Compounds in Modern Greek

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This paper is an attempt to present compounds in Modern Greek. We focus on their internal structure and the relations between their constituent parts. Verbal compounds are more closely examined and questions are raised regarding the interaction of compounding and affixation (i.e., derivation and inflection) on the one hand, as well as the status of some phrasal constructions which behave as compounds on the other. The analysis is based on the assumption that compounding constitutes a morphological process. A general word formation rule and a principled method of assignment of morphosyntactic features to compound formations is assumed to be handled through the theoretical proposals of generative morphology in its lexicalist view. Following this strategy, Modern Greek offers strong evidence in favor of a system where word structures representing compounds may be treated in an efficient manner within a word formation component.*

0. *Introduction.*

The main topic of this paper is the description of the properties, in Modern Greek (henceforth simply Greek), of the phenomenon generally known as compounding. To this aim, we will use the framework of generative morphology. We will assume that the lexicon consists of two subcomponents: a list of underived items of morphematic nature (e.g., stems, affixes and simple words) containing idiosyncratic information, and a word formation part consisting of principles and rules. The interaction between the theoretical principles and the set of linguistic data will allow us to show that we are dealing with a grammatical domain below the word level and we will investigate whether it is possible to formulate a general word formation rule and a number of principles whose form and application are active and productive in the analysis and creation of compounds.

In the first section, we will present an inventory of Greek compounds

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classified according to their categorial status and the categories of their constituent parts. We will discuss some of the morphological properties regarding their internal structure and we will focus on the issues of headedness, syntactic relations between the members of compound formations and interaction between compounding and inflection. The use of these devices will allow us to decide if the generation of the principal types of compounds is to be considered as being dependent on a general word formation rule pattern, constrained in different manners and to different degrees in the way it is employed by the particular language.

A borderline case between compounding and derivation is tackled in the second section. Although we do not intend to study this issue in depth, the facts which we propose to examine raise the question whether compounding must be treated as totally distinct from derivation.

Greek is particularly rich in verbal compounds. In the third section, some problems of notable importance in linguistic theory will be discussed with respect to the constituent structure of these formations. The question of argument structure satisfaction within compounds will be raised. The adequacy of grammatical functions (e.g., subject, object, etc.) related to the arguments of basic lexical forms will be examined and evidence will be provided supporting the view that in verbal compounds, the compound formation rule follows the application of the rule generating derived deverbal heads.

The last section will be devoted to the special case of word constructs which display a number of properties common to compounds, although their structure is rather similar to noun phrases. Based on the fact that they constitute a kind of "phrasal" compounds, we argue in favor of a lexical treatment of word constructs within a word formation component operating in parallel with the syntactic component. By assuming that their lexical insertion takes place at s-structure, as opposed to regular compounds which are inserted before d-structure, we will be able to account for their syntactic properties.

Finally, it is worth noting that as far as the description of Greek compounds is concerned, there is not sufficient information available. The only available studies are traditional grammatical descriptions which are neither complete nor updated. Thus, information about compounding will mostly be supplied by our knowledge of the language.

1. *The structure of Greek compounds.*

Compounding in Greek is traditionally defined as an association of two or more stems which always occur as one unit. Compounds are generally classified as nouns, verbs and adjectives. They are made up of constituents, each belonging to one of the categories noun, verb, adjective and adverb.

In what follows, we list representative examples of the most frequent compound types. Nouns are given by convention in nominative singular, adjectives in nominative singular of the masculine gender type and verb forms are cited in the first person singular of the present tense.

