

Angela Ralli
 University of Patras
ralli@upatras.gr

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Greek Deverbal Compounds with ‘bound stems’*

0. Introduction

This paper deals with Modern Greek deverbal formations consisting of one stem and one bound element. The following questions are addressed: a) Are these words derived or compound structures? b) What is their internal structure? c) What are the specific restrictions which govern their formation? d) Are they productively created?

First, it is claimed that the bound elements are bound stems, that is stems that cannot be free under the presence of inflectional affixes, and that the constructions containing them are compounds. In order to identify the grammatical category of these peculiar stems, the paper addresses several semantic and structural criteria. In spite of their bound character and their finite number, it is argued that they belong to the nominal category and that they derive from verb bases.

Second, the properties that distinguish the category of compounds with bound stems from common productive ones are examined. It is shown that they are governed by the basic structural principles of Modern Greek compounding and substantial evidence is provided for their right-headed endocentric character, [stem stem] structure, internal theta-role saturation, compound marking, and their stress properties. In addition, it is demonstrated that the number of specific restrictions which rule the constructions do not inherently characterize them, but are due to the derived character of their right-hand bound stems.

Third, the productivity rate of the particular formations is discussed. It is maintained that they are productive, since these words are part of the present day Greek morphological system, as illustrated by the large number of neologisms appearing each day in the media. Nevertheless, their productivity is smaller than that of the rest of Modern Greek endocentric compounds, although they are more productive than certain rare exocentric formations.

Finally, this study goes beyond Modern Greek compounding with bound stems as a contribution to the general issue about the categorization of lexical units, which is currently debated in the literature (Baker 2000). It is proposed that morphological categories, such as words, stems and affixes, are not radically separated, but are placed in a continuum, where bound stems occupy a position between affixes and normal stems, that is stems that can become free with the addition of an appropriate inflectional affix.

The paper is organized in five sections: section 1 presents a sketchy overview of the basic structural properties of both compounds and formations with bound elements. It also tackles some problems that are raised by international neoclassical formations. In section 2, the status of bound stem is assigned to bound elements, and the category of compoundhood is accorded to the constructions containing them.

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Section 3 deals with the issue of the derived nature of bound elements, which are shown to be deverbal. In section 4, compounds with bound stems are characterized as headed endocentric formations, and the restrictions to which they obey are due to the derivative nature of the bound stems. Finally, the notion of productivity is discussed in section 5, and the paper concludes with a summary of the main points examined in the text.

1. State of the art

Compounding is a very productive word-formation process of Modern Greek consisting of at least two stems, as the example *nixtoluluðo*¹ ‘night flower’ illustrates (1), while the transition between the first and second constituent is made by a vowel /o/, the so-called ‘compound marker’ (Ralli forthcoming):

- (1)a. *nixt-o-luluð(o)*² < *nixt-* *luluð-*
 night flower night flower

Compounds are right-headed and belong to all major grammatical categories, among which, verbal (2a) and deverbal ones (2b) are quite common:

- (2)a. *xartopez(o)* < *xart-* *pez-*
 play cards card play
 b. *xartopekti(s)* < *xart-* *pekti-*
 card player card player

As argued by Ralli (1992, 2007), stem constituents of Greek compounds and other morphologically complex words are usually bound, but may become free units (i.e. autonomous words) with the addition of an appropriate inflectional ending:

- (3)a. simple word: *ðasos* < *ðas-* *-os*
 forest.NEU.NOM/ACC/VOC.SG forest.NEU NOM/ACC/VOC.SG
 b. derived word: *ðasikos* < *ðas-ik-* *-os*
 forestal.NOM.MASC.SG forest-al.MASC NOM.SG
 c. compound: *pefkoðasos* < *pefk-o-ðas-* *-os*
 [pine forest].NEU.NOM/ACC/VOC.SG pine-forest.NEU NOM/ACC/VOC.SG

However, in a particular category of deverbal formations certain stems remain bound, even under the presence of an inflectional ending. In international literature, the issue of their exact morphological status has been debated, and they have been assigned various names. For instance, Migliorini (1963) calls them ‘affixoids’, Scalise (1983) semi-words, Martinet (1979) ‘confixes’, Dardano (1978) ‘elements of a cultivated form’, Ralli (1988, 1992) ‘bound stems’, and Nespør & Ralli (1996)

¹ All examples will be given in a broad phonological transcription, according to the pronunciation of Ancient or Modern Greek, depending on the case. The indication ‘Ancient Greek’ or A.G. will appear when needed, in order to distinguish the Ancient Greek examples from the Modern Greek ones. The latter will be provided without any particular indication.

² Hereafter, inflectional endings and parts of stems that are not directly involved in compounding will be included in parentheses.

