constraint (McCarthy and Prince 1993) such as ALIGN-LEX (Lex, L/R; PW, L/R), which ensures that some edge of the lexical word will be matched by some edge of the PW, ranked above EXHAUSTIVITY, a constraint that bans skipping of levels.[5] The tableau in (5) illustrates the interaction of these constraints with an abstract example.

(5)

	/Fnc Lex/	ALIGN-LEX	EXH
☞	a. [Fnc [Lex]$_{PW}$]$_{PW}$		
	b. [Fnc Lex]$_{PW}$	*!	
	c. [Fnc [Lex]$_{PW}$]$_{PPh}$		*$_{PW}$! *$_{F}$

As can be seen in the above tableau, it is not necessary to have NONREC. Rather, the interaction between other constraints has the desired effect of yielding recursive structures. If the violation of NONREC does not render recursive structures, then what is the function of this constraint in the grammar? When top-ranked, this constraint ensures that an internal clitic, that is, a clitic that fully incorporates into the PW of its host, [fnc word]$_{PW}$ (essentially a non-recursive PW), will be optimal and hence chosen to surface compared to an affixal clitic, [fnc [V]$_{PW}$]$_{PW}$, which constitutes a recursive structure. The following tableau shows this result.

(6)

	/Fnc Lex /	NONREC	EXH
☞	a. [Fnc Lex]$_{PW}$		
	b. [Fnc [Lex]$_{PW}$]$_{PW}$	*!	
	c. [Fnc [Lex]$_{PW}$]$_{PPh}$		*!*

The primary job of NONREC is to expel candidate (6b) from the competition. However, the same result can equally be achieved if an alignment constraint such as ALIGN-PW (PW, L/R; Lex, L/R) is introduced in the system and ranked below EXH. Hence, NONREC has no vital importance here.[6]

One could argue that NONREC does the crucial work in rendering free clitics, that is, functional elements that are directly parsed by the PPh. However, the effects of NONREC can once again be covered by ALIGN-PW. Appropriately ranked above EXH, this constraint makes sure that a PW can never start with a function word, as shown in (7).

(7)

	/Fnc Lex/	ALIGN-PW	ALIGN-LEX	EXH
	a. [Fnc Lex]$_{PW}$	*!	*	
	b. [Fnc [Lex]$_{PW}$]$_{PW}$	*!		
☞	c. [Fnc [Lex]]$_{PW}$]$_{PPh}$			*

Furthermore, NONREC is also not crucial to evaluate the optimal recursive structure among possible output forms. For example, the difference between the multiply nested structure [[[Lex]$_{PW}$ Fnc]$_{PW}$ Fnc]$_{PW}$ and the flat structure [[Lex]$_{PW}$ Fnc Fnc]$_{PW}$ can be decided on the basis of other independent constraints without the need for NONREC. *STRUC is one such constraint that mitigates

[5] We concur with Selkirk (1984, 1986, 1995) and Selkirk and Shen (1990) that syntax-phonology mapping is blind to function words.

[6] An anonymous reviewer raises the question as to whether EXHAUSTIVITY could be dispensed with in favor of NONREC. We argue that EXHAUSTIVITY is independently needed primarily because it ultimately forces segmental structure to be parsed into prosodic constituents. Hence, for any theory that assumes the Prosodic Hierarchy, this constraint is essential. See Itô and Mester (this volume) for the decomposition of EXHAUSTIVITY into various PARSE constraints, which essentially organize segmental input into prosodic constituents.

against the creation and, by extension, the repetition of any form of structure (Prince and Smolensky 1993; see also Itô and Mester 2007, this volume).

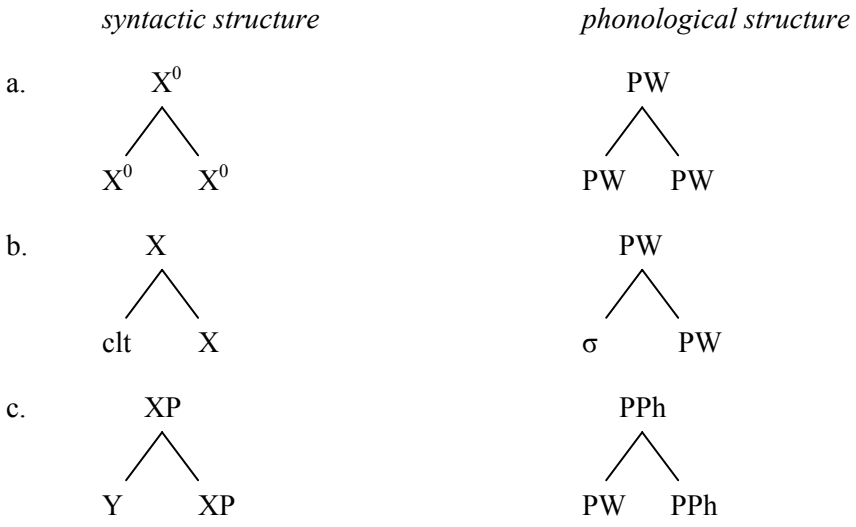
Finally, the existence of NONREC suggests that avoidance of recursion is *natural* for phonology, that is to say, an unmarked pattern across the languages of the world, to which in essence we agree. In a system where constraints are violable, however, the violation of NONREC can yield recursive outputs for all phonological entities (e.g., features, moras, syllables, feet, etc.). This in turn goes against the original intention of the constraint to ban or restrict recursion in phonology. There have been attempts to show that recursion is indeed compatible with phonology, albeit confined to higher prosodic levels (Schreuder and Gilbers 2004; Schreuder 2006).

In summary, we have argued that there are fundamental inconsistencies and functional problems with the way recursion is arrived at through the violation of NONREC. Below, we propose an alternative approach to recursion that draws on the morphosyntax-phonology interface. Furthermore, we discard NONREC as a universal constraint and derive its effects through already existing and well-established interface constraints. Our approach employs a morphosyntactically driven recursivity, which is on a par with Selkirk's (1995) original motivation to derive differences in phonological structure through differences in morphosyntactic representations. Needless to say, the phonological mirroring of morphosyntactic recursion advanced here does not necessitate per se the abolishment of NONREC from the constraint set. In the remainder of this paper, however, we will rely on the complementarity of these two assumptions to shed light on the nature of recursion, its function and limitations in phonology.