(1) a. NOUNS

N + N

σημαιοστολισμ(ός)[1]	<	σημαί(α)	στολισμ(ός)
[simeostolizmós]		[siméa]	[stolizmós]
lit. "flag decoration" = "bunting"			
οργανοπαίκτ(ης)	<	όργαν(ο)	παίκτ(ης)
[organopéktis]		[órgano]	[péktis]
lit. "instrument player" = "musician"			
ελαιοκαλλιέργει(α)	<	ελαί(α)	καλλιέργει(α)
[eleokaliérjia]		[eléa]	[kaliérjia]
"olive cultivation"			
μαλλιοτράβηγμα	<	μαλλ(ί)	τράβηγμα
[maljotrávigma]		[malí]	[trávigma]
lit. "hair tearing" = "rough fight, tussle"			
λυκόσκυλ(ο)	<	λύκ(ος)	σκύλ(ος
[likóskilo]		[líkos]	[skílos]
lit. "wolf dog" = "wolf-hound"			
τερματοφύλακ(ας)	<	τέρμα	φύλακ(ας)
[termatofílakas]		[térma]	[fílakas]
lit. "end keeper" = "goalkeeper"			
καραβόπαν(ο)	<	καράβ(ι)	παν(ί)
[karavópano]		[karávi]	[paní]
lit. "ship cloth" = "sailcloth"			
χιονόβροχ(ο)	<	χιόν(ι)	βροχ(ή)
[xjonóvroxo]		[xjóni]	[vroxí]
lit. "snow (and) rain" = "sleet"			

A + N

ασχημόπαπ(ο)	<	άσχημ(ο)	παπ(ί)
[asximópapo]		[ásximo]	[papí]
"ugly duckling"			
γλυκοχάραμα	<	γλυκ(ό)	χάραμα
[glikoxárama]		[glikó]	[xárama]
lit. "sweet dawn" = "dawn"			
αγριάνθρωπ(ος)	<	άγρι(ος)	άνθρωπ(ος)
[agriánΘropos]		[ágrios]	[ánΘropos]
"wild man"			
στεγνοκαθάρισμα	<	στεγν(ό)	καθάρισμα
[steγnokaΘárizma]		[steγnó]	[kaΘárizma]
"dry cleaning"			

[1] What is generally considered to be an inflectional ending in both compounds and their constituent parts appears in parentheses. Parentheses are also used for the adverbial suffix '-α' [a] (e.g., συχν(ά) [sixná] "often"). Examples are written in Greek and their phonological form is given according to the conventions of the International Phonetic Alphabet.

κοκκινόχωμα < κόκκιν(ο) χώμα
[kokinóxoma] [kókino] [xóma]
lit. "red earth" = "clay earth"

ελαφρόπετρα < ελαφρ(ά) πέτρ(α)
[elafrópetra] [elafrá] [pétra]
lit. "light stone" = "pumice"

λευκόχρυσ(ος) < λευκ(ός) χρυσ(ός)
[lefkóxrisos] [lefkós] [xrisós]
lit. "white gold" = "platina"

Adv + N[2]

πισωγύρισμα < πίσω γύρισμα
[pisojírizma] [píso] [jírizma]
lit. "back turning" = "going back"

ξαναδιάβασμα < ξανά διάβασμα
[ksanaðjávazma] [ksaná] [ðjávazma]
lit. "again reading" = "re-reading"

b. ADJECTIVES

A + A

ασπρόμαυρ(ος) < άσπρ(ος) μαύρ(ος)
[asprómavros] [áspros] [mávros]
lit. "white (and) black" = "black and white"

οικονομικοπολιτικ(ός) < οικονομικ(ός) πολιτικ(ός)
[ikonomikopolitikós] [ikonomikós] [politikós]
"economic (and) political"

ελληνοαμερικάν(ος) < έλλην(ας) αμερικάν(ος)
[elinoamerikános] [élinas] [amerikános]
"greek-american"

βορειοανατολικ(ός) < βόρει(ος) ανατολικ(ός)
[vorioanatolikós] [vórios] [anatolikós]
"northeast"

πικρόγλυκ(ος) < πικρ(ός) γλυκ(ός)
[pikróglikos] [pikrós] [glikós]
"bitter-sweet"

μονάκριβ(ος) < μόν(ος) ακριβ(ός)
[monákrivos] [mónos] [akrivós]
lit. "only dearest" = "one and only"

στενόμακρ(ος) < στεν(ός) μακρ(ύς)
[stenómakros] [stenós] [makrís]
"narrow (and) long" = "oblong"

ψηλόλιγν(ος) < ψηλ(ός) λιγν(ός)
[psilóliγnos] [psilós] [liγnós]
lit. "big (and) thin" = "lanky, gangling"

[2] Noun compounds containing an adverb on the left are not very common in the language. There is only a small number of them and they always involve deverbal nouns as their righthand constituents. This is not surprising, since adverbs generally function as verbal modifiers.

