

THE ROLE OF CONSTRAINTS IN GREEK COMPOUND FORMATION*

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Abstract

In this paper, we address the issue of constraints in word formation. We claim that the absence of derivational suffixes within Modern Greek compounds is due to the operation of the so-called *Bare-stem constraint*, which applies to output configurations. Our analysis builds on different types of compounds from Standard Modern Greek and its dialects. However, we focus mostly on dvandva [V V] compounds, which are unique in Modern Greek from all Indo-European languages. We also discuss a limited number of counter-examples, and show that they are only apparent exceptions to the operation of the constraint. We argue that most of them result from a reanalysis procedure, or refer to lexicalizations and loan words, which do not usually obey the rules of the language. The paper also adds to the discussion about the interaction between derivation and compounding. It is argued that the two processes intermingle in such a way that compounding cannot be treated separately from derivation. This conclusion is advocated by the postulation of a morphologically proper constraint restricting the form of compounds with a derived item as left-hand constituent, as well as by the unclear order according to which the two processes occur.

Key words: Constraints, dvandva compounds, derivation, morphology, Greek.

1. Introduction

Constraints constitute an efficient device for restricting grammars and filtering out ungrammatical structures. They have become popular in phonological theory, and occupy a prominent position in the constraint-based framework of Optimality Theory (Prince and Smolensky 1993). However, constraints may also apply to the other levels of grammar, for instance, to morphology, where they may elucidate why certain word structures are possible while other structures are not. Although there is

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no extended literature on this topic in morphology, hints about the operation of constraints can be found in Rainer (2000), where he mentions the occurrence of morphological restrictions on the input, which he calls ‘rule- or process- specific constraints’.

In this paper, we deal with the operation of constraints on compounding. In particular, we propose the existence of a constraint which affects the form of Modern Greek (hereafter Greek) compounds with a derived item in the left-hand position. By dealing with data that involve the application of both derivation and compounding, we also add the discussion about the interaction of these two processes, an interesting topic in the recent literature (see, among others, Bauer 2005, Booij 2005, ten Hacken 2000, Ralli and Dimela to appear, etc.). We provide evidence in favor of the thesis that compounding intermingles with derivation in such a way that it cannot be treated separately from affixation, contrary to Anderson (1992) who proposes that compounding should be taken care of by syntax.

The paper is structured as follows. We start by presenting the general background and hypotheses about Greek compounding, its order of application with respect to derivation, and describe the problem of not having overtly realized derivational suffixes within compounds even though these suffixes seem to affect the semantic interpretation of these morphological constructions. Next, we propose the existence of a constraint (the *Bare-stem constraint*), which requires the surfacing of stems in the left-hand position of compound words to be as bare as possible. Significant evidence for this constraint is provided by dvandva [V V] formations which are described and analyzed in Section 4. A small number of counter-examples is thoroughly examined in the subsequent section, where evidence is provided that they do not constitute real counterevidence to the correctness of the constraint. In Section 6, we return to the question of the order of application of derivation and compounding, in conjunction with the operation of the *Bare-stem constraint*, in order to show the close interaction of the two processes, a phenomenon which requires a place of compounding within morphology. The paper ends with a summary of our conclusions in Section 7.

2. Background and Hypotheses

Within a lexical morphology framework (Kiparsky 1982), Ralli (1988) has claimed that in Greek derived items appearing in compounds are formed before compounding takes place, and that the stratum/level of derivation precedes that of compounding. This proposal seems to be borne out as far as the second member of a compound word is concerned, which, in several instances, constitutes a derived item belonging to one of the three major grammatical categories, noun (1a), verb (1b), and adjective (1c):

- (1) a. *nixokoptis*¹ < [nix]-o-[kop-ti-s]
 lit. nail cutter [nail]_N-CM-[cut_V-DER_N-INFL(NOM.SG)]_N
 ‘nail clipper’ ‘nail’ ‘cutter’
- b. *krifoxorevo* < [krif]-o-[xor-ev-o]
 lit. secretly dance
 [secretly]_{ADV}-CM-[dance_N-DER_V INFL(PRES.1P.SG)]_V
 ‘dance secretly’ ‘secretly’ ‘dance’
- c. *aksiayapitos* < [aksi]-o-[ayapi-t-os]
 ‘worth loving’ [worth]_A-CM-[love_V-DER_A-INFL(NOM.SG)]_A
 ‘worth’ ‘loving’

In the examples listed above, the two constituents are linked together by a linking vowel *-o-* (‘compound marker’ for Ralli 2008a). The first constituent is a morphologically simple stem,² while the second constituent is a derived item, which contains a stem, a derivational suffix (*-ti-*, *-ev-*, *-t-*), and the appropriate inflectional ending (*-s*, *-o*, *-os*). We assume that in these words, derivation occurs before compounding, since compounds such as the verbal **nixokovo* ‘cut nails’ (< *nix(i)*³ ‘nail’ + *kovo* ‘cut’), the nominal **krifoxoros* ‘secret dance’ (< *krif(os)* ‘secret’ + *xoros* ‘dance’), and the verbal **aksiayapo* ‘worth to love’ (< *aksi(os)* ‘worth’ + *ayapo* ‘love’) are not generally acceptable for native speakers of Greek.

Corroborating evidence for the claim that the derivation of the second constituent occurs before compounding is also provided by the position of stress: as argued by Nespor and Ralli (1996), a derived word at the right-hand side of a compound blocks the application of a compound-specific stress rule, which places stress on the antepenultimate syllable of Greek compounds. Consider the following examples:

¹ The glosses should be read as: CM=compound marker, INFL=inflectional suffix, DER=derivational suffix, NOM=nominative, SG=singular, PRES=present, 1P=first person, SG=singular. See Ralli (2008a) for details about the compound marker, which does not show up when the second constituent of the compound begins with a vowel, as in (1c).