‘pseudo-words’. In this paper, I adopt the term ‘bound stem’. Examples of the formations with bound stems are given below:³

(4)a. ktinotrofos	<	ktin-	-trof-	(< trefo)
cattle-breeder		animal/beast		raise
b. anθropofayos	<	anθrop-	-fay-	(< troo) ⁴
cannibal		man		eat
c. rasoforos	<	ras-	-for-	(< fero)
clergyman		cassock		bear/wear
d. kinonioloyos	<	kinoni-	-loy-	(< leyο)
sociologist		society		talk

Note that constructions such as the ones above have always been in use in Greek, throughout its long history. Many of them originate from Ancient Greek, such as the examples *theologos* ‘who talks about the divine, theologian’ (< A.G. *the(os)* ‘God’ -log- < A.G. *lego*: ‘talk’) or *doloplokos* ‘scheming’ (< A.G. *dol-* ‘fraud’ -plok- < A.G. *pleko*: ‘weave’), but they have undergone certain phonological and semantic changes⁵. Others have been created for the specific purposes of scientific terminology, as a result of scientific and technological development, particularly in the nineteenth century. However, many of these constructions have become part of the everyday vocabulary, and bound stems currently combine with common words in neologisms or recent formations, like the following examples illustrate:

(5) burδoloy(os)	<	burδ-	-loy-	(< lego)
who talks trash		trash		talk
kukulofor(os)	<	kukul-	-for-	(< fero)
hooded		hood		carry, bear
katsariδokton(o)	<	katsariδ-	-kton-	(< A.G. <i>kteino</i> :)
cockroach-cide		cockroach		kill

In addition, they give rise to further word formation, since they may accept a derivational suffix (e.g. *-ia*) in order to produce derivative nouns. For instance, *kerdoskopia* ‘speculation’ (< *kerδ-* ‘profit’ -skop- (< A.G. *skopeo*: ‘target, observe’)) is created on the basis of *kerdoskop(os)* ‘speculator’, *efθinofovia* ‘fear for responsibilities’ on *efθinofov(os)* ‘who fears responsibilities’ (*efθin-* ‘responsibility’ – *fov-* (< *fovame* ‘fear’)), etc.

³ Parallel to certain bound stems there are autonomous inflected words which have the same form, but bear a different meaning. For instance, beside *-loy(os)* ‘who talks about, a specialist of a discipline’ the word *loy(os)* has the meaning of ‘speech, oration, address’, beside *-for(os)* ‘who carries, who bears’ the word *for(os)* denotes the ‘tax’, etc. I consider both cases as separate derivatives descending from the same verb root.

⁴ There are two basic allomorphic variations of the verb stem with the meaning of ‘eat’: *tro-* (the present stem) and *fay-* (the aorist stem). The bound stem *-fay(os)* derives from the aorist stem, in accordance with most Greek deverbal derivatives which are based on the aorist allomorph. See Ralli (2005) for additional details.

⁵ The major changes in the Greek language have occurred during the Hellenistic period (roughly 3rd c. BC - 3rd c. AC). The most striking phonological changes are the loss of quantity distinctions in the vowel system (reducing the Attic system of seven long and five short vowels to a system of five isochronous vowels /a e o i u/), and the change of voiced and aspirated stops to fricatives (/b d g/ → /v δ γ/ and /p^h t^h k^h/ → [f θ x]).

Similar constructions appear in the vocabulary of other languages, and are listed under the class of neoclassical formations, which form complex words consisting of stems of Ancient Greek and/or Latin origin (e.g. En. *sociologist*, Fr. *sociologue*, It. *sociologo*, etc.). In fact, several of these words belong to a vocabulary of internationalisms, because they appear with the same meaning, and a quasi identical form in various languages. Consider, for instance, the Greek word *astronomos*, which appears as *astronomer* in English, *astronome* in French, *astronomo* in Italian, etc. Moreover, some of Greek neoclassical formations, like *astronomos*, have been created on the basis of these internationalisms, although their constituent parts are clearly of Greek origin.

A look at various studies of these creations reveals that, with some exceptions (see Bauer 1998, Lüdeling et als. 2002, Iacobini 2004, Namer & Villoing 2005, 2006), they have not received much attention. In international literature, it is usually assumed that neoclassical word formation differs in principle from native (Bloomfield 1933, Selkirk 1982, Scalise 1984, ten Hacken 2000, etc.). A different view is expressed by Bauer (1998), Lüdeling et als. (2002), and Namer & Villoing (2004, 2006) who consider that there is no radical separation between the various word-formation categories, and that there is a unclear boundary between native and nonnative creations.