μικροκαμωμέν(ος) < μικρ(ός) καμωμέν(ος)
[mikrokamoménos] [mikrós] [kamoménos]
lit. "small made" = "little"

κουτοπόνηρ(ος) < κουτ(ός) πονηρ(ός)
[kutopóniros] [kutós] [ponirós]
lit. "silly (and) sly" = "cunning"

Adv + A

αδικοχαμέν(ος) < άδικ(α) χαμέν(ος)
[aδikoxaménos] [áδika] [xaménos]
lit. "in vain lost" = "lost in vain"

καλοπληρωμέν(ος) < καλ(ά) πληρωμέν(ος)
[kaloplirοménos] [kalá] [plirοménos]
"well-paid"

κακοντυμέν(ος) < κακ(ά) ντυμέν(ος)
[kakodiménos] [kaká] [diménos]
lit. "badly dressed" = "poorly dressed"

διπλόκλειστ(ος) < διπλ(ά) κλειστ(ός)
[δiplóklistos] [δiplá] [klistós]
lit. "doubly closed" = "doubly locked"

αργοκίνητ(ος) < αργ(ά) κινητ(ός)
[arγokínitos] [arγá] [kinitós]
"slow moving"

N + A

δαφνοστεφανωμέν(ος) < δάφν(η) στεφανωμέν(ος)
[δafnostefanoménos] [δáfni] [stefanoménos]
lit. "palm crowned" = "laurelcrowned"

ανθόσπαρτ(ος) < άνθ(ος) σπαρτ(ός)
[anΘóspartos] [ánΘos] [spartós]
lit. "flower strewn" = "strewn with flowers"

κοσμοξάκουστ(ος) < κόσμ(ος) ξακουστ(ός)
[kozmoksákustos] [kózmos] [ksakustós]
"world famous"

γαντοφορεμέν(ος) < γάντ(ι) φορεμέν(ος)
[γantoforeménos] [γánti] [foreménos]
lit. "glove weared" = "one who wears gloves"

λαομίσητ(ος) < λα(ός) μισητ(ός)
[laomísitos] [laós] [misitós]
lit. "(by the) people hated" = "hated by the people"

ηλιοκαμέν(ος) < ήλι(ος) καμέν(ος)
[iljokaménos] [íljos] [kaménos]
lit. "(by the) sun burnt" = "sunburnt"

ονειροπαρμέν(ος) < όνειρ(ο) παρμέν(ος)
[oniroparménos] [óniro] [parménos]
lit. "(by the) dream taken" = "dreamy, starry-eyed"

c. VERBS

N + V

αφισοκολλ(ώ) < αφίσ(α) κολλ(ώ)
[afisokoló] [afísa] [koló]
lit. "poster stick up" = "stick up posters"

χαρτοπαίζ(ω) < χαρτ(ί) παίζ(ω)
[xartopézo] [xartí] [pézo]
lit. "paper, card play" = "play cards"

νυχτοπερπατ(ώ) < νύχτ(α) περπατ(ώ)
[nixtoperpató] [níxta] [perpató]
lit. "night walk" = "walk in the night"

λαγοκοιμά(μαι) < λαγ(ός) κοιμά(μαι)
[lagokimáme] [lagós] [kimáme]
lit. "rabbit sleep" = "sleep lightly"

θαλασσοπνίγ(ομαι) < θάλασσ(α) πνίγ(ομαι)
[Θalasopníγome] [Θálasa] [pníγome]
lit. "sea drown" = "drown at sea"

διαολοστέλν(ω) < διάολ(ος) στέλν(ω)
[δjaolostélno] [δjáolos] [stélno]
lit. "devil, hell send" = "send to hell, damn"

χαροπαλεύ(ω) < χάρ(ος) παλεύ(ω)
[xaropalévo] [xáros] [palévo]
lit. "(with) death fight" = "be at death's door"

V + V

πηγαινοέρχ(ομαι) < πηγαίν(ω) έρχ(ομαι)
[pijenoérxome] [pijéno] [érxome]
lit. "go (and) come" = "come and go"