² A bare stem coincides with what is usually called ‘root’. Following Ralli (1988, 2005), we assume that in Greek morphology there is no structural difference between a stem and a root, since stems can be morphologically simple (in this sense, they correspond to roots), or morphologically complex. The latter may contain derivational affixes (derived stems) or more than one stem (compound stems). This position is also diachronically justified because Ancient Greek stems were formed out of roots with the adjunction of a thematic vowel. Today, thematic vowels have lost their original role and are not recognizable as distinct units. See also Kiparsky (to appear) for the use of stem as the base for the formation of verbal derivatives and compounds.

³ In this paper, segmental material, which is not relevant for the discussion, e.g. inflection of the first constituent will be included in parentheses.

- (2) a. thalasodarménos < thálas(a)⁴ dar-mén-os
vs *thalasodármenos
‘sea beaten’ ‘sea’ beat-DER-INFL(NOM.SG)
‘beaten’
- b. pagóvuno < pág(os) vun-ó
lit. ice mountain ‘ice’ mountain-INFL(NOM/ACC.SG)
‘ice berg’ ‘mountain’

We see that in (2a) the position of stress of the compound as a whole is identical to the position of stress of the second member, which is a derived word. On the contrary, the stress of the compound in (2b), which contains two morphologically simple stems, falls on the antepenultimate syllable, that is on a different position from that in the two members when taken in isolation.

However, the proposal that derivation precedes compounding is not confirmed as far as the first constituent is concerned. As noticed by Karasimos (2001) and Ralli (2007), usually derivational suffixes do not appear in the first constituent of compounds, which is generally a bare (morphologically simple) stem. In the examples listed below, the first constituent behaves like a derived item from the semantic point of view, and its lexical category is not the one that is predicted by its overt form. However, no derivational suffix is overtly realized:

- | (3) | Compound noun | Derived const. 1 | Const.2 |
|-----|---|--|-------------------|
| a. | sideroporta
lit. iron made door
‘iron door’ | sider _N -enia _A
iron-DER
‘iron made’ | porta
‘door’ |
| b. | krifotragudo
lit. secretly sing
‘sing in secret’ | krif _A -a _{ADV}
secret-DER
‘secretly’ | tragudo
‘sing’ |
| c. | xoropido
lit. dance – jump
‘jump like dancing, bob’ | xor _N -ev _V -
dance-DER
‘dance’ | pido
‘jump’ |

For instance, while a compound such as *krifotragudo* means ‘sing in secret’, a semantic interpretation which reveals the presence of the adverb *krifa* ‘secretly’ in the position of the first constituent, the form of this item is similar to the one of the adjectival stem ‘secret’ (*krif-*), since it does not bear the adverbial suffix *-a* which is usually added to adjectival stems in order to form adverbs. Similar considerations apply to the other two examples, (3a) and (3c), as well.

The non-occurrence of derived items as first constituents of compounds could be used as an argument against a linear ordering in which compounding follows

⁴ *thálasa* and *págos* are the forms of the fully inflected words in the nominative singular. In this paper, stress is noted only if it is relevant for the argumentation.

derivation. Since we have already seen evidence in favor of the opposite ordering, the question is why derivational affixes are absent from compound-internal constituents.

Note that with respect to derivation, we restrict our attention to suffixation: it is generally known that the derivational status of several prefixes is not clear, and that, several prefix-like morphemes behave like the left-hand constituents of compounds. Suffice it to mention the characteristics of stress subordination and category-neutrality that are shared by the so-called Class II prefixes in English (e.g. *pro-* and *en-* as in the words *proclitics* and *enclitics*), and the left-hand constituents of compounds (see, among others, Stekauer 2005)⁵.

3. The Bare-Stem Constraint

In our opinion, a plausible answer to the question above should be looked for in the operation of constraints on word structure. We would like to claim that the absence of derivational suffixes within compounds is only superficial, and that it is independent from the order according to which the processes of compounding and derivation occur. We propose that derivational suffixes within the first constituent of compounds become invisible because of the operation of a morphological constraint, which applies to output configurations, and restricts the surface form of compounds with derived items in the left-hand position. Let us call it the *Bare-stem constraint*. We will see below that Greek compounds are generally subject to this constraint, which modifies their structures by not permitting derivational suffixes to surface word-internally, and requires the first stem component to be as bare as possible, i.e. without any suffixal material⁶. Since constraints should not apply at random, but for a particular reason, we further propose that the *Bare-stem constraint* ensures a better cohesion of the internal structure of compounds, i.e. a strong structural bond between their two basic components:

(4) BARE-STEM CONSTRAINT

The cohesion of a compound is better guaranteed if the first stem is as bare as possible⁷.

We believe that the existence of this constraint is justified by the general structure of the vast majority of Greek compounds that have a stem in the position of the first constituent, i.e. an item with its inflectional ending stripped off, tightly

⁵ These two characteristics carry over to the corresponding Greek prefixes as well.

⁶ According to Booij (p.c.) a constraint according to which the left-hand constituent must be simplex may also be found in certain compounding patterns of Dutch, which combine an adjective with a noun or another adjective.