4. An interface perspective on recursion

We argue that recursion is not an inherent property of phonology, but rather the by-product of its interface with morphosyntax. Essentially, recursive morphosyntactic structures should correspond to recursive phonological structures, and vice versa. This view builds on van Oostendorp's (2002, 2006) *integrity* family of constraints as well as Kaye's (1974) *morphological recoverability* which states that phonological structure mirrors morphological structure as closely as possible. We assume that morphosyntactically "recursive" structures are those created outside the main lexical[7] or syntactic cycle. In such inherently recursive structures, the category of the whole construction is the same as at least one of its members. This category includes compound constructions as well as complex predicates where the whole construction inherits the properties of its head (8a). Under the same rubric fall also constructions that contain function words that are adjoined to syntactic heads such as clitics (8b), as well as extra-cyclic elements such as adjunct modifiers, i.e., pieces of structure elements that are assembled parallel to the main derivation and merge with the rest of the derivation at a later stage (Uriagereka 1999; Nunes and Uriagereka 2000) (8c).

(8) *Morphosyntax-phonology mapping*



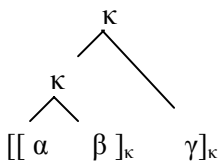
[7] This is naturally predicted by all *Lexical Phonology* models (Kiparsky 1982; Mohanan 1986; Kaisse and Shaw 1985).

An important consequence of this approach is that one cannot possibly have recursion at the level of the *foot* or the *syllable* since the interface gives us primarily two main sites: the PW and the PPh.

We achieve this mirroring effect through the use of well-established interface constraints such as ALIGNMENT and WRAP (McCarthy and Prince 1993; Selkirk 1995; Truckenbrodt 1995, 1999) which all together strive for grouping X^0 as PWs and XPs as PPhs. Below, we show that these constraints, along with Selkirk's (1995) well-known constraints on prosodic domination, namely LAYEREDNESS, HEADEDNESS, and especially EXHAUSTIVITY, can derive all the attested prosodic structures without the necessity for NONREC.

With respect to the phonological properties of PW_{REC}, we assume that 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, as shown in (9). The outermost layer inherits properties of the mother constituent which may reiteratively or optionally apply within that layer of structure. Metrical calculations may be sensitive to this extra layer of structure, leading to the development of rhythmic structure building/ re-adjustment rules strictly associated with the PW_{REC}.

(9)



where κ has properties inherited from κ (α, β) as well as its own inherent properties, κ (κ, γ)

Below we will illustrate our approach by using data primarily from Greek and Turkish. We will focus only on the lowest interface site, namely the PW, leaving high-level interface sites for future research. The structures we explore come from roughly three morphosyntactic processes, compounding, complex predication/ noun-incorporation and cliticization.

5. Deriving PW_{REC} from the interface

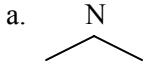
5.1. Compounds and complex predicates forming recursive PWs: Evidence from Turkish

We first explore various types of composite constructions in Turkish that essentially project an X^0 bearing the same category label as at least one of its sisters, a precursor for prosodic recursion in our approach. These constructions are nominal compounds containing bare nouns (10a) and verbal compounds which convey temporal/aspectual meanings (10b). Furthermore, Turkish exhibits particular constructions where an immediately preverbal bare noun forms a special unit with its verbal head. These are complex predicates with light verbs and verbal predicates that are often cited as exhibiting noun-incorporation (10c) (e.g., Knecht 1986; Kornfilt 1995, 2003; Aydemir (2004); among others; see Öztürk 2005 for a review).[8] What is common to these three types of constructions is that the bare noun and the verb form a verbal complex.[9]

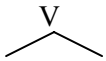
[8] Based on standard assumptions on incorporation (Baker 1988, 1996), one can claim that the moved element adjoins to the V. Thus, the analysis proposed here correctly predicts that this element will be parsed recursively to the head category.

[9] Öztürk (2005) argues for a pseudo-incorporation analysis for such constructions, the details of which are beyond our focus. What remains unchanged in this analysis is the fact that the preverbal noun, which is an NP according to Öztürk, forms a complex predicate together with the verb head ($[NP+V]_V$).

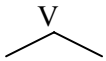
(10) *Mapping of various types of composite structures yielding [[word]$_{PW}$ [word $_{PW}$]$_{PW\text{REC}}$*

a.


kırk	*ayak*	‘centipede’[10]
fourty	foot	

b.


düş-e	*yaz*	‘to almost fall’
fall-CVM	LV	
gid-e	*dur*	‘to continue to go’
go-CVM	LV	

c.


red	*et*	‘reject’	complex predicate with light verbs
reject	do		
kitap	*oku*	‘read a book’	noun-incorporation
book	read		

Under our approach, all such constructions should automatically be mapped onto recursive PWs at the phonological level due to high ranked interface constraints, namely WRAP defined in (11) and ALIGN-LEX. The tableau in (12) shows how these constraints evaluate a set of output forms.

(11) WRAP: Each X^0/ XP is contained in a PW/ PPh, respectively (Truckenbrodt 1995, 1999; Peperkamp 1997).

(12)

$[X^0\ X^0]X^0$	WRAP	ALIGN-LEX	EXH
a. $[X^0\ X^0]_{PW}$	*!*	**	
b. $[[X^0]_{PW}\ [X^0]_{PW}]_{PPh}$	*!		
☞ c. $[[X^0]_{PW}\ [X^0]_{PW}]_{PW}$			
d. $[[X^0]_{PW}\ X^0]_{PW}$		*!	
e. $[[X^0]_{PW}\ X^0]_{PPh}$	*!*	***	*

WRAP ensures that every X^0/ XPs, regardless of whether it is the lowest or the highest in the tree, is contained in a single prosodic constituent. The constraint is violated when one of the X^0s fails to form a prosodic constituent of its own, as demonstrated by the candidates in (12a, b, e). An additional violation of ALIGN-LEX occurs in candidate (12a) since the lowest X^0s lack innermost PW boundaries. Furthermore, ALIGN-LEX is violated by candidate (12d) because the rightmost X^0 lacks a left PW-boundary. Finally, the candidate (12e) violates ALIGN-LEX because the edges of the second X^0 are not aligned with a PW-boundary.

5.2. Function words forming PW_{REC} with their host: Evidence from Greek

[10] In our Turkish examples, we mostly comply with the Turkish orthographic conventions. Accordingly, *ı, ü*, and *ö* stand for the high back unrounded (IPA: [ɯ]), high front rounded (IPA: [y]), and low front rounded (IPA: [ø]) vowel, respectively. The alveopalatal voiceless fricative ([ʃ]) and the affricate are indicated by *ş* and *ç*, respectively. The symbol *y* stands for the palatal glide. The so-called soft-*g* is represented with *ğ* and stands for a velar glide in Modern Standard Turkish (or a velar fricative in various Anatolian dialects). This segment is most often not pronounced in colloquial Standard Turkish. Following the Turkish linguistic tradition, we use capital letters to indicate those underlying segments that undergo phonological processes such as vowel harmony. Accordingly, [I] stands for an underlyingly high vowel, and [E] for an underlyingly low vowel.