τρωγοπίν(ω) < τρώγ(ω) πίν(ω)
[troγopíno] [trógo] [píno]
lit. "eat (and) drink" = "wine and dine"

ανοιγοκλείν(ω) < ανοίγ(ω) κλείν(ω)
[aniγoklíno] [aníγo] [klíno]
"open (and) close"

μπαινοβγαίν(ω) < μπαίν(ω) βγαίν(ω)
[benovγéno] [béno] [vγéno]
lit. "enter (and) go out" = "pop in and out"

ερωταποκρίν(ομαι) < ερωτ(ώ) αποκρίν(ομαι)
[erotapokrínome] [erotó] [aprokrínome]
lit. "ask (and) reply" = "ask and give a reply"

Adv + V

κακομεταχειρίζ(ομαι) < κακ(ά) μεταχειρίζ(ομαι)
[kakometaxirízome] [kaká] [metaxirízome]
lit. "badly treat" = "ill-treat, badly treat"

στραβοπατ(ώ) < στραβ(ά) πατ(ώ)
[stravopató] [stravá] [pató]
lit. "awkwardly step" = "miss one's footing"

κρυφακού(ω) < κρυφ(ά) ακού(ω)
[krifakúo] [krifá] [akúo]
lit. "secretly listen" = "eavesdrop"

κοντοζυγών(ω) < κοντ(ά) ζυγών(ω)
[kondoziγóno] [kondá] [ziγóno]
lit. "closely approach" = "come nearer"

αργοπεθαίν(ω) < αργ(ά) πεθαίν(ω)
[arγopeΘéno] [arγá] [peΘéno]
lit. "slowly die" = "die a slow death"

συχνορωτ(ώ) < συχν(ά) ρωτ(ώ)
[sixnorotó] [sixná] [rotó]
lit. "frequently ask" = "ask frequently"

σφιχταγκαλιάζ(ω) < σφιχτ(ά) αγκαλιάζ(ω)
[sfixtagaljázo] [sfixtá] [agaljázo]
lit. "tightly embrace" = "embrace tightly, hug"

From the above picture, it is clear that the set of Greek compounds contains several gaps which need to be discussed.

The claim implicitly made here that prepositions are totally absent from the set of possible constituents of compound structures relies on the assumption that Ancient Greek prepositions, still appearing in morphologically complex word forms, have lost their word status and should be analyzed as prefixes rather than prepositions.[3] Verbs such as 'επιφέρ(ω)' [epiféro] < 'επί' [epí] 'φέρ(ω)' [féro] "cause" and 'αναφέρ(ω)' [anaféro] < 'ανά' [aná] 'φέρ(ω)' [féro] "report" are, therefore, derived items and not compounds, though they have usually been treated as the latter. It is worth noting that prepositions productively used in the language today (e.g., 'με' [me] "with", 'για' [ja] "for", etc.) do not participate in compound formations.

In addition to compound structures listed in (1), there are also examples where the first constituent may be a cardinal number (2a) or a pronoun (2b):

(2) a. εφτάλοφ(ος) < εφτά λόφ(ος)
[eftálofos] [eftá] [lófos]
lit. "(based on) seven hills" = "seven hilled"

εκατόδραχμ(ο) < εκατό δραχμ(ή)
[ekatóδraxmo] [ekató] [δraxmí]
lit. "(a) hundred drachma (note or coin)"

δεκάλογ(ος) < δέκα λόγ(ος)
[δekáloγos] [δéka] [lóγos]
"decalogue"

εφτασφράγιστ(ος) < εφτά σφραγιστ(ός)
[eftasfrájistos] [eftá] [sfrajistós]
lit. "seven (times) sealed" = "well sealed"

b. παντογνώστ(ης) < πάντ(α) γνώστ(ης)
[pandoγnóstis] [pánda] [γnóstis]
lit. "who knows (γνώστη-ς) everything (πάντ-α)" = "know-all"

εγωκεντρικ(ός) < εγώ κεντρικ(ός)
[eγokendrikós] [eγó] [kendrikós]
"egocentric"

αλληλοσεβασμ(ός) < αλλήλ(ους) σεβασμ(ός)
[alilosevazmós] [alílus] [sevazmós]
lit. "each-other respect" = "respect for each other, mutual respect"

[3] Cf. Ralli (1988a) for a detailed account of this assumption.