⁷ In an Optimality-Theory framework, this constraint should be ranked higher than the faithfulness constraint, in order to make its effect visible in compound formation.

combined with a following stem or a word. As shown by a number of authors (Drachman and Malikouti-Drachman 1994, Nespor and Ralli 1996, Malikouti-Drachman 1997, Revithiadou 1997, and Ralli 2005, 2007), with few exceptions, Greek compounds are mainly built on two patterns: [stem stem] (5a) and [stem word] (5b):

- (5) a. [stem stem]
 ambeloxórafo < ambél(i) xoráf(i)
 ‘vineyard field’ ‘vineyard’ ‘field’
- b. [stem word]
 domatosaláta < domát(a) saláta
 ‘tomato salad’ ‘tomato’ ‘salad’

The criteria according to which compounds are assigned to one of these categories are the position of stress and the form of the inflectional ending. Compounds which are subject to a compound-specific stress rule (that places stress on the antepenultimate syllable), and inflect differently from their second constituent, when used as an autonomous word, are assumed to have the [stem stem] structure (see 5a). Those which preserve the stress and the inflectional ending of the second constituent (in endocentric constructions this constituent has the role of the head) are assumed to have a [stem word] structure (see 5b). Following the *Structure Preservation Principle*, as proposed by Emonds (1985), Nespor and Ralli (1996) have argued that the structure of a word constituent that appears in the position of the right-hand head, is preserved in a compound, since it constitutes a fully specified entity from all points of view: it is an autonomous item on structural grounds, one phonological word, and it bears the appropriate morphosyntactic features that are needed for syntactic purposes. Unlike words, stems have no structural autonomy, are not complete phonological words, and are underspecified with respect to some morphosyntactic features (e.g. case, number, person, etc.)⁸. Therefore, [stem stem] compounds may display properties that do not belong to those of their members, when these members are used as autonomous items. As an illustration, consider the compound *merónixto* ‘day (and) night’, which shows a different gender value, a different stress position, and a different inflectional ending from those of its two components:

- (6) merónixto < mér(a) níxt(a)
 lit. day-night.NEU day.FEM night.FEM
 ‘day and night’ ‘day’ ‘night’

The fact that a stem, i.e. a non-autonomous constituent, appears at the left-hand side of Greek compounds makes their internal structure to exhibit a stronger

⁸ Only gender is a fully specified feature of noun stems, as claimed by Ralli (1999, 2002).

structural cohesion than the internal structure of compounds which would have a fully specified word as left constituent. We, thus, suggest that this desire for structural cohesion justifies the operation of the *Bare-stem constraint*, which does not allow for the overt presence of material other than the segments of the bare stem in the first position of compounds.

However, the degree of internal structural cohesion may vary from one compound type to another. It does not depend only on the morphological category of the constituent parts (stem or word), but also on the kind of structural relation that holds between them. For instance, there are compounds with a weak structural relation between their members, the so-called loose compounds. The absence of a strong structural bond between the constituents of loose compounds should not normally forbid the overt presence of any suffixal material within their structure. If this is not the case, the constraint finds robust support: it would prove that requirements for internal structural cohesion hold across compounds, and apply even to those whose members are not tightly bound.

4. Dvandva [V V] Compounds

Significant evidence for the *Bare-Stem Constraint* comes from the domain of dvandva [V V] compounds, which are also called copulative or coordinative (Bloomfield 1933), or co-compounds (Wälchli 2005).⁹ These constructions are an innovation of the language, since they did not exist in Classical Greek (5th-4th c. BC). They are unique in Modern Greek within the family of Indo-European languages, but are frequently used in the East and South East Asian languages as, for instance, in Japanese (Kageyama to appear), Chinese (Packard 2000), Korean (Sohn 1999), and Vietnamese (Nguyen 1997). Dvandva [V V] compounds have appeared during the late medieval period (around the 14th c. AD), as shown by Manolesou and Tsolakidis (2007). They belong to the productive structures of Greek compounds:

(7)	a. anigoklino	< anig(o)	klino
	‘open – close’	‘open’	‘close’
	b. anavozvino	< anav(o)	zvino
	‘switch on – switch off (the light)’	‘switch on’	‘switch off’
	c. benovgeno	< ben(o)	vgeno
	‘go in - go out’	‘go in’	‘go out’
	d. trogopino	< trog(o)	pino
	‘eat – drink’	‘eat’	‘drink’

⁹ The term ‘dvandva’ comes from the Sanskrit tradition, but is adopted by a number of linguists, including (Bauer 2008)

Structurally, these compounds combine a stem and a word (they are [stem word] compounds, see Ralli to appear), and semantically, the two coordinated verbs express compatible (often synonymous) or opposite meanings. According to the semantic relationship that holds between the first and the second verb, dvandva [V V] compounds can be classified into three groups, additive (8a), synonymic (8b) or antonymic (8c), while most of the times it is difficult to distinguish additive from synonymic ones.¹⁰ If the two verbs are synonymous the compound denotes the joint activity over some period (Kiparsky to appear), and one of the verbs is used to reinforce the meaning of the other. On the other hand, compounds involving antonymic verbs express an iterative alternation (Nicholas and Joseph 2007, to appear, Kiparsky to appear), and occur more often than the constructions whose constituents are of compatible meanings:

- | | | | | |
|-----|------------------|---|-----------|--------------------|
| (8) | a. zimomagirevo | < | zim(ono) | magirevo |
| | ‘knead – cook’ | | ‘knead’ | ‘cook’ |
| | b. klidomadalono | < | klid(ono) | madalono |
| | ‘lock – bolt’ | | ‘lock’ | ‘bolt’ |
| | c. pigenoerxome | < | pigen(o) | erxome (iteration) |
| | lit. go - come | | ‘go’ | ‘come’ |
| | ‘come and go’ | | | |