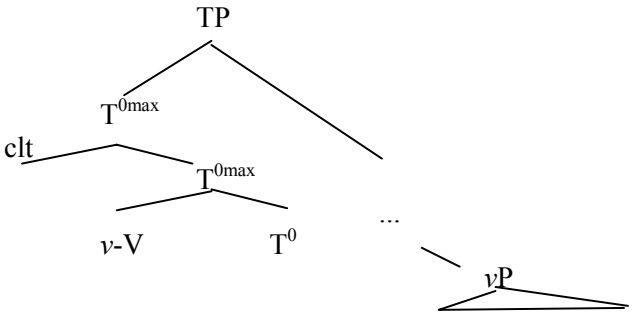
The Greek pronominal system has a set of weak forms of pronouns which are prosodically dependent on an adjacent host and constitute clitic elements. Such object clitics have certain distributional properties that vary according to the dialectal variety. In Standard Greek, they always precede the non-imperative verb form which serves as their prosodic host (13a). With imperative forms and gerunds, however, they are always postverbal (13b).

(13) a. mas málose
CLT-1.PL.GEN scold-PAST.3.SG
'S/he scolded us.'

b. ðóse tó mu
give-2.SG.IMP CLT-3.NT.SG.ACC CLT-1.M.SG.GEN
'Give it to me!'

Philippaki-Warburton and Spyropoulos (1999) have convincingly shown that object clitic pronouns do not have the properties of affixes.[11] They also provide ample syntactic evidence that object clitics behave as the arguments proper of the clause and participate in certain syntactic operations. In more technical terms, the distribution of object clitics with respect to the verb form is derived by means of a cliticization movement rule. The clitic is base-generated as an argument at the relevant theta-position inside the *v*P and then it targets the IP layer to which it moves overtly. Let us assume that it targets the T head to which it adjoins. Given that in Greek the verb overtly moves to the T functional head in order to license its tense and subject-agreement features, the clitic ends up being adjoined to the verb form as a proclitic (Philippaki-Warburton and Spyropoulos 1999; Philippaki-Warburton et al. 2004).[12]

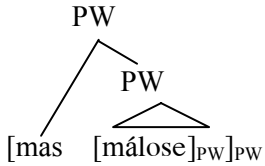
(14) *Syntactic structure of proclitic object pronouns in Greek*



'S/he scolded us.'

In this respect, cliticization does not extend the structure, but rather creates a recursive syntactic constituent which contains the clitic and the functional category that hosts the verb form. In this paper, we claim that these kind of structures are translated in the phonology as recursive PWs. On the basis of Selkirk's (1995) typology, therefore, Greek proclitics qualify as *affixal*.

(15) *Prosodic structure of proclitic object pronouns in Greek*

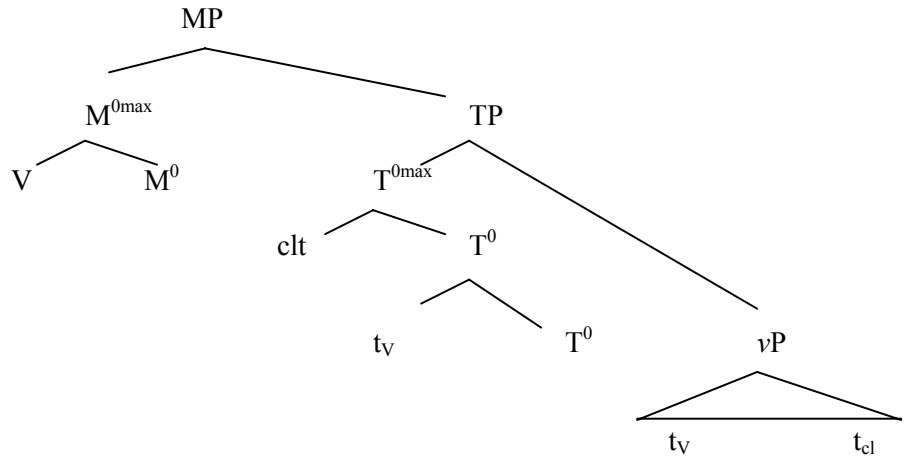


On the other hand, the fact that object clitics follow the imperative verb forms results from the morphosyntactic licensing of the imperative mood in Greek. More specifically, the imperative is the

[11] For a different view on the issue see Joseph (2003) and Condoravdi and Kiparsky (2001).
[12] See Revithiadou and Spyropoulos (2008) for a detailed typological survey of object clitic pronouns in Greek.

only affixal mood in Greek, hence it requires the overt movement of the verb form to a Mood functional head above the T head (Philippaki-Warburton 1998, among others):

(16) *Syntactic structure of enclitic object pronouns in Greek*



Interestingly, in these constructions object clitics are left behind by the movement of the verb to the c-commanding Mood head and, consequently, they belong to its complement domain. Since they are not adjuncts, they should not be expected to be parsed at the outer layer of the PW any more. Instead, phonology should translate this structure as one unit in a way analogous to the prosodification of a verb plus a complement string into one prosodic constituent (in this case, though, the PPh). This expectation is indeed met since enclitics, unlike their proclitic counterparts, are incorporated into the PW of their verbal host (see Section 6.1. below, and Revithiadou and Spyropoulos 2008 for detailed argumentation).

In sum, we have reviewed various structures where phonology mirrors morphosyntactically recursive structures as recursive prosodic domains. This analysis has the advantage to also account for different prosodic patterns in one language by means of one and the same constraint ranking making use of already existing tools. More specifically, the ranking WRAP » EXHAUSTIVITY, ALIGN gives us the desired PW_{REC} pattern for proclitics and, at the same time, it favors the internal pattern for enclitics, as illustrated. This is because WRAP remains inert in non-recursive morphosyntactic constructions such as the one associated with enclisis. The following tableaux demonstrate the selection of the optimal prosodic forms for each clitic order:

(17)

$[_T$ clt $[_T$ V]] *adjuction*	WRAP	EXH	ALIGN
☞ a. $[$clt $[$V$]_{PW}]_{PW}$		*	
b. $[$clt V$]_{PW}$	*!		