As stated above, in this paper I restrict my attention to Modern Greek neoclassical formations which consist of two stems, the second of which is bound and deverbal. However, international neoclassical structures include other types of formations as well. For instance, there are cases where the second constituent is not a deverbal element, as in the examples *monomorphemic* (< *mono-* *morphemic*) and *prefixoid* (< *prefix* *-oid* ‘kind of’), or a first learned element joins a native one, like in the word *ecodoomster* ‘a person who foretells doom in ecological matters’ (example taken from Bauer 1998: 407). There are also cases of international neoclassical formations which correspond to regular compounds in Modern Greek, the second constituent of which can be a free word, and is thus excluded from the category of bound stems. *Lypolisis* may be such an example, where *lysis* corresponds to the Modern Greek word *lisi* ‘solution’, which derives from the combination of the commonly used verb *lino* ‘solve’ and the derivational suffix *-si*.⁶

2. Compounds or derived words?

The first prerequisite to determine the exact status of the constructions under examination is to establish certain criteria according to which these items are distinct from, or similar to, other morphologically complex words. The following questions should be addressed: a) How much different are these words from the rest of current native formations? b) What is their status? c) What is their structure?

There is an implicit assumption in linguistic literature that the bound elements appearing as second constituents of these constructions should be treated as learned, since they are not the product of natural language evolution, but have been recovered from Ancient Greek, mostly in the last two centuries.⁷ Although common speakers do

⁶ Note, however, that the particular word *lypolisis* appears as *lipodialisi* in Modern Greek, where *lisi* is preceded by the prefix *dia-*.

⁷ Some examples are the following:

(i) <i>kerdoskopos</i> (1825)	< <i>kerδ-</i>	- <i>skop-</i> (< A.G. <i>skopeo</i> ·)
speculator	profit	target, observe
<i>sizmologos</i> (1897)	< <i>sizm-</i>	- <i>log</i> (< <i>leγο</i>)

not necessarily have etymological knowledge, it is obvious from their usage that most creations involving bound elements are not fossilized words. For the vast majority of them there is a structural and semantic transparency, and they are productively created today, not just in science and technology, but also in the everyday language, as already shown by the examples in (5). Therefore, although these constructions may obey some specific restrictions that do not apply to compounds involving non-learned items, a large number of them belong to common vocabulary items. Apart from boundness, we will see below that these restrictions refer to a fixed right-hand position, specific stress requirements, absence of coordinative structure, and a listing to closed-class elements.

Generally, the structural status of the formations under study seems to be controversial. Linguists agree that their right-hand elements cannot appear as independent words, but analyses range from the assumption that they are bound stems to the one that they are affixes. For instance, on the basis of their bound character, Anastassiadi-Symeonidi (1986) and Giannouloupoulou (2000) claim that they behave like a particular type of affixes (called *confixes* following Martinet's (1979) terminology), and that the constructions containing them should not be considered as compounds, but rather as derived structures. However, boundness is not a decisive criterion for defining these elements as kinds of affixes, since other properties advocate a stem status. According to Ralli (1992), they display a number of characteristics which are typical of stems.

a) They become bases to prefixed words, as in the examples below:

- (6) *ipology(os)* < *ipo-* *-logy-* (< *levo* 'talk')
 who is accountable, responsible for his actions
ipotrof(os) < *ipo-* *-trof-* (< *trefo* 'feed, nourish')
 bursar
ipermax(os) < *iper-* *-max-* (< *maxome* 'fight')
 defender, supporter
katafor(os) < *kata-* *-for-* (< *fero* 'bear')
 with vehement opposition, virulent
ayraf(os) < *a-* *-yraf-* (< *yrafo* 'write')
 unwritten

Since a complex word cannot be created without a stem base, it follows that the right-hand elements of the structures given in (6) are stems.

b) They bear a lexical meaning, which characterizes stems/lexemes, but not affixes. The semantic criterion which distinguishes affixes from lexemes is that affixes express categorical or relational values showing temporal, spatial, qualitative and agentive notions that restrict the type of bases to which they are added, and determine the type of meaning of the derived word (Iacobini 2004). In contrast, lexemes express an autonomous denotative meaning. Bound stems belong to the second category, since they do not restrict the meaning of the constituents with which they combine. The formations into which they participate generally refer to a meaning of agentive (e.g. *anthropofagos* 'man-eater, cannibal'), instrumental (e.g. *karديوyrafos* 'cardiographer') or experiencer (e.g. *efthinofovos* 'who fears responsibilities') values.

seismologist	earthquake	talk
<i>sizmoyrafos</i> (1877)	< <i>sizm-</i>	<i>-yraf-</i> (< <i>yrafo</i>)
seismolgrapher	earthquake	write
etc.		

c) They impose an argument structure to their constructions, which is inherited from the underlying verb base. The left-hand noun of the constructions into which they participate may saturate one of its theta-roles, usually the theme (7a,b), but also other roles, such as a location (7c) or a goal (7d):