As opposed to subordinative verbal compounds, for instance, [N V] formations (e.g. *afisokolo* ‘stick posters’ < *afis(a)* ‘poster’ + *kolo* ‘stick’) and [Adv V] ones (e.g. *kalotroo* ‘eat well’ < *kal(a)* ‘well’ + *troo* ‘eat’), which are generally right-headed, in dvandva [V V] compounds it is not clear whether the second constituent has the role of the head: the two internal members are of the same grammatical category, they display parallel argument structures, and their meaning is a conjunction of the meanings of their subparts. Since neither of the components dominates the other, we could adopt Kageyama’s (to appear) suggestion about similar Japanese constructions, that they are double-headed. However, the form of their inflectional paradigm, that is their inflection class (IC), implies that the second verb has a more prominent role, at least formally. When two verbs of different inflection classes combine in order to form a dvandva [V V] compound, the construction adopts the inflection class of V2.¹¹ As an illustration, consider the examples *vrodoastrafto* ‘thunder - lighten’, from Standard Modern Greek, and *vromomirizo* ‘stink - smell’, from the Asia-Minor dialect of Krini, in (9). In both cases, the compound as a whole inflects according to the inflection of V2:

¹⁰ For Wälchli (2005: 137-139), additive compounds are the most prototypical.

¹¹ Matsumoto (1996) has claimed that V2 is the head in Japanese dvandva compounds, since it shows the inflectional pattern of the compound.

(9)	Compound. IC	V1.IC	V2.IC
a.	vrodoastrafto.IC1 'thunder – lighten'	vrod(o).IC2 'thunder'	astrafto.IC1 'lighten'
b.	vromomirizo.IC1 'stink – smell'	vrom(o).IC2 'stink'	mirizo.IC1 'smell'

The question, though, is whether headedness can be identified only on the basis of the criterion of inflection class, since V1 and V2 have an equal status with respect to the rest of their features.

Since headedness is not clear-cut in dvandva [V V] compounds, neither of the verbs has a more prominent role over the other, and they express a conjunction of events, we conclude that these formations display a weaker structural relation between their components than that shown by compounds whose members are in a subordinative (or even attributive) relation.¹² Additional proof for this conclusion comes from the fact that dvandva compounds generally display structural and semantic transparency, as opposed to subordinative and attributive compounds, which are easy to lose structural transparency and to develop an unpredictable meaning. Therefore, they could be considered as a kind of loose compounds.

Returning now to the issue of the *Bare-stem constraint*, we have seen in (3) instances of its application to a number of subordinative (3b, c) and attributive (3a) compounds. Nevertheless, as already stated, the existence of the constraint would be better motivated if dvandva compounds are also submitted to its operation, since the superficial absence of word-internal derivational suffixes would show that the need for structural cohesion in compounds also applies to loose structures.

In fact, there are dvandva [V V] compounds, the first member of which does not have any overt derivational suffixes. However, it has the meaning of a derived stem. Consider the examples below, from Standard Modern Greek (SMG) and its dialects, where this type of compounds really abounds. They are taken from Andriotis (1960) and the Dialectal Data Base of the *Centre of Modern Greek Dialects* at the University of Patras. The origin of each example is listed in parenthesis:

¹² See Bisetto and Scalise (2005) for a classification of the compounds according to the relation that holds between their basic components.

(10)	Compound	Derived Const. 1	Const. 2
a.	alonotherizo 'thresh – reap'	< alon _N -iz _V - threshing-DER 'thresh'	therizo (Crete) 'reap'
b.	klidabarono 'lock – bar'	< klid _N -on _V - key-DER 'lock'	abarono (SMG) 'bar'
c.	kuklustsipázumi 'wrap up – cover'	< kuk(u) _N -ón _V - hood-DER 'wrap up'	stsipázumi (Lesbos) ¹³ 'be covered'
d.	magirukínónu 'cook – pour'	< magir _N -év _V - cook-DER 'cook'	kinónu (Imbros) 'pour'
e.	kseromarenome 'dry – wither'	< kser _A -en _V - dry-DER 'dry'	marenome (Skiros) 'wither'

Like in other typical dvandva compounds ([N N] and [A A] ones, see Ralli 2007, 2008b), in these examples, stem constituents like *aloniz(o)* 'thresh', *klidon(o)* 'lock', etc. are juxtaposed to words of the same category, in this particular case to verbs, and express a compatible or an opposite meaning. It is important to note that examples such as the ones reported in (10) do not constitute blends, and should be distinguished from them. The segments that do not surface in these examples are those of the derivational suffixes, which are normally attached to the first derived constituent, when taken in isolation (with the appropriate inflectional ending). In blends, on the other hand, portions of the two constituents may be subtracted, and this subtraction may also involve segments of the stem, other than those of the suffixal part. For instance, in Hatzidakis (1905-1907) and Koutita and Fliatouras (2001), we find blends of coordinative verbs such as *malafo* 'massage and touch' (< *malas(o)* 'massage' + *psilafo* 'touch'), and *korojelao* 'mock and laugh' (< *korojdev(o)* 'mock' + *jela(o)* 'laugh').¹⁴ Crucially, the derivational suffix, which is not overtly realized in the dvandva compounds of (10), is responsible for the grammatical category (verbal) and the semantics of the first constituent. In fact, it is always present when the constituent is used as an autonomous word, as shown by the examples in (11), where for clarity purposes, the word internal constituents are separated by a hyphen, and their lexical category is marked:

¹³ The examples from Lesbos and Imbros are given in their dialectal phonological form, where unstressed /o/ and /e/ become /u/ and /i/ respectively.