(18)

$[_{MP}$ V $[_{TP}$ clt…]] *head + complement domain*	WRAP	EXH	ALIGN
a. $[[$V$]_{PW}$ clt$]_{PW}$		*	
☞ b. $[$V clt$]_{PW}$			

6. Phonological properties of PW_{REC}

6.1. Segmental rules and optionality

Below, we demonstrate various segmental rules that apply to the extended PW constituent that arise from the interface, which we called the PW_{REC}. Crucially, the processes we demonstrate are lexical rules and hence specifically related to PWs. Closer inspection, however, reveals that their application is extended, either optionally or obligatorily, to the recursive domain as well.

We start with the Turkish constructions described in (10) above and demonstrate that consonant cluster resolution, geminate simplification, and long vowel shortening apply primarily to morphosyntactic constructions forming a PW as well as a PW_{REC}, and not to syntactic phrases which are arguably parsed into PPhs. It is a well established fact of Turkish phonology that underlying consonant clusters of a particular type, geminates, and long vowels in closed syllables cannot surface

at the end of a word. Such illicit syllable types give rise to processes such as epenthesis, geminate simplification, and vowel shortening. Syllable repair strategies are, however, blocked when the choice of resyllabification is available. This is the case when a following vowel-initial element is part of the same PW or PW_{REC} that arise from the kinds of constructions discussed above (a- and b-examples), and crucially not when it is contained in a syntactic phrase (c-examples).

(19)	a.	/haps - (y)I/ prison-ACC	[ha**ps**ı]$_{PW}$ **hapisi* (cf. *hapis*, **haps*)	‘prison’
		/kayd-(yI) record-ACC	[ka**yd**ı]$_{PW}$ **kayıdı* (cf. *kayıt*, **kayt*)	‘record’
	b.	/haps et-mEk/ prison LV-INF	[[ha**ps]**$_{PW}$ [etmek]$_{PW}$]$_{PW}$ **hapis etmek*	‘to imprison’
		/kayd et-mEk/ record LV- INF	[[ka**yd**]$_{PW}$ [etmek]$_{PW}$]$_{PW}$?/**kayıt etmek*	‘to register’
	c.	/haps iste-mEk/ prison want-INF	[[hap**i**s]$_{PW}$ [istemek]$_{PW}$]$_{PPh}$ **haps istemek*	‘to ask for imprisonment’
		/kayd aç-mEk/ record open-INF	[[kay**ı**t]$_{PW}$ [açmak]$_{PW}$]$_{PPh}$ **kayd açmak*	‘to open a registration’
(20)	a.	/redd - (y)I/ rejection-ACC	[reddi]$_{PW}$ **redi* (cf. *red*, **redd*)	‘rejection’
	b.	/redd et-mEk/ rejection LV-INF	[[re**dd]**$_{PW}$ [etmek]$_{PW}$] $_{PW}$ **red etmek*	‘to reject’
	c.	/redd al-mEk/ increase receive-INF	[[re**d**]$_{PW}$ [almak]$_{PW}$]$_{PPh}$ **redd almak*	‘to receive a rejection’
(21)	a.	/hara:m - (y)I/ forbidden-ACC	[har**a:**mı]$_{PW}$ **haramı* (cf. *haram*, **hara:m*)	‘forbidden’
	b.	/hara:m et-mEk/ forbidden LV-INF	[[har**a:**m]$_{PW}$ [etmek]$_{PW}$]$_{PW}$ **haram etmek*	‘to take the pleasure out of something’
	c.	/hara:m et/ forbidden meat	[[har**a**m]$_{PW}$ [et]$_{PW}$]$_{PPh}$ **hara:m et*	‘religiously forbidden meat’

Furthermore, the absence of consonant cluster resolution is also observed in N+N compounds, which are subsumed under the PW_{REC} in our analysis (22).

(22)	a.	/kayn-y(I)/ in.law-ACC	[ka**yn**ı] $_{PW}$ **kayını* (cf. *kayın, *kayn)*	‘in-law; brother-in-law’
	b.	/kayn+ana/ in.law+mother	[[ka**yn**]$_{PW}$ [ana]$_{PW}$]$_{PW}$ **kayınana*	‘mother-in-law’
	c.	/kayn+ata/ in.law+ancestor	[[ka**yn**]$_{PW}$ [ata]$_{PW}$]$_{PW}$ **kayınata*	‘father-in-law’

It is important to note that compounds that carry an explicit compound marker on the head (N+N-CmpM) (23a) bear a striking similarity to genitive-possessive constructions (23b), which are truly

syntactic phrases. The so-called "compound marker" and the genitive 3rd person singular suffix are essentially the same affix. According to Kornfilt (1984: 62-66), the only clearly identifiable difference between the two constructions is that the genitive-marked NP is definite, hence referential, while in the compound case the same NP is non-referential and/or generic. Indeed, contrary to N+N compounds as given in (22b-c), N+N-CmpM compounds behave like phrases with respect to the syllable repair rules. That is to say, syllabification does not apply between the first and the second member of the compound, giving rise to syllable repair rules, as shown in (24b) (see Kabak and Vogel 2001: 350 for further examples). This can straightforwardly be accounted for by the fact that [N+N-CmpM] compounds form PPhs under our analysis, rather than PW_{REC}.[13]

(23) a. öğretmen ev-i — 'a locale for teachers'
teacher house-CMPM

b. öğretmen-in ev-i — 'the house of the teacher'
teacher-GEN.3SG house-POSS.3SG

(24) a. /karn-(y)I/ — $[karnı]_{PW}$ — 'stomach'
stomach-ACC — **karını* (cf. *karın*, **karn*)

b. /karn + ağrı-sı/ — $[[karın]_{PW}\ [ağrısı]_{PW}]_{PPh}$ — 'stomach-ache'
stomach pain-CMPM — **karnağrısı*

Moving on to the Greek facts, we see that the rule of *s*-voicing before sonorants and voiced fricatives obligatorily applies to the PW (25). The fact that the rule in question also applies to a domain created by the adjunction of the object clitics to a verbal host (26) suggests that this extended domain also exhibits PW-level properties, hence yielding empirical support for recursion at the PW level.

(25) a. /pros-méno/ — pro**.zm**éno — 'anticipate'
b. /ɣeras-ménos/ — ɣe.ra**.zm**é.nos — 'aged'

(26) a. /mas málose/
CLT-1.PL.GEN scold-PAST.3.SG

---

[13] Likewise, we also make a distinction between postpositional phrases that are constructed by the so-called "genuine" (primary) postpositions as opposed to those that are formed by "fake" (secondary) ones, which bear possessive morphology thereby making the whole phrase similar to genitive-possesive constructions (Lewis 1967; Kornfilt 1997: 423).