(7)a. <i>anθropofay(os)</i> ‘man-eater, cannibal’	<	<i>anθrop-</i> man	<i>-fay-</i> (< <i>troo</i> ‘eat’)
b. <i>δiijimatoyraf(os)</i> story-writer	<	<i>δiijimat-</i> story	<i>-yraf-</i> (< <i>γrafo</i> ‘write’)
c. <i>thalasopor(os)</i> navigator	<	<i>thalas-</i> sea	<i>-por-</i> (< A.G. <i>poreuomai</i> ‘go, travel’)
d. <i>kerδoskop(os)</i> speculator	<	<i>kerδ-</i> profit	<i>-skop-</i> (< A.G. <i>skopeo</i> : ‘target’)

A similar theta-role saturation is generally observed in typical Greek deverbal compounds, for instance in those where the second constituent is a derived item in *-ti(s)* or *-ma*. Compare the words *karδιολογος* ‘cardiologist’ and *salaminomaxos* ‘Salamis-fighter’ with those of *kardiokataktitis* ‘heart conqueror’ and *ematolikizma* ‘lit. steeping in blood, butchery’:

(8)a. <i>karði-o-loy(os)</i> lit. who studies the heart	vs.	c. <i>karði-o-kataktiti(s)</i> heart conqueror
b. <i>salamin-o-max(os)</i> lit. Salamis fighter		d. <i>emat-o-kilizma</i> lit. blood-steeping

In (8a,c), both formations have the common stem *karði-* ‘heart’ as first constituent and a deverbal item as second constituent. Moreover, both formations display a word internal theme saturation. The crucial difference between the two is that while *kardiokataktitis* contains a common deverbal stem *kataktiti-* which becomes free word with the inflectional ending *-s*, the second constituent *-loy-* of *karδιολογος* can never become a free item. The same type of considerations apply to the examples of (8b,d). They both display a location-role saturation, but while *-max-* in *salaminomaxos* is a bound element, *kilizma* in *ematokilizma* can be a free inflected word.

We may, thus, conclude that elements like those of (7) and (8a,b) are stems. Since they never become free words with the appropriate inflectional endings, we accept them as ‘bound stems, following Ralli (1988, 1992), and the structures into which they participate ‘compounds with bound stems’. Crucially, the adoption of a specific category of bound stems, beside the one of regular ones (i.e. those that can become words with the addition of an appropriate inflectional ending) raises the issue whether there are distinct boundaries between the various morphological categories, that is affixes, stems and words. As argued by Ralli (2005), these categories are placed in a morphological continuum, which is determined on properties such as structural boundness and lexical meaning.⁸ Affixes and words occupy the two poles. Stems and bound stems are situated in the middle, with bound stems occupying a position between stems and affixes. This approach accounts for the similarities that may be shared by different categories, as for example, the boundness property that is displayed by both affixes and bound stems.

⁸ For the general notion of continuum, see Bybee (1985).

Note that the compoundhood of the structures under examination is further proved by the fact that they display two more properties that characterize the particular process:

a) They contain a vowel /o/ between the first and the second stem constituents. This vowel does not apply to Greek derived structures, but, as noted in section 1, is characteristic of compounds. According to Ralli (2007, forthcoming) it constitutes a compound marker:

- (9) $\gamma\text{los-o-lo}\gamma(\text{os})$ < $\gamma\text{los-}$ $-\text{lo}\gamma-$ (< $\text{le}\gamma\text{o}$ ‘talk’)
 linguist tongue
 $\text{tra}\gamma\text{u}\delta\text{-o-pi}(\text{os})$ < $\text{tra}\gamma\text{u}\delta-$ $-\text{pi-}$ (< pio ‘make’)
 song-maker

b) In accordance with typical Greek compounds, they are recursive structures and can be extended at the left-hand side:

- (10) [[kinoni]-o-[$\gamma\text{los-o-lo}\gamma\text{os}$]]
 lit. society tongue specialist ‘socio-linguist’
 [[ot]-o-[[rin]-o-[laring-o-lo γos]]]
 lit. ear nose throat specialist, ‘otolaryngologist’

Since bound stems combine with stems in order to produce compounds, it would be natural to assume that the basic structure of the constructions under examination is [stem stem]. This is a well-known configuration of a large class of Modern Greek compounds, the inflectional ending of which is different from the one of their second member taken in isolation, as the following examples illustrate (see Ralli 2007 for more details):

- (11)a. $\text{spirt-o-kut}(\text{o})$ < spirt- $\text{kut}(\text{i})$
 match box match box
 b. kapn-o-xorafo < kapn- $\text{xoraf}(\text{i})$
 tobacco field tobacco field