¹⁴ See Koutita and Fliatouras (2001) for detailed information on Greek blends, mostly with respect to the dialects.

- (11) a. $\text{alon}_N\text{-iz}_V\text{-o}$
threshing-DER-INFL (PRES.IP.SG)
'I thresh'
- b. $\text{klid}_N\text{-on}_V\text{-o}$
key-DER-INFL (PRES.1P.SG)
'I lock'
- c. $\text{magir}_N\text{-ev}_N\text{-o}$
cook-DER-INFL (PRES.1P.SG)
'I cook'
etc.

It is worth noticing that Andriotis (1960: 55) has tried to explain the non-appearance of the word-internal derivational suffix as a syllable erasure affecting verbs with more than two syllables, since, according to him, disyllabic verbs are easier to pronounce than trisyllabic ones. However, this is not always the case. Andriotis himself notes that the use of trisyllabic verbal constituents in compounds is not unknown in Greek. As an illustration, see, for instance, the examples *anigoklino* 'open-close' < *anig(o)* 'open' + *klino* 'close' and *pigenoerxome* 'go - come' < *pigen(o)* 'go' + *erxome* 'come', etc. It is crucial to stress that the part which is systematically absent from the examples of (10) is not any particular syllable, but the derivational suffix itself. Therefore, dvandva [V V] compounds are affected by the operation of the *Bare-stem constraint*, which applies to their structure in order to maximize the bound between V1 and V2, and in spite of the fact that these compounds constitute loose structures.

5. Specific Cases

In this section we examine a small number of compounds with internal derivational suffixes, which are not affected by the *Bare-stem constraint*. We provide a detailed study of these formations, and try to show that they do not provide counter evidence to the application of the constraint.

5.1. The verbal suffix *-en-*

There are few counter-examples to the *Bare-stem constraint*, which do not allow for any suffixal material within compounds, namely those containing the verbal stems *pigen(o)* 'go' and *ben(o)* 'go in'. These stems keep their *-en-* segments in formations like *pigenoerxome* lit. 'go - come' 'come and go', *pigenoferno* 'go - bring', and *benovgeno* 'go in (and) out' (12 b, c, d). As opposed to these formations, other compounds with *-en-*, for instance, *anevokateveno* (12a) do not display an overt *-en-*, as predicted by the operation of the *constraint*:

(12)	Compound	Derived Const. 1	Const. 2
	a. <i>anevokateveno</i> lit. go up - go down 'go up and down'	< <i>anev-en-</i> 'go up'	<i>kateveno</i> 'go down'
	b. <i>pigenoerxome</i> lit. go - come 'come and go'	< <i>pig-en-</i> 'go'	<i>erxome</i> 'come'
	c. <i>pigenoferno</i> lit. bring forth - bring back 'bring forth and back'	< <i>pig-en-</i> 'bring forth'	<i>ferno</i> 'bring back'
	d. <i>benovgeno</i> lit. go in - go out 'go in and out'	< <i>b-en-</i> 'go in'	<i>vgeno</i> 'go out'

In order to explain the examples of (12 b, c, d), a solution would be to suppose that *-en-* is a suffix in the case of *aneven(o)* 'go up' (12a), and as such, it loses its overt form in compounding, while it has no suffixal character but is part of the morphologically simple stem, in the cases of *pigen(o)* 'go' and *ben(o)* 'go in'. However, the question is whether there is any supporting evidence in favor of this hypothesis.

It is important to note that *-en-* is not a category-changing derivational suffix but rather a morpho-syntactic marker, since its main function is to add the [-perfective] aspectual value to a verbal stem. Substantial proof for this interpretation is offered by verbs which show *-en-* in the [-perfective] forms (e.g. in the present tense), but have a stem form without *-en-* in the [+perfective] forms, for instance in the past tense (aorist):

(13)	Present [-perfective]	Aorist [+perfective]
	a. <i>anev-en-o</i> 'I go up'	<i>anev-ik-a</i> ¹⁵ 'I went up'
	b. <i>pig-en-o</i> 'I go'	<i>pig-a</i> 'I went'
	c. <i>b-en-o</i> 'I go in'	<i>b-ik-a</i> 'I went in'

This explains why in the [+perfective] context morphologically simple stems such as *anev-*, *pig-*, and *b-*, do not belong to a different grammatical category, and do not have a different semantic interpretation from their correspondent stems *aneven-*, *pigen-*, and *ben-* in the [-perfective] context. However, while a verb like

¹⁵ *-ik-* is one of the overt markers of the morphosyntactic-feature of [+perfective]. See Ralli (1988) for more details.

aneveno ‘go up’ is affected by the *Bare-stem constraint*, and shows only the bare stem *anev-* (the one without the *-en-* suffix), when used as first constituent of dvandva [V V] compounds, *beno* ‘go in’ and *pigeno* ‘go’ behave differently. In these verbs, the stem forms *ben-* and *pigen-* are not only unaffected by the *Bare-stem constraint*, but are also used in both the [+perfective] and [-perfective] contexts, in spite of the fact that *-en-* is the [-perfective] marker. Compare the examples of (14a, b, c, d) with those of (14e, f), where *-en-* is underlined:

- (14) a. To pigenoferni/*pigoferni arketes fores prin apofasisi na mas
to xarisi
lit. it brings.back.and.forth several times before decides to us it give
‘(S)he brings it back and forth several times before (s)he decides
to give it to us’
- b. To pigenoefere/*pigoefere arketes fores prin apofasisi na mas
to xarisi
lit. it brought.back.and.forth several times before decided to us
it give
‘(S)he brought it back and forth several times before (s)he decided
to give it to us’
- c. Benovgeni /*bikovgeni apo to proi os to vradi
lit. (S)he comes.in.and.out from the morning till the evening
‘(S)he is coming in and out from morning to night’
- d. Benovgike/*bikovgike arketes fores apo to proi
lit. (S)he came.in.and.out several times from the morning
‘(S)he came in and out several times from the morning’
- vs.
- e. Anevokateveni /*anevenokateveni ta skalia arketes fores ti mera
lit. Climbs.up.and.down the steps several times the day.
‘(S)he climbs up and down the steps several times a day’
- f. Anevokatike/*anevenokatevike ta skalia arketes fores simera
lit. climbed.up.and.down the steps several times today.
‘(S)he climbed up and down the steps several times today’

With respect to *beno* ‘go in’, it is important to note that if *-en-* does not surface (because of the *Bare-stem constraint*), the stem is reduced to one consonant *b-*. We would like to suggest that in order to preserve its form integrity the particular stem escapes the application of the constraint, and that the internal structure of the stem [b-en] has been reanalyzed as a morphologically simple stem. As a result, a compound like **bovgeno* (< b-CM-vgeno) ‘go in (and) out’ is impossible, and *ben-* is used in the [+perfective] context as well (14d).

A reanalysis procedure reducing a morphologically complex stem to a simple one seems to have been applied to the internal structure of the verb *pigeno* ‘go’ too.

In this way, we could explain not only why *-en-* appears inside dvandva [V V] compounds, but also why the form *pigen-* is used in the [+perfective] forms of the aorist, as the sentence of (12b) illustrates, in spite of the fact that *-en-* has been described as a [-perfective] marker. Additional proof for this claim is offered by the free alternation of *pigen-* with the bare stem form *pa-* in the paradigm of the present tense of Modern Greek, where *pa-* does not contain any overt [-perfective] marker:

- | | | | | | |
|------|----|------------|----|------|--------------|
| (15) | a. | pigeno | b. | pao | ‘I go’ |
| | | pigenis / | | pas | ‘you go’ |
| | | pigeni / | | pai | ‘(s)he goes’ |
| | | pigenume/ | | pame | ‘we go’ |
| | | pigenete / | | pate | ‘you go’ |
| | | pigenun / | | pane | ‘they go’ |

If *-en-* in *pigen-* has lost its role as a [-perfective] marker, and its contribution to the formation of the verb stem is not morpho-syntactically transparent, it follows that it cannot be affected by the operation of the *Bare-stem constraint*.

5.2. The nominal suffixes

The validity of the *Bare-stem constraint* is also put into doubt by the presence of certain nominal suffixes, which are found at the end of the first stem constituent of nominal compounds. Consider the following examples, which display a word-internal derivational suffix regardless of the operation of the constraint:

- | | | | | | |
|------|----|----------------------|---|--|-------------|
| (16) | a. | kinisiotherapia | < | kini _V -si _N | therapia |
| | | ‘kinesiotherapy’ | | move-DER | ‘therapy’ |
| | | | | ‘movement’ | |
| | b. | klistofovia | < | klis _V -t _A | fovia |
| | | ‘claustrophobia’ | | close-DER | ‘phobia’ |
| | | | | ‘closed’ | |
| | c. | aeriagogos | < | aer _N -i _N - | agogos |
| | | ‘gas-pipe’ | | wind-DER | ‘pipe’ |
| | | | | ‘gas’ | |
| | d. | agrotospito | < | agr _N -t(i) _N - | spit(i) |
| | | ‘farmer’s house’ | | land-DER | ‘house’ |
| | | | | ‘farmer’ | |
| | e. | anixtomialos | < | anix _V -t _A - | mial(o) |
| | | ‘open-minded’ | | open-DER | ‘mind’ |
| | | | | ‘open’ | |
| | f. | ikonomikopolitikos | < | ikonom _N -ik _A - | politikos |
| | | ‘economic-political’ | | economy-DER | ‘political’ |
| | | | | ‘economic’ | |

The fact that these compounds are nominal, and that their left-hand stem belongs to the nominal category, is crucial to our argumentation. As is the case for nouns and adjectives, nominal compounds differ from verbal ones, in that they can be loan-words or ‘calques’.¹⁶ If compounds like those in (16) belong to a specific register of words, and if only these compounds display a word-internal derivational suffix, we could claim that they are not real counter-examples to the operation of the *Bare-stem constraint*, which only affects ordinary Greek compounds, both verbal and nominal, i.e. compounds which do not belong to a particular language register.

Depending on the origin and their structure, the examples in (16) are marked for certain specific characteristics, which can classify them into three categories: a) loans, calques and pure translations from other languages, b) compounds which keep the word-internal derivational suffix in order to avoid a meaning confusion, and c) compounds which originate from lexicalized phrases.

5.2.1. Words like *kinisiotherapia* (16a) and *klistofovia* (16b) are calques, or translations of terms from other European languages, in this particular case, from the English *kinesiotherapy* and the French *claustrophobie*.¹⁷ As is well-known, the form of loans and calques may deviate from the usual formations of the target language, and thus, may not be affected by the *Bare-stem constraint*. In fact, *kinisiotherapia* contains the compound-internal suffix *-si*, which also appears in the English *kinesiotherapy* but without being identified as such in the source language. Furthermore, at the moment of the adoption of the French term *claustrophobie*, the latinate *claustro-* was translated into the Greek derived adjective *klisto-* ‘closed’, which can be transparently analyzed into the verbal stem *klis-* ‘close’, the adjectival suffix *-t-* and the compound marker/linking element *-o-*.

