

A Dynamic Approach to the Syntax-Phonology Interface: A Case Study from Greek*

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8.1 Introduction

In this chapter, we investigate the consequences of the Multiple Spell-Out Hypothesis (henceforth, MSOH; Uriagereka 1999, Chomsky 2000 *et seq.*) for prosodic constituency based on evidence from Greek phrasing. More specifically, our focus of investigation falls on the phrasing of clitic-doubled DP-objects and that of subjects. The basic idea in the MSO program is that certain pieces of structure abandon the main syntactic computation before its completion and thus, become inaccessible to further computation. Consequently, such *derivational cascades* can be argued to be independently processed at the PF interface, predicting an isomorphism between syntactic and prosodic *islands*, i.e. opaque domains for the application of both syntactic and phonological rules.

The MSO program raises some important issues regarding the flow and processing of information between the components of Grammar. Most interface theories tacitly assume a serial, unidimensional model of intermodular interactionⁱ according to which a *mapping* is defined as ‘repackaging’ of the output information of one module, so as to become a proper input to the other. For instance, Selkirk’s (1986, 1995a, 1995b) End-based Theory (also extended by Truckenbrodt 1995, 1999 *et seq.*) is a representative example of such a phonology-free syntax approach: Spell-Out takes place after the completion of the whole syntactic derivation (Chomsky 1981, 1995, Chomsky & Lasnik 1993). The output of syntax then becomes an input to the phonological component which, crucially, has limited sensitivity to syntactic information: only edges (left/right) of X-bar constituents are visible to the mapping rules.ⁱⁱ In other words, phonology is blind to syntactic relations such as head/complement, c-command, sisterhood, and so on. Differences in mapping between languages are due to parametric variation with respect to the X-bar level and the relevant edges (cf. Selkirk & Shen 1990).ⁱⁱⁱ However, serial models of interface become elusive with more elaborate structures which include non-cyclic syntactic elements that are arguably added later in the syntactic structure, such as adjunct clauses, adverbs, and left-dislocated elements (Lebeaux 1988, Stepanov 2001).

MSO, on the other hand, is by design a non-linear model of syntactic derivation that calls for a parallel mode of interaction between the grammatical components. In this respect, it offers a new insight to the way syntax feeds phonology. In fact, we propose that certain syntactic chunks are Spelled-Out independently from the rest of derivation and are parsed into separate phonological phrases (henceforth, p-phrase or ϕ).^{iv} To be explicit, we assume that the rules of phonology proper (i.e. rules inducing changes in the phonological pattern) do not make direct reference to syntactic constituents but rather to units of the Prosodic Hierarchy.^v Moreover, we take the p-phrase to be the primary prosodic constituent that mediates in the syntax-phonology interface, because it shows systematic, although not always isomorphic, relation to syntactic structure. In this chapter, evidence for the existence of such a constituent in Greek comes, primarily, from sandhi rules and, secondarily, from fill-word template requirements and intonation.

The isomorphism or the lack of it between the edges of p-phrases and the edges of syntactic constituents plays a central role in this contribution. We show that rephrasing,

driven from the need of p-phrases to achieve a prosodically well-formed size, is a favored restructuring process in Greek but not for every input string. We argue that certain syntactic islands, the islandhood of which is a direct consequence of their status as derivational islands, reflect their islandhood at the phonological level as well by resisting restructuring. The existence of multiple phrasing options for a given syntactic string has long been acknowledged in the literature (Nespor & Vogel 1986, Ghini 1993, among others). More recently, studies on phrasing in Romance (Sandalo & Truckenbrodt 2001, Prieto 1997, 2005, Elordieta et al. 2003, 2005, D'Imperio et al. 2005, Elordieta 2007) and other languages (Hirose 1999, 2003 for Japanese, Jun 2003 for Korean) have underlined the relevance of notions such as branchingness, weight balancing and length of phrasing. Such prosodic size constraints, called collectively here *binarity constraints*, assess the wellformedness of a constituent of a particular level of prosodic structure C^i in terms of the number of the constituents of a particular level C^{i-1} that it contains (Selkirk 2000). The innovation of this chapter, however, relies on the fact that the (non-)isomorphism between syntactic and prosodic structure is sometimes derived from the derivational history of a syntactic string and, more specifically, from the way syntactic pieces of information are assembled.

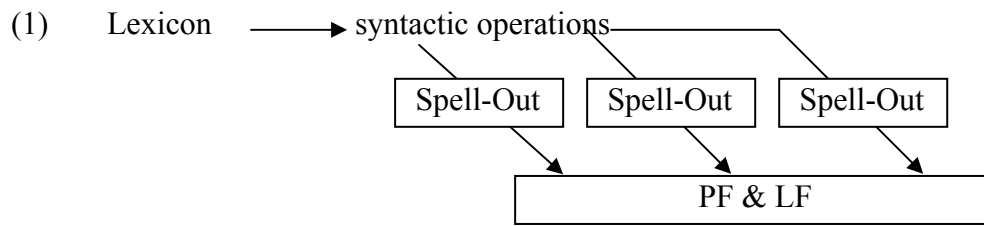
Prosodically-driven restructuring will also prove to be a valuable diagnostic in the investigation of the different derivational status of clitic-doubled objects and subjects. It is exactly this difference that supports a distinction between two different implementations of Spell-Out and, consequently, calls for a revision of the standard MSO model.

The remaining of this chapter is organized as follows. Section 8.2 presents the specifics of the MSOH and sets the stage for the discussion that follows. Section 8.3 examines the syntactic and prosodic islandhood of preverbal and post-verbal clitic-doubled DP-objects. Furthermore, it lays out the main proposal, namely, that clitic-doubled DP-objects are syntactic and prosodic islands as a result of their being derivational islands. Section 8.4 discusses an alternative approach to the prosodification of adjuncts. Section 8.5 addresses the issue of preverbal Greek subjects, which raise problems for the standard MSO architecture. Section 8.6 proposes a revised version of MSOH, which draws a distinction between two different implementations of Spell-Out, and explores its effects for the PF interface. Section 8.7 concludes this contribution.

8.2 Derivation, cyclicity and the *Multiple Spell-Out Hypothesis*

The Minimalist Program (Chomsky 1993 *et seq.*) constitutes a radical shift to a derivational approach to language. In such an approach, explanation of linguistic phenomena is provided by an independently motivated local generative procedure, the *derivation* (see also Uriagereka 1998, 2002, Epstein & Seely 2002). Moreover, there are no syntactic levels of representation, except from the interfaces with the Conceptual-Intentional system (LF) and the Articulatory-Perceptual system (PF). The *derivation* is a strictly cyclic and minimally local procedure which is linked with the interfaces by means of the operation Spell-Out.

In the recent developments of the Minimalist Program (Uriagereka 1999, 2002, Chomsky 2000, 2001, Epstein & Seely 2002) and, especially in the MSOH, the role of strict cyclicity has been capitalized. The main assumption of the MSOH is that Spell-Out is able to apply iteratively sending pieces of syntactic derivation to PF and LF. The MSO architecture is depicted in (1):



Spell-Out is, therefore, proposed to apply at the end of a derivational cascade. The application of Spell-Out destroys the internal structure of the cascade, so that it behaves as a single object for the purposes of the rest of derivation. As a consequence, the derivation is divided into derivational domains/cascades, each one with its own derivational history. These derivational domains define syntactic cycles within the strict limits of which syntactic operations apply; cross-cycle relations and operations are strictly forbidden (see also Nunes & Uriagereka 2000). This prohibition takes the form of the Principle of Strict Cyclicity (PSC) stated in (2).

- (2) *Principle of Strict Cyclicity* (PSC; Uriagereka 1999: 274)
 All syntactic operations take place within the derivational cycles of cascades.

The interesting question that emerges at this point is whether MSOH has certain implications for the interfaces. As a consequence of the derivational architecture, we propose that it does so and that PSC should extend to the interfaces in the form of the *Generalized Principle of Strict Cyclicity* (GPSC). More specifically, we claim that derivational domains/cascades define also phonological and interpretative cycles, in the domain of which phonological and interpretative operations apply. This is because these cascades reach PF and LF as separate units and are, therefore, independently processed by the operations of these components.

- (3) *Generalized Principle of Strict Cyclicity* (GPSC)
 All syntactic, phonological and interpretative operations take place within the derivational cycles of cascades.