Therefore, deverbal compounds with bound stems are structurally integrated within the regular compounding system of Modern Greek, as opposed to neoclassical compounds of other European languages, which do not generally follow the same structural properties of native compounds. For instance, while English native compounds are word based, neoclassical compounds involve stems (see Selkirk 1982), as shown by the comparison of the native compound [sun flower] with the neoclassical one [anthrop-o-log(ist)]. In addition, while Greek deverbal compounds with bound stems display the compound marker *-o-* between the two basic constituents (11), in English, this *-o-* is absent from native formations, and surfaces only in neoclassical compounds. However, it is important to add that there are linguists (e.g. Bauer 1998, Lüdeling et als. 2000) who do not exclude neoclassical compounds, at least English and German ones) from the native word-formation system. In particular, they claim that neoclassical compounds do not differ in principle from native ones, and that there is only a difference in ‘degree’ in each aspect of rules and elements that are involved in their formation. In Bauer’s (1998: 403) terms, there is a fuzzy boundary between the different word-formation

categories, while for Lüdeling et als. (2000: 257) neoclassical and native categories form a continuum.

3. Structure and grammatical category of bound stems

In the previous section I have concluded that the bound elements in the constructions under examination belong to the class of stems. I have also assumed that these elements are deverbal, because they constitute nominal derivative formations which are created from an underlying verb base. Now their derivational structure and specific grammatical category remains to be determined. For this purpose, I take into consideration a number of characteristics in relation to their form and combinability properties.

With respect to their form, it is important to note that most bound stems have no overt nominalizing affix, unlike other nominal deverbal formations of Modern Greek (e.g. *katakti-ti(s)* ‘conqueror’ from *katakt(o)* ‘conquer’). As such, they could be treated as belonging to the original verbal category. This is the analysis proposed by Namer & Villoing (2004, 2006) for the corresponding cases of French neoclassical compounds of the type *anthropofage* ‘lit. man-eater, cannibal’. Nevertheless, there are significant arguments in favor of assigning to bound stems a nominal status. Crucially, a large number of them display a different stem vowel from the one that shows in the underlying verb stem, and more importantly, this vowel appears in nouns that are derived from the same verb base. The latter constitute typical cases of deverbal structures deriving by ablaut. This process was very common in Ancient Greek and still surfaces today, although it is not very productive, since it applies to a closed class of verb bases. Compare the following examples:

(12)	verb	free derivative noun	bound stem in compounds
a.	leyo	loyos	-loy- as in <i>theologos</i>
	talk	word, speech	theologian
b.	fero	fora	-for- as in <i>leoforos</i>
	bear, carry	flow, direction	lit. people carrier, ‘avenue’
c.	klepto	klopi	-klop- as in <i>loyoklopos</i>
	steal	stealing	lit. speech thief, ‘plagiarist’
d.	temno	tomi	-tom- as in <i>ilotomos</i>
	cut	cut	woodcutter
e.	trefo	trofi	-trof- as in <i>melisotrofos</i>
	feed	food	lit. who feeds bees, ‘apiarist’

In (12), both the free derivative noun and the bound stem display the same vowel, which is distinct from the one of the basic verb stem. Thus, there is good reason to assume that the bound stem is also a derivative nominal, which has undergone the same derivational process, that is ablaut.

It should be added that for some actual bound stems the productive relation with the original verb bases has been lost, since the latter are Ancient Greek items that do not surface in Modern Greek any more. For instance, the bound stem *-nom-* in a word like *dasonomos* ‘forester’ originates from the Ancient Greek verb *nemo*: ‘give as a part of, divide in parts, distribute’ which appears only in today’s prefixed verbs, like *katanemo* ‘distribute’. I presume that such bound stems are listed in the lexicon with all their deverbal features, but no synchronic rule could associate them to the Ancient Greek verb bases which they descend from.

Ablaut is not the only process that is responsible for the derivation of bound stems. There are also cases which are derived by simple conversion (13a), or overt suffixation (13b):

(13)	verb	nominal bound stem	compound
	a. conversion		
	γραφ _V (o)	-γραφ _N (os)	λογογραφος
	write		prose/discourse writer
	b. suffixation		
	θετ _V (o)	-θε-τι _N (s)	ονοματοθητις
	put		name giver

Significantly, bound stems that are derived through conversion or overt suffixation are more frequent in Modern Greek, than those derived by ablaut. Some of them are already attested in Ancient Greek (14), although they have undergone certain phonological and semantic changes,⁹ while others are modern creations (15):

(14)	Ancient Greek		
	verb	nominal bound stem	compound
	a. conversion		
	γραφ _V -(o:)	-γραφ _N -(os)	λογογραφος
	write		prose/discourse writer
	b. suffixation		
	τιθη: _V -(mi)	-θη-τ _N (e:s)	ονοματοθητε:s
	put		name giver
(15)	Modern Greek		
	a. verb base	bound stem	compound
	γραφ(o)	-γραφ-	χορογραφ(ος)
	write		chorographer
	b. δεν(o)	-δε-τι-	βιβλιοδετι(s)
	tie, bind		book binder

Conversion has a limited productivity today. It usually derives nominal bound stems from certain verbs, as well as second class verbs from nominal bases (see Ralli 2005 for more details).¹⁰ Nevertheless, it is relatively more productive than ablaut. On the contrary, overt suffixation is an extremely productive process in Modern Greek, which derives nominal items from verb bases of almost any type.