With respect to (16f), we should point out that the violation of the *Bare-stem constraint* is not due to the specific type of *-ik-*, since there are similar compounds, i.e. dvandva [A A] ones, whose first component is a derived item in *-ik-*, and this *-ik-* is not overtly realized. Consider the following examples, which display a juxtaposition of ethnic names, and a flexible order between constituents:

- | | | | |
|------|----|--------------------|-------------------|
| (17) | a. | anglogermanik(os)/ | germanoanglik(os) |
| | | English-German | German-English |
| | b. | italorosik(os)/ | rosoitalik(os) |
| | | Italian-Russian | Russian-Italian |
| | c. | rinolaringik(os)/ | laringorinik(os) |
| | | rhinolaryngic | laryngo-rhinic |

¹⁶ The existence of a big range of verbal compounds makes Greek distinct from other European languages, where these formations are either rare or not productive (see Booij 1992, among others).

¹⁷ According to the most recent Greek dictionaries, i.e. Babiniotis (2002) and Idryma Triantaphyllidi (1998).

- d. kiklokilindrik(os)/ kilindrokiklik(os)
 cyclocylindrical cylindro-cyclic

In these examples *-ik-* has no overt form when the constituent is at the left-hand position, but is morphologically present when the same constituent is used as second member of the compound. Therefore, the reason why there is *-ik-* in (17f) should be searched elsewhere. Note that (16f) belongs to a small group of *dvandva* [A A] compounds, like *ikonomikopolitikos* ‘economic-political’, *politikokinonikos* ‘political-social’, *iθikoθriskeftikos* ‘ethical-religious’, etc, which have been created during the 19th century in order to fulfill specific scientific needs (see Babiniotis 2002). Like the examples of the previous category, some of them constitute simple calques from French (e.g. *fisikoximikos* < Fr. *physicochimique*, attested in 1821 according to the *Idryma Triantaphyllidi Dictionary*), while others have been created by analogy, more or less at the same period (e.g. *politikokinonikos* in 1825, *ikonomikopolitikos* ‘economic-political’ in 1894). Again, words of this type, which are constructed for specific purposes do not constitute sufficient evidence to cast doubt on the validity of the *Bare-stem constraint*.

5.2.2. In certain formations, the presence of the derivational suffix seems to be necessary in order to disambiguate the meaning of the compound. For instance, in the examples *aeriyoyos* ‘gas pipe’ (16c) and *ayrotospito* ‘farmer’s house’ (16d) the alternative forms without the derivational suffixes *-ti(s)* and *-i(o)*, would be *aerayoyos* and *ayrospito*, which are also possible in Greek, but have a different meaning, ‘air-hole’ and ‘country-house’, respectively. Therefore, semantic ambiguity can be avoided if the compounds in (16c, d) keep the suffix in their surface morphological form.

5.2.3. The occurrence of the derivational suffix *-t-* within compounds like *anixtomialos* ‘open-minded’ (15e), is restricted to cases where the first component slot is filled by the deverbal adjective *anixt(o)* ‘open’.¹⁸ We would like to propose that compounds with *anixt(o)* as their first constituent originate from phrases, in this particular case, from the phrase *anixto mialo* ‘open mind’, the structure of which has undergone lexicalization, and, as is well-known, lexicalized structures may be different from the ones which are built within morphology.

However, compounds with *anixt(o)* at the left-hand side are generally considered to be structurally transparent exocentric formations, and their structure can be analyzed according to the rules of Modern Greek compounding. Following Ralli (2007), we further suppose that after lexicalization, items like (16e) have been submitted to a structural reanalysis as compounds, analogically to other exocentric compounds of a similar structure, i.e. to compounds containing the combination of an adjective and a noun (e.g. *oligomelis* ‘few membered’ < *oliy(o)* ‘few’ + *mel(os)* ‘member’). It is crucial to note though that this reanalysis has affected only the

¹⁸ Other similar occurrences with *anixt-* as first constituent are the examples of *anixtoxeris* ‘open-handed’, *anixtokardos* ‘open-hearted’, and *anixtomatis* ‘open eyed’.

functional elements of the construction, i.e. the inflectional ending *-o* of the adjectival word *anixto* ‘open’, which got reinterpreted as the compound marker *-o-*, and the inflectional ending *-o* of the noun *mialo* ‘mind’, which was replaced by the adjectival inflectional ending *-os*, as seen in (16e). Items with a lexeme status, such as the verbal stem *anix-* and the noun stem *mial-*, as well as the derivational adjectival suffix *-t-*, did not lose their identity. As a consequence, the derivational suffix *-t-* is overtly present within the structure of the compound *anixtomialos*.