Focusing on the implications of the MSOH for the syntax-phonology interface, we further propose that the products of each application of Spell-Out are mapped onto separate prosodic constituents. More specifically, we argue that, since these derivational cascades reach PF as individual units, they are independently processed and thus, are mapped onto separate p-phrases. This leads us to the prediction that no phonological rule (i.e. sandhi) can relate elements of different derivational cascades, even if all the conditions for the application of such a rule are otherwise respected. This prediction, which stems from the GPSC, is encapsulated in (4):

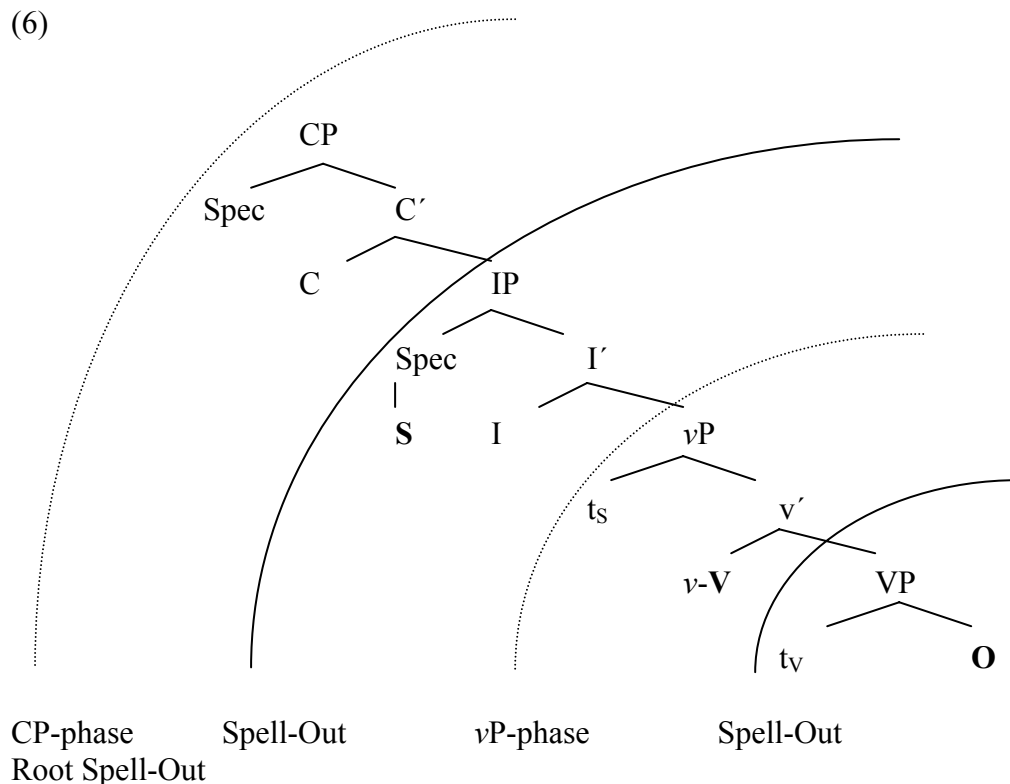
- (4) *PF Corollary of GPSC*
 The edges of a derivational cascade are aligned with a p-phrase boundary.

Delving more into the issue of what constitutes a natural definition of a derivational cascade, we first encounter Chomsky's (2000 *et seq.*) definition in terms of *phases*. Phases are theoretically postulated as sub-arrays at the Numeration and coincide with the CP and the vP constituents, as these objects are propositional in nature. Spell-Out in such a system is triggered by the computational requirement that the checked features be deleted, so as to be unavailable for the rest of derivation. The PSC in Chomsky's system takes the form of the

Phase Impenetrability Condition (PIC):

- (5) *Phase Impenetrability Condition* (PIC; Chomsky 2001: 13)
 For strong phase HP with head H the domain of H is not accessible to operations outside HP; only H and its edge are accessible to such operations, the edge being the residue outside H', either Specifiers (Specs) or elements adjoined to HP.

In practice, PIC implies that Spell-Out applies at the domain of a phase upon its completion. Thus, the phase system predicts that for an SVO structure there are three Spell-Out domains: (i) the VP upon the completion of vP phase, (ii) the IP upon the completion of the CP-phase, and (iii) the root Spell-Out that finalizes the structure.



Given now our assumptions about the impact of MSO on the PF interface, which is stated as the *PF Corollary of GPSC* in (4), the phase system predicts the following prosodification of an SVO structure:

- (7) Spell-Out of VP → [O]φ
 Spell-Out of IP → [SV]φ
 → [SV]φ [O]φ

Such an approach may be taken to independently derive phonological phrasing based on the products of each application of Spell-Out.^{vi} Nevertheless, the predicted phrasing of the SVO string is not the only pattern attested in the languages of the world and more crucially not even in the same language (e.g. English; Selkirk 2000). One may assume that the attested patterns are the result of rephrasing processes taking place at the PF in order for certain binarity or perhaps other constraints to be satisfied (see the discussion in section 8.1). Crucially, such an assumption undermines the predictive power of the model, in the sense

- (9)
- a. [... ε]φ [γ δ]φ [α β]φ
 - b. * [... ε γ]φ [δ]φ [α β]φ
 - c. * [... ε γ δ]φ [α β]φ
 - d. * [... ε γ]φ [δ α β]φ
 - e. * [... ε]φ [γ δ α β]φ
 - f. * [... ε]φ [γ]φ [δ α β]φ
 - g. * [... ε γ δ α β]φ

Such a model therefore assumes an isomorphism between the syntactic and the phonological islandhood of a chunk as a result of its derivational history. That is, the mapping algorithm is sensitive to the syntactic derivation, in the sense that derivational cascades are mapped onto independent phonological phrases, despite the dynamics of the mapping system itself.

In what follows, we will review significant evidence from the prosodification of OclV(S) and clVO(S) structures in Greek which shows that the syntax-phonology interface is indeed sensitive to the products of syntactic derivation. More specifically, the clitic-doubled object, which constitutes a peripheral adjunct element, is shown to be mapped onto a separate phonological phrase that, contra to the predictions of the mapping system, does not comply with binarity and, more significantly, it resists restructuring.

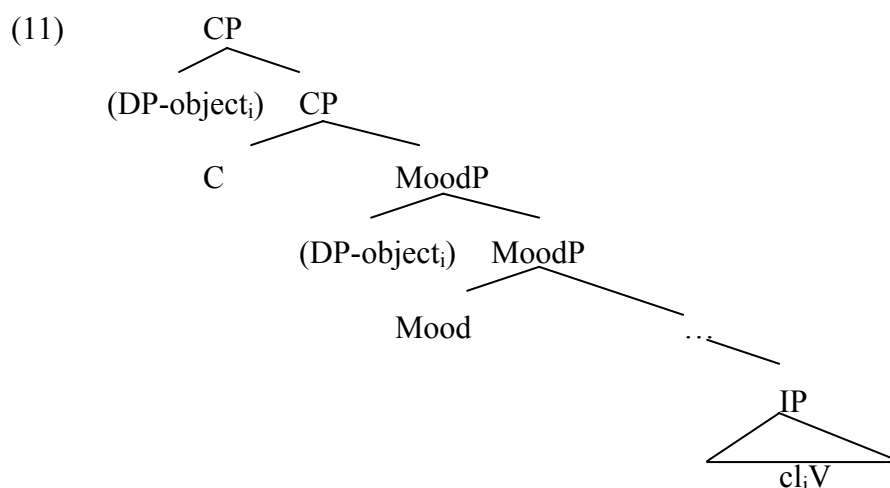
8.3 The syntactic and prosodic islandhood of clitic-doubled DP-objects

8.3.1 Preverbal clitic-doubled DP-objects

8.3.1.1 Syntactic status

Preverbal clitic-doubled objects have been shown to be peripheral elements, base-generated as adjuncts to the MoodP or to the CP, and coindexed with the clitic in order to license their features and theta-role (Philippaki–Warburton 1987 *et seq.*):^x

- (10) *to axláði to éfaye o kóstas*
 the pear-ACC it-ACC eat-PAST.3SG the Kostas-NOM
 ‘As for the pear, Kostas ate it’



Their peripheral status is indicated by the fact that they are not arguments and constitute left-dislocated topics (Philippaki–Warburton & Spyropoulos 1999, Philippaki–Warburton *et al.* 2004).^{xi} As such, these elements can never be focused:^{xii}

- (12) *TO AXLÁÐI to éfaye o kóstas
 the pear-ACC it-ACC eat-PAST.3SG the Kostas-NOM
 ‘It is the pear that Kostas ate it’

That they are base-generated adjuncts is indicated by the fact that they can appear outside weak islands (Tsimplici 1990). Compare (13a) with the ungrammatical (13b), which contains a wh-phrase moving out of a weak island:

- (13) a. to axláði_i ðé mu ípan [pjós to_i éfaye]
 the pear-ACC NEG me-GEN tell-PAST.3PL who-NOM it-ACC eat-PAST.3SG
 ‘As for the pear, they didn’t tell me who had eaten it’
 b. *t_i /pjó axláði_i ðé su ípan [pjós éfaye t_i]?
 what/which pear-ACC NEG you-GEN tell-PAST.3PL who-NOM eat-PAST.3SG
 ‘*What/which pear didn’t they tell you who had eaten?’

More crucially, these elements exhibit CED effects:

- (14) *pjanú_i mu ípes óti [_{DP} to axláði t_i] to éfaye
 who-GEN me-GEN tell-PAST.2SG that the pear-ACC it-ACC eat-PAST.3SG
 o kóstas?
 the Kostas-NOM
 ‘Whose did you tell me that Kostas ate the pear?’

All these facts indicate that preverbal clitic-doubled objects constitute independent derivational cascades and exhibit syntactic islandhood. They are thus predicted to be independently Spelled-Out, before they merge with the rest of structure, and to constitute prosodic islands, too.^{xiii}

8.3.1.2 Prosodification

(i) Evidence from sandhi rules

It has been shown on the basis of intonational evidence that preverbal clitic-doubled objects are mapped onto an independent p-phrase or intonational phrase (i-phrase) (Baltazani & Jun 1999, Baltazani 2002). Here, we provide additional support for this conclusion from sandhi phenomena. In (15), we provide a representative list of sandhi rules that provide cues for p-phrase breaks.