The nominal category of bound stems is further proved by their combinability properties. For instance, bound stems can be preceded by adjectival stems such as in the following compound:

(16)	ταξιγραφ(ος)	<	ταξι _A -	-γραφ-	(< γραφο ‘write’)
	quick writer		quick		

Crucially, a verbal category of the bound stem does not allow a combination with an adjectival stem, but requires an adverbial item. Likewise, bound stems can

⁹ See footnote 5.

¹⁰ *Kiniγ(o)* ‘hunt, chase’ may be a typical example of a second class verb deriving from the noun *kiniγ(os)* ‘hunter’ through conversion.

also accept prefixes which do not combine with verbs, but necessitate nominal bases. For instance, there are formations with bound stems and the privative prefix *a-*:

(17)	prefixed adjective	prefix	bound stem	underlying verb	prefixed verb
	a. <i>ayraf(os)</i>	< a-	- <i>γraf-</i>	(< <i>γraf(o)</i> ‘write’)	* <i>ayrafo</i>
	unwritten				
	b. <i>amax(os)</i>	< a-	- <i>max-</i>	(< <i>maxome</i> ‘fight’)	* <i>amaxome</i>
	non-combatant				

More importantly, deverbal compounds with bound stems can be further developed into verbal formations. These formations have always occurred throughout the history of Greek composition, inflect differently from the original underlying verb base, and the position of their stress is also different from the position of the original verbal stress. For example, the Ancient Greek deverbal compound *anthro:pológ(os)* (attested in Aristotle, 4th c. BC) ‘who talks about people’ gave rise to the verbal formation *anthro:pologéo:* > *anthro:pologó:* ‘speak a human language’ (attested in Philon, 1st c. BC). This formation inflects according to the second conjugation class of verbs (‘contracted verbs in *-eo:* > *-ó*’)¹¹, while the verb underlying the bound stem, i.e. A.G. *légo:* ‘talk’, displays a different stress position, and belongs to the first conjugation class. In fact, a quick research in an Ancient Greek dictionary (cf. Lidell, Scott et als.) reveals that the vast majority of nominal compounds, like *anthro:pológ(os)*, are attested earlier than verbal ones (e.g. *anthro:pologéo*). I consider the latter to be back formations on the basis of the first, and diachronic evidence supports this hypothesis. The back-formation process of creating verbs from compounds containing deverbal bound stems is still active today, and produces many neologisms. Recent creations such as *γlosologyó* ‘behave like a linguist’ (from *γlosologyos* ‘linguist’) or *ajioyrafó* ‘paint religious figures’ (from *ajioyrafos* ‘hagiographer’), etc. are indicative of the productivity of this process. Similarly to the Ancient Greek *anthro:pologó:*, Modern Greek *γlosologyó* and *ajioyrafó* are stressed on the ultimate syllable and inflect according to the second inflection class, while the verbs *légo* ‘talk’ and *γráf(o)* ‘write’ which are the bases of the bound stems are stressed on the penultimate syllable, and are members of the first inflection class.¹²

(18) Modern Greek

underlying verb	bound stem	compound	back formation
<i>légo</i>	- <i>logy-</i>	<i>γlosology(os)</i>	<i>γlosologyó</i>
talk	who talks	linguist	behave/talk like a linguist
<i>γráf(o)</i>	- <i>graf-</i>	<i>ajioyraf(os)</i>	<i>ajioyrafó</i>
write	who writes	hagiographer	paint icons

In conclusion, bound stems participating in the compounds under examination belong to the nominal category and derive from verbs. Some of bound stems are

¹¹ In Ancient Greek, contracted verbs were those who were submitted to a rule reducing two adjacent vowels into one (e.g. /e o:/ → /o:/). After undergone contraction, the verbal forms received stress on the ultimate syllable resulting from contraction.

¹² Following Ralli (1988, 2005), Modern Greek verbs inflect according to two inflection classes on the basis of their stem allomorphy: verb stems of the second class display a systematic X(a/e) ~ Xi allomorphy pattern, which is absent from those of the first class. It should be noticed that the second inflection class is divided into two subclasses, according to the quality of the vowel (/a/ or /e/) of the first stem variant.

created by suffixation, while the vast majority of them are built on the basis of suffixless processes such as conversion or ablaut. In other words, derivation of bound stems occurs before compounding, but as shown in the previous paragraph, nominal compounds with bound stems may become bases to the derivation of a certain type of verbs, those of the second inflection class.