These compounds are commonly used, but their existence depends entirely on the presence of the first constituent. Only few items from the range of numbers and pronouns may appear in compounding processes.

Although structures consisting of an adverb and a constituent of another category are not unknown in Greek, the adverb only appears on the left. Commonly used adverbial compounds such as 'ζερβόδεξα' [zervóðeksa] "left (and) right" and 'βορειοανατολικά' [vorioanatolikά] "northeast" are generally derived on the basis of an association of an adjectival compound stem ('ζερβόδεξ' [zervóðeks] and 'βορειοανατολικ-' [vorioanatolik]) with the very productive adverbial suffix '-α' [a]. Forms consisting of two adverbs such as 'πάνω κάτω' [páno káto] "up-down" (metaphorically "more or less") and 'πίσω μπρός' [píso brós] lit. "behind front" are very few and should be treated as fixed expressions rather than as productive morphological compound formations.[4]

Also missing from the list in (1) are nominal compound types containing a verb at the lefthand side of their structure. As we will see below their structure is not productively derived by rules of the grammar, therefore, the examples found in the language should be viewed as remnants of Ancient Greek compound formations:

(3) μισάνθρωπ(ος) [misánΘropos], lit. "(who) hates men" = "misanthrope"
(Ancient Greek: μισέω -ῶ "hate", ἄνθρωπος "man")
φιλόκαλ(ος) [filókalos], lit. "(who) loves beauty" = "lover of beauty"
(Ancient Greek: φιλέω -ῶ "love", κάλ(λ)ος "beauty")
φυγόπον(ος) [fiγóponos], lit. "(who) avoids (hard) work" = "lazybones"
(Ancient Greek: φεύγω "avoid", πόνος "hard work")

1.1. *Stress assignment.*

Just as in simple words, Greek compounds bear only one primary stress which does not necessarily fall on any of the syllables that bear primary stress before the compounding process:

(4)	αρχοντόσπιτ(ο)	<	άρχοντα(ς)	σπίτ(ι)
	[arxondóspito]		[árxondas]	[spíti]
	"manor-house"		"nobleman"	"house"

Compounds constitute phonological words and respect the same condition of well-formedness that applies to stress in simple words, that is, stress falls on one ot the last three syllables of the compound. According to Nespor and Vogel (1986: 112-115), in nominal compounds, the location of primary stress is largely predictable from the quality of the last vowel. If the last vowel is a back vowel, primary stress falls on the antepenultimate syllable.

[4] In this paper, productivity is taken to be defined in terms of high frequency, semantic compositionality and structural transparency.

If it is a front vowel, the word is stressed on the penultimate syllable. These observations apply to the vast majority of Greek compounds. Nevertheless, there are cases, such as the example 'ελαφοκυνηγ(ός)' [elafokiniγós] "deer hunter" < 'ελάφ(ι)' [eláfi] "deer" 'κυνηγ(ός)' [kiniγós] "hunter" where the position of the final stress remains unpredictable. Stress assignment to compounds will not constitute one of the topics of this paper. However, an indication of the stressed syllable will be given to all the examples included in the paper.[5]

1.2. *Compound formation rules.*

According to Ralli (1988a), Greek compounds are generated by a general context-free rewriting rule of the following type:

(5) X → Y Z[6]

This is Lieber's (1980) general rule pattern and specific values for X, Y and Z may range among the categories of stem and word depending on the type of the compound. Y generally has the value of a stem. Z can either be a stem or a word and its particular value, depending on the case, percolates to X. It is worth noting that in Modern Greek, a possible distinction between a stem and a root is not of significant importance on the synchronic level. The term 'stem' may cover both notions, stem and root. According to the different combination possibilities between a stem and a word which are found in the language, the general rule pattern listed in (5) may be translated into the following two rules:

(6) a. Stem → Stem Stem[7]
b. Word → Stem Word

[5] For information regarding stress phenomena in Greek the reader is referred to Nespor and Vogel (1986) and Malikouti-Drachman and Drachman (1988).