- (15) *sandhi rules at the level of p-phrase in Greek*
- a. *t-voicing*
 t → d / [...V__V]φ
 e.g. /θélo_l ta kulurákja/ → [θélo **da** kuluráca] ‘(I) want the cookies’
- b. *s-voicing*
 s → z / [... __ C[+cont, +voi], m, n]φ
 e.g. /meýálo_s máyo_s/ → [meýálozmáyo_s] ‘big magician’
- c. *C-degeminatation*
 C_i → Ø / [... [...__]PrW [C_i...]PrW]φ
 e.g. /ásximo_s satrápis/ → [ásximoØsatrápis] ‘ugly satrap’
- d. *V-degeminatation*
 V_i → Ø / [... [...__]PrW [V_i...]PrW]φ
 e.g. /kání italiká/ → [kánØitaliká] ‘(s/he) learns Italian’

- e. *nasal-stop assimilation*
 [+nas] → [α p.a.] / [... ____ C[-cont, α p.a.]...]φ
 [-cont] → [+voi] / [... [+nas] ____...]φ
 e.g. /éxun palépsi/ → [éx**u**mbalépsi] ‘(they) have wrestled’

For the purposes of our discussion, we focus on t-voicing, s-voicing, vowel degemination and nasal-stop assimilation. In general, sandhi rules are blocked between the clitic-doubled object and the following constituent, suggesting that the clitic-doubled object forms a separate p-phrase. This is illustrated by the examples in (16) and (17), which render the orders *DP-object cIV DP-subject* and *DP-object DP-subject cIV*, respectively.

- (16) DP-object cIV DP-subject
- a. *to axláð̃i to éfaje o kóstas*
 the pear-ACC it-ACC eat-PAST.3SG the Kostas-NOM
 [tØ axláð̃i]φ [to éfaje o kóstas]φ
 ‘As for the pear, Kostas ate it’
- b. *tis próves mas/sas tis klíni*
 the rehearsal-ACC.PL us/you-ACC.PL them-ACC.PL arrange-3PL
 o pános
 the panos-NOM
 [tis próves]φ [mas/sas tis klíni o pános]φ
 ‘As for the rehearsals, Panos arranges them for us/you’
- c. *tus amáñ tus parakoluθún ta peðjá*
 the A.M.A.N them-ACC.PL watch-3PL the kid-NOM.PL
 [tus amáñ]φ [tus parakoluθún ta peðjá]φ
 ‘As for the A.M.A.N (group), the kids watch them’
- (17) DP-object DP-subject cIV
- a. *tin ániksĩ i kátja tin aɣapá*
 the spring-ACC the Katia-ACC it-ACC love-3SG
 [tin ániksĩ]φ [i kátja tin aɣapá]φ
 ‘As for the spring, Katia loves it’
- b. *ton aléko o ba^mbás ton misí*
 the Aleko-ACC the dad-NOM him-ACC hate-3SG
 [ton aléko]φ [o ba^mbás ton misí]φ
 ‘As for Alex, dad hates him’

As is obvious from the above examples, sandhi rules provide additional evidence for the independent p-phrasing of clitic-doubled objects. More specifically, in (16a), t-voicing, a rule that voices an intervocalic *t*, fails to apply between the clitic-doubled object and the clitic, although its structural conditions are met. Similarly, in (16b), s-voicing, which is initiated before a voiced fricative or a nasal, is blocked between the object and the following clitic. In (16c), nasal-stop voicing assimilation is also blocked between the clitic-doubled object and the following clitic. Moreover, in (17a-b), vowel degemination is not enforced between the clitic-doubled object and the DP-subject. We conclude, therefore, that the syntactic islandhood of clitic-doubled objects is matched with prosodic islandhood as well. This is

further supported by the fact that they exhibit resistance to rephrasing, which constitutes a popular restructuring procedure at the level of p-phrasing.

(ii) Evidence from wellformedness constraints on phrasing

Revithiadou (2004a, b, 2005) argues that the End-based mapping algorithm for Greek is {Right, XP}, translating to the ranking: ALIGN-XP,R >> ALIGN-XP,L. However, on the basis of a corpus of 204 declarative sentences (elicited by four native speakers – three female and one male – and produced with neutral sentence stress), she shows that there is a strong preference for p-phrases to be binary. This is particularly enforced when the subject (S) is light (smaller than two feet) and the VP is heavy (larger than two feet). The examples below illustrate both available phrasing options:

- (18) [DP Det N] [IP V [VP tv [DP Det N] [PP P DP]]
to fós đini isxi sti mixani
the light-NOM give-3SG power-ACC to-the machine-ACC
‘The light gives power to the engine’
a. [to fós]φ [đin∅ isxi]φ [sti mixani]φ *end-based mapping*
b. [to fóz đini]φ [isxi sti mixani]φ *binarity-based mapping*
- (19) [DP Det N] [IP V [VP tv [DP Det N] [PP P DP]]]
o pános đini efxes me kartes
the Panos-NOM give-3SG wish-ACC.PL with card-ACC.PL
‘Panos sends wishes with cards’
a. [o pános]φ [đin∅ efxes]φ [me kartes]φ *end-based mapping*
b. [o pánoz đini]φ [efxéz me kartes]φ *binarity-based mapping*

The blocking of s-voicing and vowel degemination between the DP-subject and the V in (18a) and (19a), respectively, suggests that the respective constituents belong to separate phrases. Moreover, in (18a), the VO string forms a p-phrase, since vowel degemination applies between the V and the object, i.e. *đin∅ isxi*. In (19a), s-voicing is blocked between the DP-subject and the V, suggesting that they phrase separately, whereas the deletion of the high vowel /i/ before the more sonorous /e/ between the V and the object, *đin∅ efxes*, suggests that these two constituents phrase together.

The data in (18b) and (19b), on the other hand, reveal that a second algorithm, which evaluates p-phrases on the basis of prosodic weight, is in force. In fact, the (b)-phrasings are preferred over the (a)-phrasings, especially in normal to rapid speech rates. The driving force for (b)-phrasings is binarity. In (18b) and (19b), the V joins with the DP-subject into a binary p-phrase. Likewise, the two complements are combined together into a second binary p-phrase, thus yielding a balanced and symmetrical i-phrase: {[ω ω]φ [ω ω]φ}i-phrase.

Binarity is achieved only when a constraint such as (20),^{xiv} which regulates what the minimal size of a p-phrase needs to be, outranks the syntax-phonology interface constraint: BIN^{min} >> ALIGN-XP,R.

- (20) *prosodic binarity* (Selkirk 2000, based on Itô & Mester 1992, 1995, Ghini 1993)
a. BIN^{min}: A p-phrase must consist of at least two PrWs.
b. BIN^{max}: A p-phrase must consist of at most two PrWs.

To summarize, weight balancing and prosodic branchingness constraints constitute the

driving force for the partition of sentences into prosodic units that show no respect to syntactic boundaries. A phrasing mechanism that assigns primary role to prosodic wellformedness (21a) naturally stands in a rivalry relationship with the end-based mapping (21b) that requires a hand-in-hand co-operation between phonology and syntax.

- (21) *p-phrasing algorithms*
 a. *edge-based algorithm*: alignment >> binarity
 b. *binarity-based algorithm*: binarity >> alignment

Interestingly, binary phrasings are not an option for the sentences in (22). Clitic-doubled DPs consisting of a single prosodic word are not liable to the balancing forces of the binarity-based algorithm and they resist restructuring.

- (22) a. *to axláði to éfaje o kóstas tis ánas*
 the pear-ACC it-ACC eat-PAST.3SG the Kostas-NOM the Anna-GEN
 ‘As for the pear, Anna’s Kostas ate it’
 a’. [to axláði]φ [to éfaje o kóstas tis ánas]φ
 a’’. *[to axláði *do* éfaje]φ [o kóstas tis ánas]φ
 b. *tin ániksi i kátja tin éxi ayapísi*
 the spring-ACC the Katia-ACC it-ACC have-3SG love
 ‘As for the spring, Katia has loved it’
 b’. [tin ániksi]φ [i kátja tin éxi ayapísi]φ
 b’’. *[tin ániksiØi kátja]φ [tin éxi ayapísi]φ

To conclude, blocking of sandhi rules and resistance to binarity indicate that preverbal clitic-doubled objects form independent phrases and hence prosodic islands.

8.3.2 Postverbal clitic-doubled DP-objects in clVO(S) constructions

8.3.2.1 Syntactic status

Postverbal objects in clVO(S) constructions exhibit different syntactic properties from objects in VO(S) structures, which are unquestionably arguments. Thus, it has been argued that clitic-doubled objects in clVO(S) constructions are peripheral elements to the vP domain, adjoined to either vP or VP (Philippaki–Warburton *et al.* 2004,^{xv} Georgiafentis 2004):

- (23) a. *to éfaje to axláði o KÓSTAS*
 it-ACC eat-PAST.3SG the pear-ACC the Kostas-NOM
 ‘As for the pear, it was Kostas that ate it’
 b. [IP to éfaje [_{vP} to axláði [_{vP} o kóstas t_v t_{CL}]]]

The peripheral status of clitic-doubled DP-objects in clVO(S) is indicated by the fact that, unlike DP-objects in VOS structures, they cannot be focused.