(i) a. kitap için — 'for a book'
bıçak ile — 'by a knife'

b. kitap arka-sı — 'behind a book'
masa üst-ü — 'on/ above a table'

Being genuine postpositional phrases, the constructions in (ia) arguably behave like bare compound constructions illustrated in (22). Therefore, genuine postpositional phrases are expected to form a PW_{REC}, while those that bear the rubric of genitive-possesive constructions (ib) are presumably grouped as a PPh, similar to the N+N-CMPM construction given in (24b). The phonological reflection of this distinction is clearly observed in constructions where genuine postpositions such as *için* 'for' and *ile* 'with' *optionally* do not give rise to syllable repair rules (iia). The vowel-initial "fake" postpositions, however, almost obligatorily give rise to the application of the syllable repair rules such as degemination and epenthesis (iib).

(ii) a. $[[za\mathbf{mm}]_{PW}\ [için]_{PW}]_{PW}$ — 'for an increase'
$[[ke\mathbf{yf}]_{PW}\ [ile]_{PW}]_{PW}$ — 'with pleasure'
$[[ha\mathbf{tt}]_{PW}\ [için]_{PW}]_{PW}$ — 'for connection'

b. $[[za\mathbf{m}]_{PW}\ [arka\text{-}sı]_{PW}]_{PPh}$ — **zamm arka-sı* — 'after an increase'
$[[key\mathbf{if}]_{PW}\ [önce\text{-}si]_{PW}]_{PPh}$ — **keyf önce-si* — 'before pleasure'
$[[ha\mathbf{t}]_{PW}\ [ara\text{-}sı]_{PW}]_{PPh}$ — **hatt ara-sı* — 'between connection(s)'

ma**z. m**álose
'S/he scolded us.'

b. /mas ðjavázi/
CLT-1.PL.GEN read-3.SG
ma**z. ð**javázi
'S/he reads for us.'

It is important to note that [z] syllabifies together with the following morphological element (affix or root) in (25). On the contrary, in (26) the consonant in question is ambisyllabic since complete resyllabification is blocked between the proclitic and the verb: *maz.má.lo.se*./ **ma.zmá.lo.se*. This suggests that the consonants are separated by a PW boundary, hence showing once again that the construction in question indeed forms a $PW_{REC.}$

Another PW-rule that applies to resolve hiatus in a derived environment is vowel deletion. More specifically, a less sonorous vowel deletes when a vowel of greater sonority follows. This rule obligatorily applies within the PW (27) but optionally in the PPh domain (28). Interestingly, vowel deletion is almost obligatorily enforced in constructions which we argue to form PW_{REC} domains (29). The process is blocked only when the construction is produced in very careful speech or rendered with emphatic stress (30).

(27) a. /kse-alázo/ ksalázo 'change'
b. /kse-onomázo/ ksonomázo 'un-name s.o.'
c. /ipo-ánθropos/ ipánθropos 'sub-human'

(28) a. /to ómorfo aɣóri/
the handsome-NOM.SG boy-NOM.SG
'the handsome boy'

Possible outputs (variation):
b. tómorfaɣóri (uttered in normal to fast speech rate)
c. tómorfo aɣóri ~ to ómorfo aɣóri (uttered in careful speech)

(29) a. /mu to afíni/
CLT-1.SG.GEN CLT-3.NT.SG.ACC leave-3.SG
mutafíni
'S/he leaves it to me.'

b. /me onomázi/
CLT-1.SG.ACC name-3.SG
monomázi
'S/he names me.'

c. /me elénxi/
CLT-1.SG.ACC control-3.SG
meléŋçi
'S/he controls me.'

(30) A. Pjó íne to próvlima me ton Perséa?
'What is the problem with Perseas?'

B. E, pjó náne? [Sinéxia me afíni]$_F$.
'Well, what could it be? HE CONSTANTLY ABANDONS ME.'

In conclusion, PW-rules are also observed in the outermost domain although there may be some level of optionality involved due to other reasons such as focus, sentence stress, as well as the type of register. It is important to emphasize that *none* of these segmental rules are specific to this domain. Since we are dealing with an extended domain, hence an extra layer of metrical structure, it is

only natural that the inherited properties may show a lesser degree of pertinacity. Unique segmental rules are hard to attest in a constituent between the PW and the PPh, which in turn makes it difficult to substantiate the CG (Nespor and Vogel 1986: Hayes 1989). Below, however, we show that the domain we claimed to be the PW_{REC} induces special rhythmic phenomena, which could arguably be used as evidence for the existence of an independent constituent such as the CG or the *composite group* (see Vogel this volume). Nevertheless, we argue that this is only epiphenomenal, and crucially arises from the way in which the rhythmic algorithm interprets the extra layer of structure associated with the PW_{REC}. Another related factor is also the length of the resulting constituent, which often calls for further prosodic organization by means of footing, for instance. To the best of our knowledge, the recursive domain does not induce any unique segmental rules in the languages under examination, as well as cross-linguistically.

6.2. Rhythmic structure-building and re-adjustment rules: Unique PW_{REC} processes?

Here we demonstrate that the extended PW domain may show spurious metrical structures or serves as a domain where special rhythmic re-adjustment processes take place. We first look into a straightforward case of the emergence of secondary/rhythmic stress in this domain. In several varieties of Greek, especially those spoken in Northern Greece, a sequence of proclitics provide enough material to form a foot of their own. Such footed elements develop secondary/rhythmic stress, as shown in (31).[14]

(31) *Rhythmic stress in proclitics*

a. /mu to ðjávase/
CLT-1.SG.GEN CLT-3.NT.SG.ACC read- PAST.3.SG
(mù to) ðjávase
'S/he read it to me.'

b. /mas tus ðjálekse/
CLT-1.PL.GEN CLT-3.M.SG.ACC choose-PAST.3.SG
(màs tuz) ðjálekse
'S/he chose them for us.'

c. (màs tuz) majirévi
/mas tus maɣirévi/
CLT-1.PL.GEN CLT.3.M.SG.ACC cook-PAST.3.SG
'S/he cooks them for us.'

Although it looks like this rhythmic stress is a unique property of the extended constituent, its triggering force should be sought in the binarity of the adjoined material which naturally calls for grouping into trochaic feet (Hayes 1995) and, consequently, the development of rhythm. The effects of such size constraints can be detected within the PW domain as well: *pàrakatjanós* 'of lower descend', *ànθropistikós* 'humanitarian'.

Likewise, compounds in Turkish, unlike corresponding phrases, display specific prosodic structure, where non-primary stress is conflated in this domain, as shown in (32). The result is that the second PW surfaces with secondary stress in syntactic phrases while the stress on the same PW is perceptually reduced in compounds.