6. Ordering between Derivation and Compounding Revisited

In Section 1, we tackled the issue of the order of application of derivation and compounding. In the subsequent sections, we showed that the absence of compound-internal derivational suffixes is only apparent, since the non-surfacing of derivational material is due to the operation of the *Bare-stem constraint*, which renders invisible material other than the segments of the first component’s bare stem in order to ensure a better structural cohesion between the two components of a compound. Therefore, it may be misleading to conclude that the absence of compound-internal derivational suffixes provides arguments in favor of an ordering of compounding after derivation. Since we have seen examples advocating the opposite order (see (1)), should we deduce that there is a linear order which requires derivation to occur first? It is important to point out that there is no positive answer to this question. On the one hand, there are derived words which feed derivation, as shown by the examples in (1), but on the other hand, there are compound structures which are subject to derivation. For instance, consider the adjectival compound *xartopektikos* ‘gambling’ and the noun *pederastia* ‘pederasty’. These words are built on the basis of the combination of a compound stem with a derivational affix, as depicted in (18):

- | | | |
|------|--|---|
| (18) | a. <i>xartopektikos</i>
lit. card-playing
‘gambling’ | < <i>xart-o-pekt(i)-ik-os</i>
card-CM-player-DER-INFL(NOM.SG)
‘card’ playing’ |
| | b. <i>pederastia</i>
lit. child-loving
‘pederasty’ | < <i>peδ-erast-ia-Ø</i>
child-lover-DER-INFL(NOM.SG) ¹⁹
‘child’ ‘loving’ |

In (18ab), there are no actual de-adjectival words **pektikos* ‘playing’ and **erastia* ‘loving’, which would imply a linear order in which derivation occurs before compounding. Moreover, the existence of compounds like *xartopektis* ‘gambler’ (< *xart(ia)* ‘cards’ + *pektis* ‘player’) and *pederastis* (< *peδ(i)* ‘child’ +

¹⁹ In this compound, there is a zero inflectional ending. Moreover, there is no compound-internal marker *-o-* because the second member begins with a vowel. See Ralli (2008a) for more details.

erastis ‘lover’) offers arguments in favor of the opposite order, i.e. compounding preceding derivation.

It should be noticed that there are also occurrences of verbal compounds, like *alatopiperono* ‘put salt and pepper’ (19a), where native speakers cannot take a clear decision in favor of one particular order:

- | | | | | |
|------|----|----------------------------|---|---|
| (19) | a. | <i>alatopiperono</i> | < | [[[alat-o-piper]-on]-o] |
| | | lit. put salt - put pepper | | |
| | | | | [[[salt-CM-pepper]-DER]-INFL(PRES.1P.SG)] |
| | | ‘to salt and pepper’ | | ‘to salt’ ‘to pepper’ |
| | b. | <i>alatopiperono</i> | < | [[[alat-iz]-o-[piper-on]]-o] |
| | | lit. put salt - put pepper | | |
| | | | | [[[salt-DER]-CM-[pepper-DER]]-INFL(PRES.1P.SG)] |
| | | ‘to salt and pepper’ | | ‘to salt’ ‘to pepper’ |
| | c. | <i>alatopipero</i> | < | [[alat-o-piper]-o] |
| | | lit. salt-pepper | | [[salt-CM-pepper]-INFL(NOM/ACC/SG)] |
| | | ‘salt and pepper’ | | ‘salt’ ‘pepper’ |
| | d. | <i>alatizo</i> | | alat-iz-o |
| | | ‘to salt’ | | salt-DER-INFL(PRES.1P.SG) |
| | | | | ‘to salt’ |
| | e. | <i>piperono</i> | | piper-on-o |
| | | ‘to pepper’ | | pepper-DER-INFL(PRES.1P.SG) |
| | | | | ‘to pepper’ |

In (19), the very frequent dvandva [N N] compound *alatopipero* ‘salt-pepper’ (19c) provides an indication for a subsequent derivational formation *alatopiperono* ‘to salt and pepper’ (19a), on the basis of the compound noun stem *alatopiper-* ‘salt and pepper’ and the derivational suffix *-on-* (*-o* being the inflectional ending). However, this is only an indication borne out by the dictionaries, which view the derived verb *alatopiperono* as a secondary compound formation on the basis of the primary nominal compound *alatopipero*. Theoretically, we could suppose that the structure is built on the combination of two derived verbal stems, the most common *alatiz-* ‘to salt’ (19d) and the less common *piper-on-* ‘to pepper’ (19e), a hypothesis which would denote exactly the opposite order, according to which derivation takes place before compounding, as in (19b). Moreover, in accordance with our argumentation at the previous sections, we should also suppose that the structure is affected by the operation of the *Bare-stem constraint*, which renders the overt form of the derivational verbal suffix *-iz-* of the verbal stem *alatiz-* ‘to salt’ invisible (17d).

To conclude, there is no clear evidence for an extrinsic linear ordering of the two processes. We have seen that a derived item may be used either as first or as second member of compounds, but the operation of the *Bare-stem constraint* hides the overt form of derivational suffixes within their structure. We have also seen that

derived items can be created after compounding takes place. Thus, the interaction of the two processes provides arguments for compounding being a word-formation process, which should be accounted for in the same way as derivation, i.e. within morphology. More crucially, the existence of a specifically morphological constraint, the *Bare-stem constraint*, which has a specific domain of operation, i.e. compounding, and affects specific morphological units, i.e. derivational suffixes, stresses the close interaction of the two processes and also implies a morphological account of compounding.

7. Conclusions

In this paper we have shown that there are morphological constraints that have an impact on the form of morphologically complex items. We have proposed the existence of the so-called *Bare-stem constraint*, which affects the output form of compounds with a derived item in the position of the left component. In order to preserve structural cohesion, this constraint renders invisible the derivational suffix, and makes the stem component as bare as possible, even though its category and semantics are those of a derived item. The few problematic examples that exist do not provide sufficient evidence against the postulation of this constraint. Unless they keep the derivational suffix for purposes of disambiguation, or to maintain integrity, it is shown that these occurrences result from reanalysis or originate from foreign formations and lexicalized phrases.

Finally, our paper comments on the place of compounding within the grammar. By examining the order of application between derivation and compounding, in conjunction with the operation of the *Bare-stem constraint*, we have shown the close interaction between the two, which argues in favor of an account of compounding in morphological terms.

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