- (24) a. *éfaje [TO AXLÁÐI]_{FOC} o kóstas* (answer to ‘What did Kostas eat?’)
 eat-PAST.3SG the pear-ACC the Kostas-NOM
 ‘Kostas ate THE PEAR’
 b. **to éfaje [TO AXLÁÐI]_{FOC} o kóstas*
 it-ACC eat-PAST.3SG the pear-ACC the Kostas-NOM
 ‘As for the pear, Kostas ate it’

Furthermore, clitic-doubled objects in cIVOS constructions constitute islands for extraction from within (CED effects) (25a). Notice again the difference from objects in VOS constructions (25b):

- (25) a. * pjanú_i mu ípes óti to éfaye [DP to axláði t_i]
 who-GEN me-GEN tell-PAST.2SG that it-ACC eat-PAST.3SG the pear-ACC
 o kóstas?
 the Kostas-NOM
 ‘Whose did you tell me that Kostas has eaten the pear?’
- b. pjanú_i mu ípes óti éfaye [DP to axláði t_i]
 who-GEN me-GEN tell-PAST.2SG that eat-PAST.3SG the pear-ACC
 o kóstas?
 the Kostas-NOM
 ‘Whose did you tell me that Kostas has eaten the pear?’

We conclude that clitic-doubled objects in cIVO(S) constructions qualify as derivational cascades. Therefore, they are predicted to exhibit, on the one hand, similar prosodic behavior as preverbal clitic-doubled objects in OclV(S) constructions, and, on the other hand, different prosodic properties from DP-objects in VO(S) constructions.

8.3.2.2 Prosodification

In order to figure out the prosodic behavior of DP-objects in the constructions under investigation, we designed eight declarative sentences of the cIVO(S) order, differing in the size of the DP-object. These sentences were compared with respect to their prosodic pattern to eight declarative sentences of the VO(S) order. Five subjects, three female and two male, ranging in age from 22-30 years old, participated in the experiment. All subjects were speakers of standard Greek and unaware of the exact purposes of the experiment. They were given a total of sixteen randomized target sentences displaying mixed VOS and cIVOS patterns interspersed with eight fillers. All twenty-four sentences were rendered with DP-subject focusing,^{xvi} which was elicited with the help of questions, as indicated by the sample dialogues in (26-27). Prosodically light (L) and heavy (H) structures for Vs and Os were used, so that all possible combinations could be represented in the sentences, namely, LLX, HHX, LHX, HLX, (where X stands for the focused subject). The subjects were told to read the sentences in conversational style without being given any specific instructions regarding the phrasing. Sentences were recorded on a Marantz PMD 660 digital recorder with an AKG C547 BL microphone and were analyzed using PRAAT (Boersma & Weenink 2006).

- (26) pjí (a) éfayan / (b) to éfayan to axláði?
 who-NOM.PL eat-PAST.3PL/ it-ACC eat-PAST.3PL the pear-ACC
 ‘Who ate the pear?’
- a. LLX, VOS
 éfayan do axláði TA PEðjÁ
 eat-PAST.3PL the pear-ACC the kid-NOM.PL
 ‘THE KIDS ate the pear’
- b. LLX, cIVOS
 to éfayan to axláði TA PEðjÁ
 it-ACC eat-PAST.3PL the pear-ACC the kid-NOM.PL
 ‘As for the pear, THE KIDS ate it’

(27) *pjí* *θa* (a) *simeostólizan* / (b) *to* *simeostólizan* *to* *próto*
 who-NOM.PL FUT decorate-PAST.3PL / it-ACC decorate-PAST.3PL the first-ACC
árma?

vehicle-ACC

‘Who would have decorated the first vehicle with flags?’

a. HHX, VOS

θa simeostólizan to próto árma TA PEðjÁ
 FUT decorate-PAST.3PL the first-ACC vehicle-ACC the kid-NOM.PL

‘THE KIDS would have decorated with flags the first vehicle’

b. HHX, cIVOS

θa to simeostólizan to próto árma TA PEðjÁ
 FUT it-ACC decorate-PAST.3PL the first-ACC vehicle-ACC the kid-NOM.PL

‘As for the first vehicle, THE KIDS would have decorated it with flags’

The results of the experiment verify the hypothesis that postverbal clitic-doubled objects constitute prosodic islands in the sense that they never phrase together with the verb. More specifically, in VO(S) orders, the V and O are phrased together, [VO]φ, if both are light, but are grouped into separate p-phrases, [V]φ [O]φ, if both are heavy. Both p-phrasings are illustrated in (28a) and (28b), respectively. Particularly in the latter example, the HH constituents are organized into two equally balanced p-phrases, indicating that prosodic minimality considerations, such as binarity, are in control of their size.

(28) *p-phrasings of VOS orders*

a. LLX, VOS

[*éfayan do axláði*]φ [TA PEðjÁ]φ
 eat-PAST.3PL the pear-ACC the kid-NOM.PL

‘THE KIDS ate the pear’

b. HHX, VOS

[*θa simeostólizan*]φ [*to próto árma*]φ [TA PEðjÁ]φ
 FUT decorate-PAST.3PL the first-ACC vehicle-ACC the kid-NOM.PL

‘THE KIDS would have decorated the first vehicle with flags’

Evidence for the proposed p-phrasings comes mainly from the application of sandhi rules, the prosodic templates for fill-words and partly from intonation. Starting from sandhi rules, nasal-stop assimilation applies between the verb *éfayan* and its complement *to axláði* in (28a), indicating that the two constituents are phrased together. The same rule is blocked in (28b) because both the heavy verb *θa simeostólizan* and its branching complement *to próto árma* independently comply to binarity and hence, form independent p-phrases. This sentence contrasts with (29) where nasal-stop assimilation applies because the prosodically light Vs and Os phrase together:

(29) *éspan̩ ta pjáta I NÍFES*
 break-PAST.3PL the plate-ACC.PL the bride-NOM.PL
 [*éspan̩ da pçáta*]φ [I NÍFES]φ
 ‘THE BRIDES were breaking the plates’

On the other hand, the examples in (30) clearly show that the postverbal clitic-doubled object in cIVOS orders does not incorporate into the p-phrase of the cIV, strikingly at the expense of binarity. Sandhi rules, such as nasal-stop assimilation, for instance, which

otherwise would have applied, are blocked. Consequently, the p-phrasing is consistently [cIV]φ [O]φ, for constructions with both light and heavy Vs and Os.

(30) *p-phrasings of cIVOS orders*

a. LLX, cIVOS

[to éfayan]φ [to axláði]φ [TA PEðjÁ]φ
 it-ACC eat-PAST.3PL the pear-ACC the kid-NOM.PL
 ‘As for the pear, THE KIDS ate it’

b. HHX, cIVOS

[ða do simeostólizan]φ [to próto árma]φ [TA PEðjÁ]φ
 FUT it-ACC decorate-PAST.3PL the first-ACC vehicle-ACC the kid-NOM.PL
 ‘As for the first vehicle, THE KIDS would have decorated it with flags’

The next piece of evidence comes from 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 p-phrase of the i-phrase: {[...]φ ___ [...]φ ...}i-phrase. The fill-words are inserted after the cIV constituent, i.e. cIV]φ ↓ [OS, suggesting that in cIVO(S) orders the object does not belong to the initial p-phrase, as illustrated in (31a). Furthermore, they follow the VO constituent in VO(S) strings, i.e. VO]φ ↓..., provided that both the V and O are light. This is shown in (31b) where the V and the object, driven by the need to achieve binarity, combine into one p-phrase. (Cf. examples (31a’-b’) where the fillers occur after the heavy verb.)

(31) *fill-words in VOS and cIVOS orders*

a. [to éfayan]φ *léj* [to axláði]φ [TA PEðjÁ]φ
 it-ACC eat-PAST.3PL say-3SG the pear-ACC the kid-NOM.PL
 ‘As for the pear, let’s say, THE KIDS ate it’

a’. [to éxun simeostólisi]φ *léj* [to próto árma]φ
 it-ACC have-3PL decorate say-3SG the first-ACC vehicle-ACC
 [TA PEðjÁ]φ
 the kid-NOM.PL
 ‘As for the first vehicle, let’s say, they have decorated it with flags’

b. [éfayan do axláði]φ *léj* [TA PEðjÁ]φ
 eat-PAST.3PL the pear-ACC say-3SG the kid-NOM.PL
 ‘THE KIDS ate the pear’

b’. [éxun simeostólisi]φ *léj* [to próto árma]φ [TA PEðjÁ]φ
 have-3PL decorate say-3SG the first-ACC vehicle-ACC the kid-NOM.PL
 ‘THE KIDS, let’s say, have decorated with flags the first vehicle’

The evidence presented above establishes beyond doubt that the object is phrased differently in cIVOS and VOS orders. More specifically, like their preverbal counterparts, postverbal clitic-doubled objects constitute prosodic islands in the form of independent p-phrases. The prosodic and syntactic islandhood of these elements is an immediate consequence of their status as derivational cascades, which are assembled in their own derivational work-space, and are independently Spelled-Out and processed by PF.