(32) *Leftmost prominence in Turkish nominal compounds*

a. kɨrk ayak 'centipede'

* PPh
* PW_{REC}
* * PW
kɨrk ayak

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

b. k+rk ayak ‘forty feet’

* PPh
* * PW
k+rk ayàk

Similarly, another type of composite structure, namely verbal compounds ([V+V]) that we analyzed as yielding PW_{REC} in Section 5.1, also shows stress differences in comparison to comparable syntactic phrases. While the syntactic phrases in (34) can bear secondary stress on the second PW, the same makes their homophonous V+V-compound counterparts in (33) sound awkward or illicit.

(33) *V+V verbal compounds (no secondary stress)*
a. ban-a bak-íp dur-du (?/* dur-dù)
I-DAT look-CVM aux-PAST
‘(S)he kept looking at me.’

b. ban-a at-í ver-di (?/* ver-dì)
I-DAT throw-CVM aux-PAST
‘(S)he suddenly threw (it) at me.’

(34) *Phrases* (secondary stress)
a. ban-a bak-íp dur-dù
I-DAT look-CONJ stop-PAST
‘(S)he looked at me and stopped.’

b. ban-a at-í ver-đi
I-DAT horse-ACC give-PAST
‘(S)he gave me the horse.’

Again, this could be used as evidence for the existence of unique phonological processes of the rhythmic type taking place in the PW_{REC}. Yet another piece of evidence pointing towards this direction comes from Greek word+word compounds, which exhibit rightmost stress prominence in compounds but not in phrases. Just like in the case of Turkish compounds, these constructions, listed in (35), also form a PW_{REC} in our analysis. Interestingly, such word+word compounds are essentially different from comparable PPhs consisting of an adjective modifying a noun, where the opposite prominence pattern is observed (36).

(35) *Adj+N compounds: rightmost stress prominence*
a. pirinikòs pólemos ‘nuclear war’
b. ðiplomatikò sóma ‘diplomatic delegation’

(36) *Adj+N phrases: leftmost stress prominence*
a. irakinós pòlemos ‘Iraqi war’
b. ðiplomatikó àsilo ‘diplomatic asylum’

Closer examination of both the Turkish and Greek data above reveals, however, that what appears to be unique is nothing more than an extension of word-based restrictions to this domain. More specifically, accent resolution in Turkish is always left-oriented, including within words (Inkelas 1994,1999; Kabak and Vogel 2001). This is especially evident in cases where two (lexical) stresses are contained within a morphological word and the leftmost one always wins (e.g., /Ávrupa-lı-laş-árak/→ [Ávrupalılaşarak] ‘by becoming European’). Similarly, we see a reincarnation of word-related stress prominence resolution in the Greek data as well. The compounds, as well as several other instances of compounding in Greek, indeed follow the three-syllable window restriction, a truly word-level constraint, which prohibits stress from appearing on a syllable further than the antepenult. Yet again, the size of the morphological elements participating in a particular construction lies behind this bias towards rightmostness. In compounds, longer words are at the risk of violating the window

requirement, and therefore, they develop modes to keep their prominence closer to the right edge. We see similar tactics being developed within the PW, for example, when enclitics are incorporated into their verbal host, as shown in (37). In this example, the unfooted syllable of the verb forms, together with the clitic, a post-lexical foot which, under the pressure to keep stress within the last three syllables, is assigned primary prominence.

(37) /ðjávase to/
read-2.SG.IMP CLT-3.NT.SG.ACC
ðjàvasé to
'Read it!'

To sum up, our analysis of compound and clitic+host constructions into the extended constituent of PW, namely PW_{REC}, correctly accounts for the transfer of purely PW-level restrictions and mechanisms to this domain. We showed that such constituents share the same segmental rules with the PW, and this is further supported with evidence from rhythmic phenomena. Assigning to this constituent an independent status simply misses this important generalization. Finally, we argued that the forcefulness and often the uniqueness in which rhythmic rules apply in this domain have been argued to be intimately related to the size of the resulting constituent.

7. Other sources of prosodic recursion

Besides the purely morphosyntax-driven account of recursivity, we argue that prosodic recursion can also arise through lexical specification. More specifically, morphosyntactic elements can have a templatic specification as to where they need to be assembled in the prosodic structure. For instance, certain affixes in languages like Dutch (e.g., *-achtig* 'like'; *-loos* '-less') fall outside the PW of their morphological host to which they adjoin recursively (e.g., van Oostendorp 2002, and the references cited therein). This by no means weakens our proposal primarily because such idiosyncratic elements are arguably fossilized instances of the morphosyntax of the past. It has been argued that the origin of such markers is composite constructions (van Beurden 1987: 24) of the sort discussed in Section 5.1, which in the course of history lost their independent lexical status and became bound elements. Similarly, Kabak and Revithiadou (in press) argue that bound elements that do not cohere with the word stress pattern of otherwise a regular (edgemost) stress language seem to have emerged from the morphologization of unstressed elements in composite structures, which essentially correspond to recursive prosodic constituents under the present analysis. It seems that PW_{REC} structures provide a breeding ground for the genesis of bound morphemes with idiosyncratic stress properties at least in edge-oriented stress languages.

8. Conclusions

We argued that recursion is not an inherent property of phonology but the result of its interface with morphosyntax. Recursive constituents as such arise primarily from a requirement to mirror recursive morphosyntactic (e.g., complex predicates, adjuncts, etc.) structures. We reviewed different instantiations of recursivity in the prosodic phonology literature and highlighted various conceptual and functional issues related to the notion of recursivity and how it is translated into the OT framework via the constraint NONREC. We concluded that there is no need for NONREC since already available interface constraints such as ALIGNMENT and WRAP together with other well-established constraints on prosodic domination suffice to yield recursive structures in phonology.

We claimed that differences in morphosyntactic structure are responsible for the differences in which lexical as well as functional elements are prosodified. The need for recursion primarily arises from the principle of mirroring. By definition then, recursion is only confined to the level of the PW and the PPh since these are the main interface sites. Furthermore, we have shown that the *same grammar* (i.e., constraint ranking) gives rise to different prosodic patterns. It should be noted that this line of reasoning is in accordance with basic premises of OT, and also on a par with Selkirk's (1995) assumptions about the different patterns of prosodization of function words in English:

> "…the variety in prosodization of function words, can come about in just two different ways, given an optimality theoretical perspective: through differences in the

> morphosyntactic input structure in which the Fnc is located and/or differences in the ranking of the relevant constraints." (Selkirk 1995: 464).