[6] Because of missing compound types (e.g., nominal compounds with a verb as the left-hand member), one might claim that the formulation of the general rule pattern given in (5) is one which overgenerates and fails to encode the systematic gaps. Alternatively, one could write rules of specific category names, in the same way as Selkirk (1982: 16) proposes to do:

$$N \rightarrow \begin{Bmatrix} N \\ A \\ Adv \end{Bmatrix} N,\ A \rightarrow \begin{Bmatrix} N \\ A \\ Adv \end{Bmatrix} A,\ V \rightarrow \begin{Bmatrix} N \\ V \\ Adv \end{Bmatrix} V$$

We prefer, however, to explain systematic gaps in the set of compounds by some other principles related to the syntactic structure or to the semantics of the language. For example, adjectives are not lefthand members of compound types containing verbs as heads because adjectives cannot be arguments to verbs and neither can they function as modifiers. The idea that gaps in compound structures may be explained in terms of independent principles of the grammar is also explicitly mentioned by Selkirk (1982: 127).

[7] The rule Stem → Word Stem does not belong to the grammatical system of Greek because words are generally associations of stems and inflectional endings and inflection is word final. As we will see below, the only possibility of having inflection word internally is in the case of noun phrases analyzed as word constructs where the notion of word extends the limits of a morphematic combination and may also cover any unit insertable in X^0 nodes.

For a large number of compounds, there is no evidence that the grammar chooses one analysis over the other. For example, for very productive formations such as the ones listed in (7), we may hesitate between the two structures generated by the different rules:

(7) εθνοφρουρ(ός) lit. "country guard" = "militiaman"
ανοιγοκλείν(ω) "open (and) close"

a. [[[eΘn] – o – [frur]] – ós][8]
[[[aniγ] – o – [klín]] – o]

b. [[eΘn] – o – [[frur] – ós]]
[[aniγ] – o – [[klín] – o]]

Structurally, both of these representations are possible and semantically, both alternatives are interpretable. We assume, then, that the grammar allows for this systematic ambiguity.[9] For some formations, however, as for example for the compounds listed in (8), it seems that rule (6a) is the only rule generating their structure. Evidence for this comes from inflection. Usually, inflectional endings appearing last in compound formations are the same as inflectional endings chosen by the righthand consituents when they are used as autonomous words. This is not the case for (8) where the inflectional endings of compounds are different from the endings usually taken by the constituents placed on the right:

(8)	νυχτολούλουδ(ο) "night flower"	[nixtolúluδo],	but	λουλούδ(ι) "flower"	[lulúδi]
	ομορφόπαιδ(ο) "pretty child"	[omorfópeδo],	but	παιδ(ί) "child"	[peδí]
	κουκλόσπιτ(ο) "doll's house"	[kuklóspito],	but	σπίτ(ι) "house"	[spíti]

It should be noted though that the ending of the compound differs from the ending of its righthand member only with respect to the form and the declination class. Both endings are attached to stems of the same category (e.g., nouns) and generally share the same morphosyntactic features.[10]

To sum up, we used inflection in order to prove that a number of compound types are generated by rule (6a) instead of by the more general (6b). It is also plausible to assume that in principle, the choice between

[8] In most Greek compounds, there is a linking vowel [o] between the first and the second constituent. An explanation concerning the status of '-o-' will be given in section 1.3.

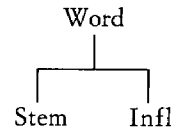
[9] Within the framework of lexical morphology and phonology (cf. Kiparsky, 1982 and Mohanan, 1986), we may postulate that the rules given in (6) may apply to different levels. According to Ralli (1988a), the third level of lexical structure may become the domain of application of rule (6b) given the fact that inflection may follow or precede compound formation. On the contrary, rule (6a) applies to a previous level because inflection always follows its application.