4. Headedness and restrictions of compounds with bound stems

In the preceding section, I have argued that the constructions under examination are compounds, and that their second members constitute derived stems, in spite of their bound nature which makes them look like affixes. Significantly, the behavior of the compound word as a whole is determined by the morphological and the semantic nature of the bound stem, which is situated at the right-hand position of the structure. Thus, compounds with bound stems should be seen as right-headed endocentric formations, since their nominal category and other basic structural or semantic features are inherited from these items.¹³ In fact, right-headedness and endocentricity are not surprising in Modern Greek compounds given that the vast majority of them behave in the same way (see Ralli 2007), while these characteristics were also typical of a large number of Ancient Greek compounds.¹⁴

Nevertheless, I have already pointed out that bound stems obey a number of restrictions that do not affect regular compounds in Modern Greek. In the following paragraphs I argue that most of these restrictions are not typical properties of compounds with bound stems but are due to the derivative nature of the particular stems.

a) Bound stems occupy only the second position of compounds¹⁵, contrary to other stems which may appear in the first or the second position, as the example in (19) illustrates:

- (19)a. xartokut(o) < xart- kut-
 paper box paper box
 b. asimoxart(o) < asim- xart-
 silver paper silver paper

The fixed second position makes bound stems behaving like suffixes, and can be used as an argument against their stem status. However, this property may be justified by their derivative character; as shown by Ralli (2007), derivative items rarely appear in the first position of Greek compounds, and are only derivative structures ending in a suffix like *-t(os)* or *-ik(os)*.¹⁶

b) Compounds with bound stems are exempted from the compound-specific stress rule (Ralli 2007), according to which the stress falls on the antepenultimate syllable (20a), independently of the stress of their head constituent. In fact, compounds with

¹³ Note that the adoption of bound stems as verbal items would render the compounds exocentric, since neither of the two basic constituents would justify their nominal category.

¹⁴ See Williams (1981) for the principle of right-headedness in word formation.

¹⁵ Some items with an identical form to that of bound stems may appear in the first position of compounds. However, they are not bound stems but regular free ones. E.g. *log(os)* ‘speech’ in *logotherapia* ‘speech therapy’, *for(os)* in *foroapalaji* ‘tax exemption’, etc. See also footnote 3.

¹⁶ Typical examples are the derivative adjectives *kinonikoikonomik(os)* ‘socio-economic’ < *kinonik-* ‘social’ *ikonmik-* ‘economic’, and *anixtoxeri(s)* ‘open-handed, generous’ < *anixt-* ‘open’ *xeri-* ‘hand’.

bound stems are usually stressed on the penultimate syllable, which is the core stressed syllable of the bound stem (20b):¹⁷

- (20)a. xartókut(o) vs. kutí ‘box’
 paper box
 b. xartoyráf(os) vs. –γράφ(os) (< γράφ(o) ‘write’)
 cartographer

Again, as argued by Ralli (2007) and illustrated by the example in (21a), the vast majority of derivative items have stress properties which are preserved under composition. In other words, they have a fixed stress position which is kept under headedness in compounding:

- (21) a. kart-o-metrítí(s) vs. metrítís (< metr(o) ‘calculate’)
 lit. card calculator calculator
 b. xart-o-γράφ(os) vs. –γράφ(os) (< γράφ(o) ‘write’)
 cartographer

c) Generally, the relations between the compound constituents allow us to distinguish between formations with a dependency relation (22a), and formations with a coordinative one (22b):

- (22)a. alatoner(o) < alat- ner-
 salted water salt water
 b. alatopiper(o) < alat- piper-
 salt (and) pepper salt pepper

Modern Greek compounds display both relations, with the exception of those with bound stems whose constituents bear only a dependency relation. This constitutes another restriction which is explained by the derivative character of bound stems: items which follow from a derivational process do not usually appear in coordinative compounds.¹⁸

Finally, it is important to stress that bound stems belong to a closed class of items, and in this respect they are similar to affixes. Apart from boundness (see section 2), this is the only feature which does not follow from their derivative structure. A plausible explanation may be searched in their origin: since bound stems descend from Ancient Greek roots, which have been recovered mostly in the last two centuries, it would be logical to assume that they do not belong to the open class of common Modern Greek lexemes. However, the process of building words with bound stems should not be considered as a peripheral case of Modern Greek word formation. It is perceived as part of the compounding system of Modern Greek, since new formations are continuously produced, something that will be demonstrated in the next section.

5. Productivity of compounds with bound stems

¹⁷ There are few exceptions which should be treated as lexicalized cases, e.g. *xiróyrafo* lit. ‘hand-written, manuscript’

¹⁸ With the exception of the adjectival derivative stems in *-ik-* (e.g. *kinonikopolitik(os)* ‘socio-politic’ < *kinonik-* ‘social’ *politik-* ‘politic’).