An in-depth examination of two typologically distinct languages, namely Turkish and Greek, revealed that inherently recursive morphosyntactic structures give rise to extended prosodic constituents in the phonological components whose phonological reflections reincarnate segmental as well as prosodic phenomena observed at the level of the PW. Our analysis also accounted for several instances of the 'left-right asymmetry' problem (e.g., proclitics vs. enclitics in Greek), which is born out from an asymmetry at the relevant morphosyntactic representations.

Our focus here was primarily on recursion at one constituent, namely the PW. Further research is necessary to explore the phonological properties of recursive structures at the level of PPh, or even higher constituents. It also remains to be seen under what conditions phonology is *non*-isomorphic to morphosyntax and why. Are there specific morphosyntactic structures or processes that call for non-isomorphism? Do all instances of non-isomorphism result from morphosyntax? Here we already hinted at how diachronic change may lead to recursion in phonology, but we left unexplored the restructuring effect that performance-based phonological constraints, pertaining to the size and length of lexical material, may exercise on the output of morphosyntactic derivation. Future research should address such historical and psycholinguistic aspects of phonological recursion.

List of Abbreviations

ACC	ACCUSATIVE
CLT	CLITIC
CVM	CONVERB MARKER (AKA GERUND)
CMPM	COMPOUND MARKER
CONJ	CONJUNCTIVE
DAT	DATIVE
GEN	GENITIVE
IMP	IMPERATIVE
LV	LIGHT VERB
M	MASCULINE
N	NOUN
NOM	NOMINATIVE
NT	NEUTER
PAST	PAST
POSS	POSSESSIVE
PL	PLURAL
SG	SINGULAR
V	VERB
2	second person
3	third person

Acknowledgements:

We would like to thank Junko Itô and Armin Mester for fruitful discussion, and Vassilios Spyropoulos for updating us about recent syntactic notions and representations. Special thanks also go to Miriam Butt for her useful input on the syntactic and semantic aspects of complex predicates. We also wish to thank two anonymous reviewers for providing useful comments. Finally, we would like to thank the audiences of the 29th Annual Meeting of the German Linguistics Society, Siegen, Germany (28.02-02.03.2007) and the 15th Manchester Phonology Meeting, Manchester, United Kingdom (24-26.05.2007) for useful feedback. This research is made possible by funds from (i) the German Research Foundation (DFG) given to Project D9 within the SFB 471 at the University of Konstanz, and (ii) the Pythagoras Project No. 1347 (Action: 'Operational Program for Reinforcement of Research Groups at Universities', University of the Aegean). This project was sponsored by the Second Community Support Framework (EPEAEK II) and co-funded by the European Social Fund (75%), the European Regional Development Fund and National Resources (25%).

References

Aydemir, Yasemin
2004 Are Turkish preverbal bare nouns syntactic arguments? *Linguistic Inquiry* 35: 465-474.

Baker, Mark
1988 *Incorporation: A Theory of Grammatical Function Changing*. Chicago: Chicago University Press.

1996 *The Polysynthesis Parameter.* Oxford: Oxford University Press.

Berendsen, Egon
1983 Final devoicing, assimilation, and subject clitics in Dutch. In: Hans Bennis, and W.U.S. Kloeke van Lessen (eds.), *Linguistics in the Netherlands*, 21-30. Dordrecht: Foris.

Beurden, Lisan van
1987 Playing level with Dutch morphology. In: Frits Beukema, and Peter Coopmans (eds.), *Linguistics in the Netherlands 1987*, 21-30. Dordrecht: Foris.

Booij, Geert
1995 *The Phonology of Dutch*. Oxford: Clarendon Press.

1996 Cliticization as prosodic integration: The case of Dutch. *The Linguistic Review* 13: 219-242.

Condoravdi, Cleo, and Paul Kiparsky
2001 Clitics and clause structure. *Journal of Greek Linguistics* 2: 1–40.

Dresher, Elan B., and Aditi Lahiri
1991 The Germanic foot: Metrical coherence in Old English. *Linguistic Inquiry* 22: 252-86.

Grijzenhout, Janet, and Martin Krämer
2000 Final devoicing and voicing assimilation in Dutch derivation and cliticization. In: Barbara Stiebels, and Dieter Wunderlich (eds.), *Lexicon in Focus*, 55-82. Berlin: Akademie Verlag.

Gussenhoven, Carlos
1985 Over de fonologie van Nederlandse clitica. [On the phonology of Dutch clitics.] *Spektator* 15: 180-200.

Hayes, Bruce
1989 The prosodic hierarchy in meter. In: Paul Kiparsky, and Gilbert Youmans (eds.), *Rhythm and Meter*, 201-260. Orlando: Academic Press.

1995 *A Metrical Theory of Stress: Principles and Case Studies*. Chicago, Illinois: University of Chicago Press.

Inkelas, Sharon
1989 Prosodic constituency in the lexicon. Ph.D. diss., Stanford University.

1994 Exceptional stress-attracting suffixes in Turkish: Representations vs. the grammar. Paper presented at the Workshop on Prosodic Morphology, Utrecht University. [ROA39, http://ruccs.rutgers.edu/roa.html]

1999 Exceptional stress-attracting suffixes in Turkish: Representations versus the grammar. In: René Kager, Harry van der Hulst, and Wim Zonneveld (eds.), *The Prosody-Morphology Interface*, 134-187. Cambridge: Cambridge University Press. [Revised version of Inkelas, Sharon. 1994.]

Itô, Junko, and Armin Mester
1992 Weak layering and word binarity. Linguistic Research Center Working Paper LRC-92-09, UC Santa Cruz.

2003 Weak layering and word binarity. In: Takeru Honma, Masao Okazaki, Toshiyuki Tabata, and Shin Ichi Tanaka (eds.), *A New Century of Phonology and Phonological Theory. A Festschrift for Professor Shosuke Haraguchi on the Occasion of his Sixtieth Birthday*, 26-65. Tokyo: Kaitakusha. [Revised version of the 1992 LRC working paper.]

2007 Categories and projections in prosodic structure. Paper presented at the Old World Conference in Phonology 4, January 18-21, 2007, Rhodes, Greece.

this volume. The extended prosodic word.

Joseph, Brian D.
2003 Defining word in Modern Greek: A response to Philippaki-Warburton and Spyropoulos. In: Geert Booij, and Jaap van Maarle (eds.), *Yearbook of Morphology 2002*, 87–114. Dordrecht: Kluwer.

Kabak, Barış, and Anthi Revithiadou
in press From edgemost to lexical stress: Diachronic paths, typology and representation. *The Linguistic Review*.

Kabak, Barış, and René Schiering
2006 The phonology and morphology of function word contractions in German. *Journal of Comparative Germanic Linguistics* 9: 53-99.