[10] In some cases though, there is also a change of the gender of the head. In the example below, the head is feminine but the compound is neuter. This may be explained by the application of a zero affixation process following the compound formation:

δεκαήμερ(ο)	neuter	<	δέκα	ημέρ(α),	but	ημέρ(α)	feminine
[δekaímero]			[δéka]	[iméra]		[iméra]	
"(set of) ten days"			"ten"	"day"			

the two structures is a question of internal cohesion of the word. Structures generated by (6a) show a close bond between the two members of the compound and very often undergo a semantic drift (e.g., 'νυχτολούλουδ(ο)' "night flower"). All constituents involved in this kind of compound are of the same level, that is stems, and the inflectional ending marks the compound as a whole. On the other hand, structures generated by (6b) have their constituents in a looser bond and they receive a rather compositional semantic interpretation. It is beyond question, therefore, that the righthand member keeps its own inflectional ending independently of its combination with its sister node. Finally, a more general conclusion that can be drawn from this analysis, although in a less explicit manner, is that in Greek, inflectional endings are generally sisters to a category type stem:

(9)



1.3. *The linking vowel [o].*

The structure of most compounds treated up to now contains a vowel [o] between the first and the second member:

(10) παγοβουν(ο) < πάγ(ος) βουν(ό)
[paγóvuno] [páγos] [vunó]
"ice mountain" = "iceberg"
ψωμοτύρ(ι) < ψωμ(ί) τυρ(ί)
[psomotíri] [psomí] [tirí]
"bread (and) cheese"

A study based on Classical Greek insights might consider this vowel as part of the lefthand member of the structure which is usually called a "theme", meaning a combination of a root and a thematic vowel. Note, however, that a possible distinction between a root and a theme has only a diachronic value in Greek. Therefore, any morphological study, trying to determine the form of the first constituent, has either to treat it as a single underived form, i.e., a stem ending in '-o-', or to assume that this '-o-' does not belong to the first constituent and its appearance is triggered by the application of the compound formation rule. Given our present state of knowledge, it seems clear that the first solution is the less satisfactory one because for most stems of the language used as first member in a compound formation, we have to postulate an allomorphic variation ending in '-o-'. Consider now the possibility to treat this vowel as a word internal inflectional element; we must explain why its form remains unchanged (i.e., [o]) while the form of common inflectional affixes varies according to the morphosyntactic features denoted by the base to which these affixes attach. For example,

in a compound like 'ασπρόμαυρ(ος)' [asprómavros], lit. "white (and) black", distinct values of case and number do not affect the form of the vowel in question. On the contrary, these values correspond to different forms of word final inflectional affixes (e.g., 'ασπρόμαυροι' [asprómavri] in nominative plural, as compared to 'ασπρόμαυρου' [asprómavru] in genitive singular). We decide, then, to consider '-o-' as a linking vowel which makes the transition between the first and the second constituent of a compound structure. As such, it may be inserted either by a lexical phonological rule after the compound formation rule has taken place, or by a string dependent rule according to Lieber (1980). The former would be justified within the framework of lexical phonology (cf. Kiparsky, 1982) while the latter constitutes a sort of transformation applied to morphological structure in order to explain variations on the form not accounted for by a morphological or a phonological rule.

As a final remark, we should add that '-o-' does not generally occur before items beginning with a vowel (cf. 11a), unless it is the case of a coordinative structure (cf. 11b):[11]

(11) a. αγριάνθρωπ(ος) [αγριαάnΘropos] "wild man" < άγρι(os) [ágrios] "wild" άνΘρωπ(os) [ánΘropos] "man"

αξιαγάπητος [aksiaγápitos] < άξι(os) [áksios] "worth" αγαπητ(ός) [αγαpitós] "loved"

lit. "worth (to be) loved" = "lovable"

b. αγγλοαμερικάν(ος) [agloamerikános] "anglo-american" < άγγλ(os) [áglos] "English" αμερικάν(os) [amerikános] "American"

βορειοανατολικ(ός) [vorioanatolikós] "northeast" < βόρει(os) [vórios] "northern" ανατολικ(ός) [anatolikós] "eastern"

πηγαινοέρχ(ομαι) [pijenoérxome] "come and go" < πηγαίν(ω) [pijéno] "go" έρχ(ομαι) [érxome] "come"

Lexical phonology can account for the non-occurrence of [o] in front of another vowel: [o] is inserted between stems (or between a stem and a word) of structures involving dependency relations only if the second member begins with a consonant.