Intonation offers promising insights into the issue of prosodic islandhood of clitic-doubled objects. Baltazani & Jun (1999) and Baltazani (2002) claim that initial as well as medial clitic-doubled objects display the exact same intonational pattern. We reached the

same conclusion in a provisional study of the intonational phrasing of the preverbal and postverbal clitic-doubled objects (see figure 1 and figure 2).^{xvii}

Fig. 8.1: Intonational pattern of OclVS order with focus on S: *to axláði to éfaye O KÓSTAS*

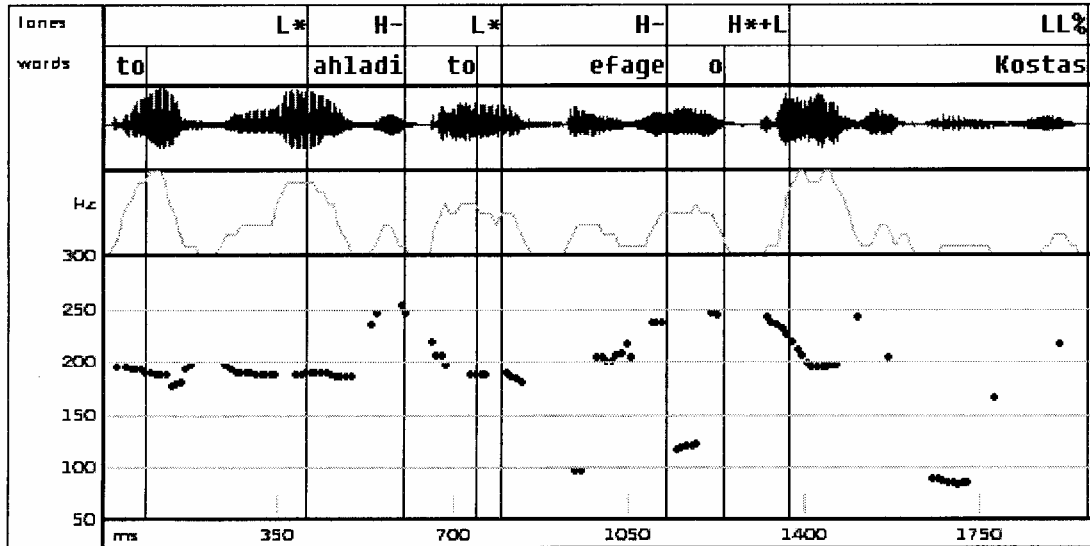


Fig. 8.2: Intonational pattern of clVOS order with focus on S: *to éfaye to axláði O KÓSTAS*

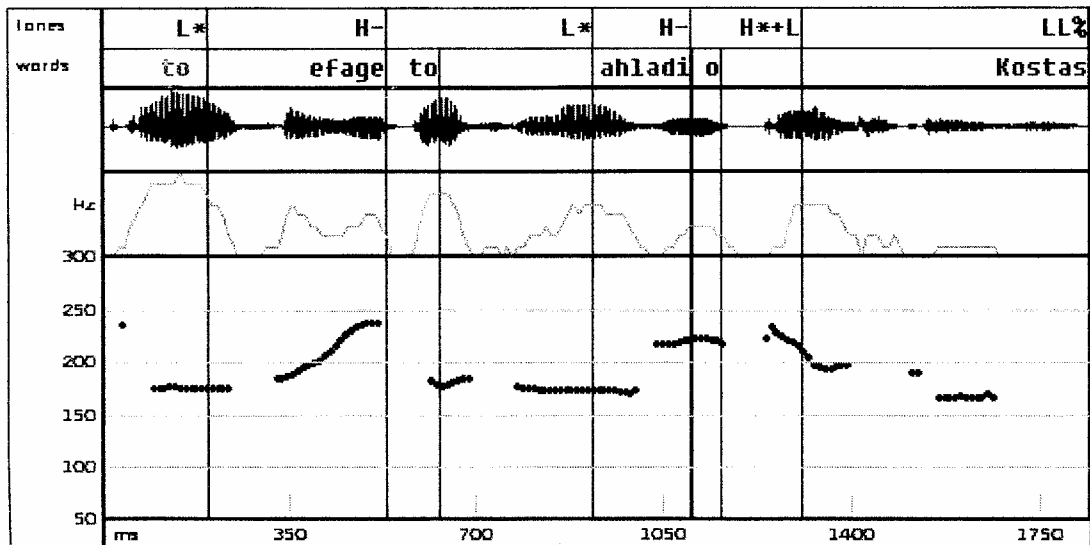
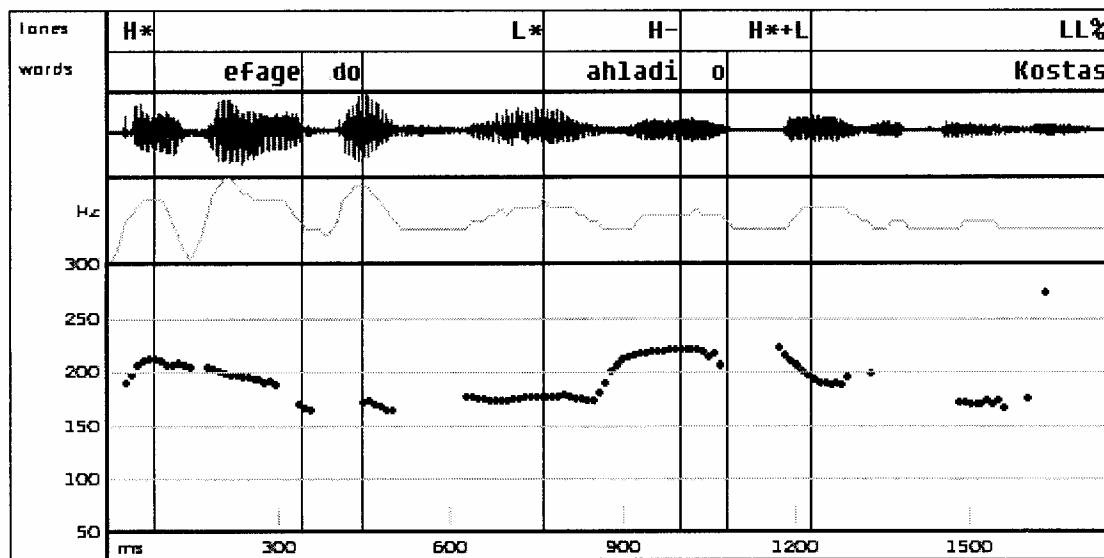


Fig. 8.3: Intonational pattern of VOS order with focus on S: *éfaɣe do axláði O KÓSTAS*



The above figures lead us to the following observations: First, both the preverbal and the post-verbal clitic-doubled object form a p-phrase with a L* pitch accent and a H-. Second, a phrase accent marks the right p-phrase boundary of the clV string, regardless of whether it precedes (fig. 1) or follows (fig. 2) the clitic-doubled object.^{xviii} In VOS constructions, the H- marks the endpoint of the p-phrase that contains the VO string. Contrast *fig.1* and *fig.2* with *fig.3*. In short, the objects in clVOS and OclVS orders form independent p-phrases with a L* pitch accent and a H-, whereas the object in VOS orders phrases together with the verb. The end-result once again points to the expected direction: clitic-doubled objects are wrapped into their own phrase.

8.3.3 Syntactic derivation and the prosodification of clitic-doubled DP-objects

So far we provided both syntactic and phonological evidence for the islandhood of clitic-doubled objects regardless of their position within the sentence. Syntactically, these elements are not arguments and this explains why they cannot be focused. Moreover, they constitute islands for extraction from within, exhibiting CED effects. These syntactic properties suggest that clitic-doubled objects constitute independent derivational domains. This means that they are assembled at their own derivational work-space and merge with the rest of the structure by means of a discontinuous application of Merge. Following Uriagereka's analysis, such a merging takes place after an application of Spell-Out has driven their derivation to PF. Spell-Out destroys the internal structure of the clitic-doubled object and turns it into a derivational island. The PSC (2) then accounts for the syntactic islandhood of clitic-doubled objects: Spell-Out makes the material inside the clitic-doubled object inaccessible for further computation.

In addition, there is substantial phonological evidence from sandhi rules, fill-word templates and intonation that clitic-doubled objects behave as phonological islands as well: they map onto a separate p-phrase, regardless of the phrasing of the rest of derivation, and fail to prosodically incorporate with the rest of the structure, showing an otherwise unexplained resistance to the binary groupings triggered by the performance-based algorithm.