Kabak, Barış and Irene Vogel
2001 The phonological word and stress assignment in Turkish. *Phonology* 18: 315-360.

Kager, René
1994 Ternary rhythm in alignment theory. Ms., Utrecht University. [ROA-35, http://ruccs.rutgers.edu/roa.html]

Kaisse, Ellen, and Patricia Shaw
1985 On the theory of lexical phonology. *Phonology Yearbook 2*: 1-30.

Kaye, Jonathan
1974 Opacity and recoverability in phonology. *Canadian Journal of Linguistics* 19: 134-149.

Kiparsky, Paul
1982 Lexical morphology and phonology. In: In-Seok Yang (eds.), *Linguistics in the Morning Calm*, 1-91. Seoul: Hanshin.

Knecht, Laura Ellen
1986 Subject and object in Turkish. Ph. D. diss., Massacusetts Institute of Technology.

Kornfilt, Jaklin
1984 Case marking, agreement and empty categories in Turkish. Ph.D. diss., Harvard University.

1995 Scrambling and incorporation in Turkish. In: Artemis Alexiadou, Nanna Fuhrhop, Paul Law, and Sylvia Löhken (eds.), *ZAS Papers in Linguistics* 1(4), 29-42. Berlin: Zentrum für Allgemeine Sprachwissenschaft.

1997 *Turkish*. London: Routledge.

2003 Scrambling, subscrambling and case in Turkish. In: Simin Karimi (ed.), *Word Order and Scrambling*, 125-155. Malden and Oxford: Blackwell.

Lewis, Geoffrey N.
1967. *Turkish grammar*. Oxford: Oxford University Press.

McCarthy, John J., and Alan Prince
1993 Generalized alignment. In: Geert Booij, and Jaap van Maarle (eds.), *Yearbook of Morphology 1993*, 79-153. Dordrecht: Kluwer Academic Publishers.

Mohanan, Karuvanuur P.
1986 *The Theory of Lexical Phonology*. Dordrecht: Reidel.

Nespor, Marina, and Irene Vogel
1986 *Prosodic Phonology*. Dordrecht: Foris.

Nunes, Jairo, and Juan Uriagereka
2000 Cyclicity and extraction domains. *Syntax* 3: 20-43.

Oostendorp, Marc van
2002 The phonological and morphological status of the prosodic word adjunct. In: Gisbert Fanselow, and Caroline Féry (eds.), *Resolving Conflicts in Grammars: Optimality Theory in Syntax, Morphology, and Phonology*, 209-235. Hamburg: Buske.

2006 ‘The theory of Faithfulness.’ Ms. Meertens Institute/KNAW.

Öztürk, Balkız
2005 *Case, Referentiality and Phrase Structure*. Amsterdam/Philadelphia: John Benjamins.

Peperkamp, Sharon
1997 Prosodic words. Ph.D. diss., HIL Dissertation Series 34 (HIL/University of Amsterdam), Holland Academic Graphics, The Hague.

Philippaki- Warburton, Irene
1998 Functional categories and Modern Greek syntax. *The Linguistic Review* 15: 158–186.

Philippaki-Warburton, Irene, and Vassilios Spyropoulos
1999 On the boundaries of inflection and syntax: Greek pronominal clitics and particles. In: Geert Booij, and Jaap van Marle (eds.), *The Yearbook of Morphology 1998*, 45–72. Dordrecht: Kluwer.

Philippaki-Warburton, Irene, Spyridoula Varlokosta, Michalis Georgiafentis, and George Kotzoglou
2004 Moving from theta-positions: Pronominal clitic doubling in Greek. *Lingua* 114: 963-989.

Prince, Alan, and Paul Smolensky
1993 Optimality Theory: Constraint interaction in Generative Grammar. Report no. RUCCS-TR-2, Rutgers University Centre for Cognitive Science, New Brunswick, NJ.

Revithiadou, Anthi, and Vassilios Spyropoulos
2008. Greek object clitic pronouns: A typological survey of their grammatical properties. *Universals and Language Typology. Greek in Typological Perspective* 61: 39-53.

Selkirk, Elisabeth
1980a The role of prosodic categories in English word stress. *Linguistic Inquiry* 11: 563-606.

1980b Prosodic domains in phonology: Sanskrit revisited. In: Mark Aronoff, and Mary-Louise Kean (eds.), *Juncture*, 107-129. Saratoga, CA: Anma Libri.

1981 On prosodic structure and its relation to syntactic structure. In: Thorstein Fretheim (ed.), *Nordic Prosody* 2, 111-140. Trondheim: Tapir.

1984 *Phonology and Syntax: The Relation Between Sound and Structure*. Cambridge, MA: MIT Press.

1986 On derived domains in sentence phonology. *Phonology Yearbook 3*: 371-405.

1995 The prosodic structure of function words. In: Jill Beckman, Laura Walsh Dickey, and Suzanne Urbanczyk (eds.), *University of Massachusetts Occasional Papers in Linguistics 18: Papers on Optimality Theory*, 439-469. University of Massachusetts, Amherst: Graduate Linguistic Student Association.

Selkirk, Elisabeth, and Tong Shen
1990 Prosodic domains in Shanghai Chinese. In: Sharon Inkelas, and Draga Zec (eds.), *The Phonology-Syntax Connection*, 313-338. Chicago and London: The University of Chicago Press.

Schreuder, Maartje
2006 Prosodic processes in language and music. Ph. D. diss., Rijksuniversiteit Groningen.

Schreuder, Maartje, and Dicky Gilbers
2004 Recursive patterns in phonological phrases. In: Bernard Bel, and Isabelle Marlien (eds.), *Proceedings of Speech Prosody 2004*, 341-344. Nara, Japan: ISCA (SproSig).

Truckenbrodt, Hubert
1995 Phonological phrases: Their relation to syntax, focus, and prominence. Ph.D. Thesis, Massachusetts Institute of Technology, Cambridge, MA.

1999 On the relation between syntactic phrases and phonological phrases. *Linguistic Inquiry* 30: 219 -255.

Uriagereka Juan
1999 Multiple Spell-Out. In: Samuel David Epstein, and Norbert Hornstein (eds.), *Working Minimalism*, 251-282. Cambridge, MA: MIT Press.

Vigário, Marina
1999 On the prosodic status of stressless function words in European Portuguese. In: Tracy Alan Hall, and Ursula Kleinhenz (eds.), *Studies on the Phonological Word*, 253-293. Amsterdam: John Benjamins.

2003 *The Prosodic Word in European Portuguese*. Berlin: Mouton de Gruyter.

Vogel, Irene
this volume. The status of the Clitic Group.