It is usually assumed that a process is productive if it coins new words in a subconscious fashion (van Marle 1985), and if it is not largely submitted to combinability restrictions. For instance, in a considerable number of languages, items that are learned do not freely combine with native common bases of any kind (Bloomfield 1933, Domenig & ten Hacken 1992, ten Hacken 2000). This characteristic has led van Marle (1985: 60) to propose that neoclassical compounds are less productive than native. This view has been disputed by Scalise (1984), Bauer (1998), and Bergmann (1998), who argue that neoclassical word formation is productive and active today. In the same spirit, Bauer (1998) supports that, in English, neoclassical stems have always combined with native stems.

In Modern Greek, word formation with bound stems constitutes an important source of lexical enrichment, particularly after the nineteenth century, when a revival of Ancient Greek roots contributed to a considerable lexical innovation. These formations are productive, not only because of their high frequency, but also because bound stems in Greek can combine with commonly used stems, some of which are not even of Ancient Greek origin. A typical example is the neologism *burðologos* ‘who talks trash’ (see the examples in (5)), where the bound stem *-log-* combines with *burð-*, which is of Spanish origin (cf. Dictionary of Modern Greek Koine). Examples such as *burðologos* prove that stem boundness does not imply selection, because bound stems do not generally have selection requirements like affixes. However, this particular behavior does not characterize all bound stems, since there are also instances which combine with only items of an Ancient Greek origin. These stems are those whose underlying verb base is not a recognizable word of Modern Greek, although it had occurred as such in Ancient Greek (see A.G. *nemo*: ‘distribute’ and its derivative bound stem *-nom-* in a compound such as *ðasonomos* ‘forester’, section 4.). Certain compounds with these bound stems already existed in Ancient Greek (23a), while other occurrences are modern formations (23b):

- (23)a. nosokom(os) < nos-[learned] -kom-[learned] (< A.G. *komeo*: ‘take care of...’)
 nurse sickness
- b. vrefokom(os) < vref- -kom-
 baby nurse baby

In section 3, I have proposed that bound stems which do not derive from a verb base on synchronic grounds are listed in the lexicon with all their deverbal properties. I would like to add that their entries are also specifically marked as requiring an Ancient Greek stem to combine with. Nonetheless, these cases are only exceptions to the vast majority of bound stems which have no selection requirements.

However, in spite of their frequent and productive character today, a large number of deverbal compounds with bound stems are not the product of spontaneous speech. Before being adopted by the common language, they are rather coined by educated individuals, that is individuals with the necessary knowledge of learned items. Even so, as shown in the previous sections, these formations differ from regular productive compounds only with respect to the nature of their bound constituent, while the basic structural properties are the same: form and meaning transparency, [stem stem] formation pattern, right-hand headedness, compound marker *-o-*, internal theta-role saturation. Therefore, although most of them have been invented in order to fulfill some specific needs (to express technological and scientific concepts), and in spite of the boundness and closed-set membership of their bound stems, they are fully integrated into the system of Modern Greek compound formation. In this respect, they

diverge from similar international formations, which structurally differ from native compounding. At the end of section 2, we saw how the structure of English neoclassical compounds diverges from the structure of native ones. Similarly, neoclassical compounds in Romance languages are usually right-headed (24b), while native compounds follow a rather left-headed pattern (24a):

(24)a. French	Italian
essuie-mains	asciugamani
lit. wipes hands, 'hand towel'	
b. anthropologue	antropologo
anthropologist	

In an effort to define the productivity rate of compounds with bound stems, I agree with Bauer (1998: 414) that there is a gradual cline from the most productive to the least productive type of processes rather than an abrupt division. In this cline, they occupy a central position with respect to non-productive compound formations (e.g. some rare [VN] exocentric formations¹⁹, e.g. *misojinis* 'who hates women' < *mis-* 'hate' *jini* 'woman'), but a more peripheral one compared to the productive right-headed compounds (e.g. *karðiakaktitis* 'heart conqueror' < *karði-* 'heart' *kaktitis* 'conqueror'). Significantly, the notion of cline allows us to account for the non clear-cut division between the various types of word-formation processes. Instead of accepting a radical separation between the two cases, it provides a better way to represent word-formation structures, which display properties that are shared by more than one word-formation process.

6. Summary

In this paper, I have examined a category of Modern Greek formations which correspond to a large number of international neoclassical compounds. I have argued that these constructions are integrated in the compounding system of the language, and constitute endocentric [stem stem] structures. The second member of these structures is a deverbal bound stem in spite of the fact that it shares with affixes the properties of boundness and listing to a closed-set items. The particular compounds obey a number of restrictions, which do not characterize the specific compounding process itself, but follow from the derived nature of the bound item. Moreover, they are productively produced today, although their productivity rate is not as high as the rate of other endocentric compound formations.

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¹⁹ See Ralli (2007) for more details on these formations, which are considered to be formed analogically to certain correspondent constructions of Ancient Greek.

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