Table 1 summarizes the syntactic and prosodic evidence put forward so far in support of the matched syntactic and prosodic islandhood of clitic-doubled objects:

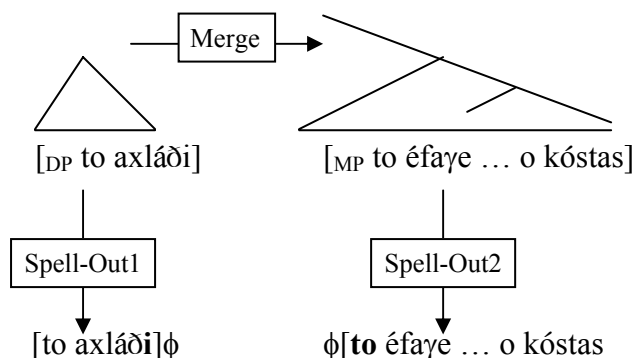
Table 8.1. Syntactic and prosodic evidence for the islandhood of clitic-doubled objects

SYNTACTIC EVIDENCE	
argument status	no
focus	no
CED effects	no
PROSODIC EVIDENCE	
blocking of sandhi and resistance to rephrasing	O]φ ↓ [cIV... cIV]φ ↓ [O...
insertion of fill-words	O]φ ↓ [cIV... cIV]φ ↓ [O...
insertion of phrase boundary tone	O]φ ↓ [cIV... cIV]φ ↓ [O...

Putting these facts together, we conclude that there is an isomorphism between the syntactic and the phonological islandhood of the clitic-doubled object which can be straightforwardly explained when we consider the derivational status of such elements. Being non-cyclic and independently Spelled-Out, they become a derivational island for both the syntactic derivation and the prosodic structure. Thus, clitic-doubled objects in Greek offer robust evidence for the representational effects of the derivation at the interfaces. The existence of such effects was originally suggested by Uriagereka (2002: 10-12) and, in section 8.2, it is stated in the form of GPSC (3) and its PF Corollary (4). Such a principle clearly predicts that a derivational island is an island for all components and it defines domains into which these operations are restricted to apply. To exemplify our proposal, we provide the derivation and the prosodification of the OclVS structure (32) in (33). The point of interest is the prosodic break between the clitic-doubled object and the cIV constituent. All things being equal, the same analysis can be extended to cIVOS orders.

- (32) to axláði to éfaye o kóstas
the pear-ACC it-ACC eat-PAST.3SG the Kostas-NOM
‘As for the pear, Kostas ate it’

- (33) CU1: {to axláði} → Spell-Out1: [to axláði]φ
CU2: {to éfaye o kóstas} → Spell-Out2: [to éfaye o kóstas]



8.4 An alternative account to the p-phrasing of adjuncts: Truckenbrodt's 'dominance' approach

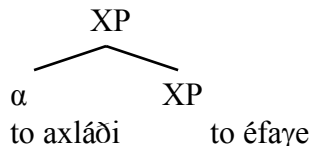
Research on the area of the syntax-phonology interface and, especially on p-phrasing, has very little to state about the peculiarities characterizing the phrasing of non-cyclic elements such as adjuncts. Truckenbrodt (1995) builds up a proposal for the p-phrasing of adjuncts, based on Chomsky's (1986a, 1993) definition of dominance (34):

- (34) *Dominance* (Chomsky 1986a: 7)
A is dominated by B only if A is dominated by every segment of B.

Based on this definition, he assumes that adjuncts (a) are segments and (b) are not dominated by the category they adjoin to. This has two important consequences for the p-phrasing of adjuncts: first, because they are segments, they can p-phrase *together* with the host category and, second, because they are not dominated by the category they adjoin to, they can phrase *separately* from the host category. Let us exemplify this point with an abstract example.

Assume a language like Greek, where WRAP-XP is high ranked and, more specifically, outranks ALIGN-XP,R. According to Truckenbrodt's proposal the adjunct structure depicted in (35) results in two possible p-phrasings: (36a) and (36b). In (36a), the end-based mapping algorithm maps the higher XP onto a p-phrase, thus rendering the p-phrasing $[\alpha \text{ XP}]_{\phi}$. This is because WRAP-XP demands elements genuinely inside of an XP to be wrapped into a single p-phrase. In (36b), the same mapping algorithm maps α and the lower XP onto separate p-phrases, i.e. $[\alpha]_{\phi} [\text{XP}]_{\phi}$, because α is not dominated by the category it adjoins to. That is to say, WRAP-XP does not care whether elements adjoined to XP and outside of the (lower) XP, in the relevant sense, are wrapped in with the material genuinely inside of XP.

- (35) *p-phrasing of an adjunct*



- (36) a. $[\text{XP } \alpha \text{ XP}]_{\phi}$
b. $[\text{XP } [\alpha] \text{ XP}]_{\phi} [\]_{\phi}$

Since WRAP-XP cannot definitively decide on the two outputs, we conclude that in Greek ALIGN-XP,R, which is ranked below WRAP-XP, decides in favor of the fine-grained p-phrasing in (36b). So far, Truckenbrodt's account derives the empirically attested pattern (36b), but faces a rather important empirical problem: it cannot preclude the inclusion of the adjunct into the p-phrase of the XP in Greek preverbal clitic-doubled objects. Recall that in Greek, prosodic binarity vigorously interacts with the syntax-phonology interface constraints, and dramatically affects the prosodification of the input string. In section 8.3.1.2 (ii), we have shown that BIN^{min} crucially dominates ALIGN-XP,R, thus predicting p-phrasing (36a) not only to occur, but to also be the preferred output in cases where α is subminimal, i.e. it consists of a single PrW. This expectation, however, is not borne out since, as shown above, initial clitic-

doubled objects do not rephrase with the cIV.

To account for that, a proponent of the domination account needs to invoke additional machinery, perhaps in the form of parochial alignment constraints (e.g. ALIGN-ADJUNCT, L/R, ϕ , L/R) which would map elements of specific syntactic status, i.e. adjuncts, onto certain phonological units. Given that these constraints are high-ranking, they would guarantee that the relevant constituents will not rephrase with the remaining string. There is no doubt that employing such constraints in the analysis would have the desired effect of mapping adjuncts onto their own closed phonological units. However, an analysis along these lines offers no principled reason to explain why the forcefulness of these alignment constraints – expressed by means of high-ranking – is intimately related with the specific syntactic status of certain elements. On the other hand, our approach not only manages to predict the attested p-phrasing patterns and to exclude the non-attested ones, but also enjoys the merit that such an interface mapping is the result of the independently established principles and operations of the computational system itself, without having to resort to poorly motivated structure-specific mechanisms and constraints.

8.5 A problematic case: Greek preverbal subjects

It has been established that preverbal DP-subjects in Greek do not occupy an EPP Specifier position, but are rather adjoined either to the IP domain (MoodP) or to the CP domain (Philippaki-Warburton 1987, 1989, Alexiadou & Anagnostopoulou 1998, Spyropoulos 1999, Spyropoulos & Philippaki-Warburton 2002), and are coindexed with a *pro* in the relevant theta position. According to Uriagereka's (1999) definition of derivational cascades as CUs, Greek preverbal DP-subjects in SVO constructions qualify as derivational cascades and are thus expected to be independently Spelled-Out, exhibiting both syntactic and prosodic islandhood. However, this prediction is not borne out. First, preverbal DP-subjects in Greek are not islands, in that they allow for extraction from within (Spyropoulos 1999, 2003, Kotzoglou 2005):

- (37) [pjanú maθítí]_i mu ípes [CP óti [DP-subj i mitéra t_i]
 who-GEN student-GEN me-GEN tell-PAST.2SG that the mother-NOM
 paraponéθike sto ðiefθindí]]?
 complain-PAST.3SG to-the headmaster-ACC
 'The mother of which student did you tell me complained to the headmaster?'

Second, when preverbal DP-subjects are light, they comply to binarity:

- (38) to fós ðíni isxí sti mixaní
 the light-NOM give-3SG power-ACC to-the machine-ACC
 'The light gives power to the engine'
 a. [to fós] ϕ [ðín \emptyset isxí] ϕ [sti mixaní] ϕ *end-based mapping*
 b. [to fóz ðíni] ϕ [isxí sti mixaní] ϕ *binarity-based mapping*
- (39) o kóstas mázeve eljés kalamón
 the Kostas-NOM harvest-PAST.3SG olive-ACC.PL Kalamata-GEN.PL
 'Kostas was harvesting Kalamata olives'
 a. [o kóstas] ϕ [mázev \emptyset eljés kalamón] ϕ *end-based mapping*
 b. [o kóstaz mázeve] ϕ [eljés kalamón] ϕ *binarity-based mapping*

The syntactic and prosodic non-islandhood of Greek preverbal subjects indicates that, although they constitute independent CUs, they do not behave as derivational cascades. This renders Uriagereka's (1999) definition of derivational cascades in terms of CUs problematic. It also shows that Spell-Out need not be triggered by the requirements of PF linearization according to Kayne's (1994) Linear Correspondence Axiom, as originally suggested by Uriagereka (1999).

8.6 Revising the model

8.6.1 The derivational status of subjects

A cross-linguistic examination of the syntactic islandhood of subjects underlines the significance of the problem at the theoretical level. In general, preverbal subjects constitute islands from extraction from within, an observation that has been stated as the Subject Condition (Chomsky 1973). Huang's (1982) Condition on Extraction Domains unified the Subject Condition and the Adjunct Condition, and the Barriers framework (Chomsky 1986a) offered a unified analysis of the corresponding facts (namely, the non-availability for extraction from within subjects and adjuncts) as a combinatory result of the Subjacency Condition and the Empty Category Principle. Uriagereka's (1999) Multiple Spell-Out system offers a minimalist account of CED as an effect of derivational islandhood: subjects and adjuncts, being non-complements, are forced to be independently Spelled-Out and thus no extraction is permitted from inside them (Nunes & Uriagereka 2000).^{xix}

However, a unified account of the Subject and the Adjunct Conditions seems to be unjustified, because, although extraction out of adjuncts is universally banned, there are languages that permit extraction out of (preverbal) subjects (e.g. Basque, Greek, Japanese, Russian, Turkish, Hungarian, Serbo-Croatian, Latin). Based on these observations, Stepanov (2001) suggested that the Subject and the Adjunct Conditions should be dissociated and that extraction out of subjects and adjuncts should be treated differently. More specifically, he suggested that adjuncts are islands by virtue of their being merged late in the derivation, following the well-known observation of Lebeaux (1988), whereas it is the derived position of subjects that makes them opaque to extraction. Stepanov follows Takahashi's (1994) ideas on movement and argues that extraction out of subjects is blocked because of PF requirements on chain linearization, a minimalist variant of the Freezing Principle by Wexler & Culicover (1980). Based on Spyropoulos' (2003) observations that the minimalist variants of the Freezing Principle are too deep a cut – mainly because they incorrectly disallow a number of permissible extractions out of subjects, Kotzoglou (2005) proposes an interesting revision of the model. More specifically, he builds on the ideas on Chain Reduction requirements (Nunes 2004) and Anti-Locality (Grohmann 2003) in order to propose that the islandhood of the subject is regulated by the number of copies of the moving element surviving in a phase. Putting aside the technical details, these proposals share the intuition that subjects do not constitute derivational islands in the sense of Uriagereka (1999). Their islandhood is regulated instead by independent principles of the computational system and crucially not because these elements are Spelled-Out independently from the main derivation. Thus, subjects, unlike adjuncts, seem to belong to the main clausal skeleton, i.e. the main derivational work-space of the clause.

8.6.2 The revised proposal and the status of Spell-Out

On the basis of the Greek case study of clitic-doubled objects and preverbal subjects, we are

now in the position to revise our proposal. We maintain that the effects of the *Generalized Principle of Strict Cyclicity* refer to derivational cascades. However, derivational cascades are now defined as the chunks that are assembled and processed in their own derivational workspace, and are Spelled-Out and processed by the interfaces independently from the main derivation. In short, derivational cascades are only these chunks that exhibit rigid and universal syntactic islandhood and loose connectivity with the main derivation.

According to the revision proposed here, adjunct modifiers qualify as derivational cascades because (a) they exhibit rigid and universal islandhood and (b) they have been independently argued to be loosely connected with the main derivation (Lebeaux 1988, Pietroski & Uriagereka 2002). Subsequently, they are also expected to exhibit prosodic islandhood in terms of forming their own p-phrase and resisting rephrasing.^{xx} Subjects on the other hand, belong to the main clausal skeleton, as indicated by the fact that their islandhood is neither rigid nor universal. This is further reinforced by the observation that subjects rarely show prosodic islandhood even in languages that respect the *Subject Condition*. For instance, in Italian and European Portuguese preverbal subjects constitute syntactic islands (extraction out of them is not banned) but not prosodic, in the sense that they either phrased with other elements of the clause (European Portuguese; Elordieta *et al.* 2003) or are subject to rephrasing (Italian; Nespov & Vogel 1986, Ghini 1993).

Let us now return to Greek and the distinction between preverbal subjects and clitic-doubled objects. The problem arises since the mainstream analysis of preverbal subjects considers them as left-dislocated elements doubled by a null subject element in the main derivation. Such an analysis implies that there is a structural similarity between preverbal subjects and clitic-doubled objects (compare the relevant structures in sections 8.3.1.1, 8.3.2.1 and 8.5). Nevertheless, clitic-doubled objects do not allow extraction from within and resist prosodic rephrasing; preverbal subjects, on the other hand, allow for extraction from within and are able to rephrase. Consequently, their difference as far as the syntactic and the prosodic islandhood calls for an explanation.

Although we are still in search of a more conclusive answer to this issue, we have sufficient evidence to contemplate a hypothesis that preverbal subjects are a part of the clausal skeleton, whereas clitic-doubled objects are not. The latter elements constitute a kind of a peripheral modifier similar in status with overt arguments in polysynthetic languages (Baker 1996; see the discussion in Spyropoulos 1999, 2001). There are good reasons to believe that these elements have a different derivational status: First, clitic-doubled objects can never appear in an argument position (see the discussion in sections 8.3.1.1 and 8.2.1 and the references cited therein), whereas subjects can do so in VS(O) constructions (see Philippaki-Warbuton 1987 *et seq.*, Alexiadou & Anagnostopoulou 1998, Alexiadou 1999, among others). Second, preverbal subjects can be focused (41a); clitic-doubled objects can never be focused (40).

- (40) *clitic-doubled objects*
- a. *to éfaye [TO AXLÁði]_{FOC} o kóstas
 it-ACC eat-PAST.3SG the pear-ACC the Kostas-NOM
 ‘It is the pear that Kostas ate it’
- b. *[TO AXLÁði]_{FOC} to éfaye o kóstas
 the pear-ACC it-ACC eat-PAST.3SG the Kostas-NOM
 ‘It is the pear that Kostas ate it’

- (41) *preverbal subjects*
- a. [O KÓSTAS]_{FOC} éfaye to axláði
the Kostas-NOM eat-PAST.3SG the pear-ACC
- b. éfaye [O KÓSTAS]_{FOC} to axláði
eat-PAST.3SG the Kostas-NOM the pear-ACC
- c. éfaye to axláði [O KÓSTAS]_{FOC}
eat-PAST.3SG the pear-ACC the Kostas-NOM
'KOSTAS ate the pear'

We may, therefore, speculate that preverbal subjects retain some of their argument properties, something that has already been suggested by Horrocks (1994). Furthermore, it is sensible to also assume that this is closely related to the nature of the doubling element as well as the satisfaction of visibility conditions (see Spyropoulos 1999, 2001). In the case of preverbal subjects, the doubling element is considered to be either a *pro* or the agreement morpheme itself. In the case of clitic-doubled object, it is an overt clitic pronoun. This overt clitic may be considered to be able to fully satisfy the relevant argument requirements, whereas the null-subject elements can do it only partially, permitting the overt subject to share with it the argument role. We leave the issue of formal expression of these intuitions and speculations open to further research.

We believe that this distinction has serious repercussions for the status of Spell-Out. We mentioned in section 8.2 that Spell-Out is an operation that ships certain parts of derivation to the interfaces and hence destroys their internal structure so that they are no more accessible to computation. There are two ways to implement the derivational effects of Spell-Out. Uriagereka (1999) draws a distinction between *radical* and *conservative* Spell-Out. Radical Spell-Out not only destroys the internal structure of the derivational chunk, but it also wipes it out so that it behaves as a single element for the purposes of the rest of derivation. Conservative Spell-Out, on the other hand, destroys the internal structure of the derivational chunk, but preserves its items linearized as a list. We claim that this distinction is crucial and is intimately related to GPSC. Radical Spell-Out incorporates the GPSG and defines derivational cascades, whereas conservative Spell-Out only defines the syntactic cycles that can take place within the limits of a derivational cascade. This means that radical Spell-Out not only ships parts of derivation to the interfaces, but also forces the interfaces to exhaustively process them. In contrast, conservative Spell-Out ships strings away from the derivation, but does not force the interface to exhaustively process them at once.

We take this idea one step further and propose the following. Radical and conservative Spell-Out are cover labels for the interface procedures that are associated with Spell-Out, which is viewed as an operation that merely ships material away from the syntactic derivation and destroys its internal structure. PF immediately processes this material by linearizing it and assigning to it higher order prosodic structure, i.e. p-phrasing.^{xxi} This kind of processing constructs only a partial phonological representation and defines conservative Spell-Out. P-phrasing and sentential stress are finalized at root Spell-Out, i.e. after the whole derivation is completed (see also Kratzer & Selkirk 2007), when core PF constraints (e.g. binarity and heaviness constraints) can take effect. This final PF processing defines radical Spell-Out.

Putting together the elements of our proposal, we claim that the derivation of a sentence proceeds in a cyclic fashion following a clausal skeleton which includes the predicate, its arguments and all the relevant functional categories. This constitutes the main

derivational work-space. Since derivation is a strictly cyclic procedure, Spell-Out may apply inside this main derivational cascade defining cycles, in the form of either Chomsky's phases or Uriagereka's specifiers. Crucially, such a conservative Spell-Out permits the Spelled-Out strings to communicate at the interfaces, because they have not been erased and their elements survive at the interface together with the elements of other Spelled-Out chunks that belong in the same derivational work-space. That is, as far as the syntax-phonology interface is concerned, such strings are still visible and open to the restructuring mechanisms that take place at PF in order to ameliorate their prosodic make-up. In parallel to the main derivation, adjunct modifiers may also be formed at their own derivational work-space. These elements constitute independent derivational cascades and, upon their completion, they are radically Spelled-Out, so that, when they join the main derivation, they have already been processed at the interfaces and wiped out. No communication across their boundaries is possible anymore, since these cascades are completely opaque and their elements totally invisible. It is the opaqueness of these cascades that derives the effects of GPSC.

The behavior of Greek clitic-doubled objects as opposed to that of preverbal subjects offers ample support to the proposed architecture. With the clitic undertaking the argument function, clitic-doubled objects are peripheral elements and constitute derivational cascades. They are thus radically Spelled-Out before they join the main derivation and their rigid syntactic and prosodic islandhood derives from their derivational status. Preverbal subjects, on the other hand, belong to the main derivation.^{xxii} They are thus subject to the syntactic cycles defined by the application of the conservative Spell-Out. Their syntactic islandhood is regulated by the principles of the computational system, which in this case permit the extraction from within. Their prosodification is subject to the independently justified principles and algorithms of the mapping procedure of the syntax-phonology interface, which correctly derive the attested patterns.

8.7 Conclusions

This contribution explores the empirical scope of the MSOH with particular emphasis on the syntax-phonology interface. More specifically, we have shown that the interface is sensitive to differences in the processing of syntactic material, in that it reflects – via p-phrasing – the derivational status of cascades. Empirical justification for the assumption that the derivational dynamics of MSO has a representational effect at the syntax-phonology interface was provided from Greek clitic-doubled objects in both clVO(S) and OclV(S) strings. Such elements constitute derivational cascades that are independently processed by the PF. Future research should reveal the limits of this isomorphism, if any. In other words, it should explore whether more instances of prosodic islandhood (expressed as avoidance of prosodic restructuring or failure to satisfy prosodic binarity restrictions, and so on) coincide with syntactic cascades that are independently Spelled-Out, and vice versa.

Our research also centered on what exactly qualifies as a derivational cascade. For this reason, we discussed the syntactic and prosodic non-islandhood of preverbal DP-subjects in Greek. We have argued that, at first sight, the observed type of isomorphism creates problems for the standard MSO model and calls for its refinement. We provided sufficient argumentation that the Greek case study offers the required empirical verification for the distinction between two different implementations of Spell-Out, which has already been technically drawn in Uriagereka (1999). To be precise, we argued that, unlike clitic-doubled objects which are adjuncts that are separately assembled and fed to the interfaces, Greek subjects exhibit enough argument properties to be kept within the derivational work-space of the clausal skeleton. This entails that they are still visible to other elements of the same

derivational work-space and hence susceptible to the laws of prosodic restructuring. Technically, this implies a split in the implementation of Spell-Out between a radical and a conservative type, exactly as theoretically suggested by Uriagereka (1999). The extension proposed here is that only the latter incorporates the GPSC and has consequences for the interface. To conclude, the revised version of MSOH advanced here makes specific predictions for the Syntax-Phonology interface since prosodic islandhood should always match rigid and universal syntactic islandhood that results from radical Spell-Out.

Future research should be directed to further exploring the type of syntactic dependencies established between certain elements and the main derivational cycle.

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ⁱ For a bi-directional approach see Inkelas (1989), Zec & Inkelas (1990).

ⁱⁱ Selkirk (1995) argues that only lexical categories (not functional ones) and their projections are visible to the mapping rules. Moreover, empty categories and their projections do not project p-phrase boundaries (Nespor & Vogel 1986).

ⁱⁱⁱ Selkirk (2000), based on McCarthy & Prince's (1993) *Generalized Alignment*, proposes constraints on edge-alignment of syntactic phrases with p-phrases (ϕ) such as the following:

- (i) a. ALIGN-XP,L: Align (XP, L; ϕ , L)
'For each XP, there is a ϕ , such that the left edge of XP coincides with the left edge of ϕ .'
- b. ALIGN-XP,R: Align (XP, R; ϕ , R)
'For each XP, there is a ϕ , such that the right edge of XP coincides with the right edge of ϕ .'

Truckenbrodt (1995, 1999) also adds the WRAP-XP constraint in (ii):

- (ii) *WRAP-XP* : Each XP is contained in a phonological phrase.

Cross-linguistic variation arises from different rankings of the respective constraints. Some indicative examples of various p-phrasings are given in (iii):

- (iii)

	[V	NP	PP] _{VP}	<i>syntactic string</i>
a.	[] ϕ	[] ϕ	[] ϕ	p-phrasing due to high-ranking of ALIGN-XP,L
b.	[] ϕ	[] ϕ	p-phrasing due to high-ranking of ALIGN-XP,R
c.	[] ϕ	p-phrasing due to high-ranking of WRAP-XP

^{iv} See also Kahnemuyipour (2004), Adger (2006), Selkirk (2006a,b), Kratzer & Selkirk (2007), among others.

^v There is ample empirical motivation for the existence of prosodic constituency in the literature. See, among others, Selkirk (1978, 1980, 1981, 1984), Nespor & Vogel (1986), Hayes (1989).

^{vi} See Dobashi (2003) for a proposal along these lines and Elordieta (2007) for an overview.

^{vii} It should be mentioned that the phase model of Spell-Out has been proposed by a number of researchers to correctly derive sentential stress and the intonational phrasing of a clause, by mapping phases onto specific prosodic constituents such as Major or Intonational phrases (Ishihara 2003, Kahnemuyipour 2004, 2005, Kratzer & Selkirk 2005, among others).

^{viii} See Johnson (2002) for a proposal that also defines derivation and derivational cascades in terms of the phrase structure building algorithm.

^{ix} An anonymous reviewer raises the question as to why ε being simplex is not able to prosodify together with $K = \{\gamma\{\gamma, \delta\}\}$, since it is able to c-command it. We believe that the answer lies in the fact that ε does not belong in the same CU as K , because it does not combine with it by means of a continuous application of Merge. Notice that ε merges with $[\alpha [\gamma \gamma \delta] [\alpha \alpha \beta]]$ and not with K itself. In addition, recall that K being a CU is forced to independently Spell-Out before it merges with the structure. If by GPSC and its PF Corollary a CU is mapped onto its own closed phonological constituent, then there is no way that ε can prosodify together with K .

^x Alternatively, it has been proposed that clitic-doubled objects occupy the Specifier position of a Topic Phrase (Tsimplici 1990, Alexiadou 1997, Roussou 2000). Since this has no major effect to our discussion (both adjuncts and Specifiers constitute island domains), we will consider the TopicP analysis as a notational variant of the adjunct analysis, for the purposes of this chapter, and we will not try to evaluate them.

^{xi} See also Anagnostopoulou (1994) and Giannakidou (2000) among others.

^{xii} It has been reported (Philippaki-Warbuton & Veloudis 1984, Giannakidou 2000) that the emphatic *kanénas* ‘no one’ can be clitic-doubled in constructions such as:

- (i) **kanenós** ðén tu arési i kakometaxírisi
noone-GEN NEG him-GEN like-3SG the maltreatment-NOM
‘Nobody likes being treated badly’

It is important to clarify that the stress prominence exhibited by *kanénas* derives from its lexically associated emphatic stress (indicated with boldface in example (i)). Giannakidou (2000) also convincingly shows that such elements should not be syntactically treated as preposed foci. The most crucial piece of evidence comes from the fact that when they do become foci, the clitic-doubling option is unavailable:

- (ii) *KANÉNAN ðén ton íða
noone-ACC NEG him-ACC see-PAST.3SG
‘NOBODY I saw’

^{xiii} Unlike other languages, such as Germanic, Greek topicalization does not involve scrambling (see (13)), so that the surface position of the topic element cannot be due to either syntactically or phonologically motivated (Féry 2007) movement.

^{xiv} Elordieta *et al.* (2005) propose a parametric size constraint which calculates prosodic heaviness in terms of syllables, prosodic words or levels of syntactic branchingness,

depending on the language. Such parametric constraints, however, raise serious theoretical problems since a basic tenet of Optimality Theory (Prince & Smolensky 1993) is that constraint-reranking and not different parameter setting is the primary source of cross-linguistic variation.

^{xv} Alternatively, they have been proposed to constitute Specifiers in an internal Topic projection (Georgiadjentis 2004):

(i) [IP to éfaye [_{iTopicP} to axláði [_{vP} o kóstas t_v t_{CL}]]]

^{xvi} This way we dispense with the problem of post-focal de-accentuation, which disqualifies (cl)V-focusing as an informative case study.

^{xvii} We wish to thank Mary Baltazani for analyzing these sentences for us.

^{xviii} This accent can either be H- or L-, depending on the speaker. In Greek, narrow focus such as *O KÓSTAS* is signaled with a H*+L nuclear pitch accent followed by a L-L% (Arvaniti & Baltazani 2000).

^{xix} See also Johnson (2002).

^{xx} For a preliminary study which verifies this prediction in Greek see Féry & Skopeteas (in progress).

^{xxi} See footnote iv.

^{xxii} In more recent work (Spyropoulos & Revithiadou 2007), we capitalize on the syntactic and prosodic non-islandhood of preverbal Greek subjects and propose that these elements are not left-dislocated, as it is usually assumed, but rather they occupy an EPP Spec. Thus, being EPP elements, preverbal subjects belong to the main clausal derivation and their non-islandhood derives from their derivational status.