[11] Lexical marking prohibiting '-o-' insertion has to be postulated for some stems such as 'πολύ' [polí] "much and many" and 'ταχύ' [taxi] "quick" when used as first members of compounds:

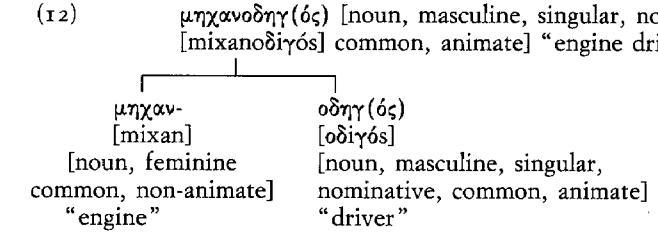
πολύτεκν(ος) [políteknos] < πολ(ύ) [polí] τέκν(υ) [tékno] "(who has) many children"

ταχυγραφ(ος) [taxiγráfos] < ταχ(ύ) [taxí] -γράφ(ος) [γráfos] "quick writer"

1.4. *Headedness.*

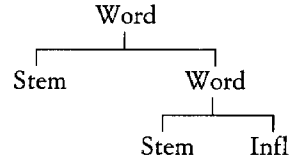
The rule in (5) (or those in 6) is generally subject to a number of well-known conventions, such as headedness and percolation (cf. Lieber, 1980, Williams, 1981, Selkirk, 1982 and Scalise, 1988 for a detailed account of these conventions). The notion of head has a long history in syntax but the application of a similar notion in morphology is relatively new and has been prompted by the development of the lexicalist approach. Williams (1981) states that the rightmost node in any word binary structure will always be the head (righthand head rule). With regard to compounding, this view has been challenged by Scalise (1988), who demonstrates that the position of the head cannot be established by any universal principle of the grammar. Languages may be expected to differ in the way and degree they employ the position of the head. Scalise shows that Italian, for example, is a language which exhibits two possibilities, that is a lefthand and a righthand head. Focussing on Greek, it is possible to claim that compounding is a righthand head rule sensitive process in a number of respects. Aspects relevant to our present discussion can be briefly summarized as follows: in compound structures, category and other morphosyntactic properties of the righthand member percolate to the upper node from it:

(12)



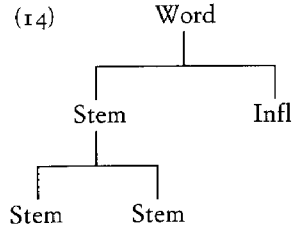
It is worth noting that the righthandness of the head is also confirmed by the location of inflection, which generally appears as the last morpheme in structures based on morpheme associations. The close relation between inflection and the head of a structure has already been discussed by Zwicky (1985). He claims that the head of a construction is defined as the morphosyntactic locus, in that it bears the overt inflectional marking of the construction and that it is the item from which morphosyntactic information percolates to the upper node of the construction. Zwicky's definition of morphosyntactic locus, implies the following structure for a Greek compound type:

(13)



As pointed out earlier, this constitutes the generation schema for a large number of productive compound formations. A different generation schema has been suggested for compounds where inflection does not follow the head (cf. 14). It was argued that the latter refers to less productive formations with less coherent semantics.

(14)



The notion "head" is also crucial for the characterization of the semantic representation of compounds. In general, in endocentric compounds, where there is a dependency relation between the two constituents, the class of elements denoted by the compound is a subset of the class of elements denoted by the head. For example, a compound like 'αγριόπαπια' [αγριόpapja] "wild duck" < 'άγρι(α)' [ágria] "wild" 'πάπι(α)' [pápja] "duck" designates a particular bird that belongs to the class of ducks. As Selkirk (1982: 22) notes, the non-head member of an endocentric compound further specifies the head either by functioning as a modifier (15a) to it, or by assuming the role of an argument to the head, as is the case for verbal compounds (15b):

(15) a. χοντράνθρωπ(os) < χοντρ(ός) άνθρωπ(ος)
[xondránΘropos] [xondrós] [ánΘropos]
"fat man" "fat" "man"

ανθόκηπ(ος) < άνθ(ος) κήπ(ος)
[anΘókipos] [ánΘos] [kípos]
"flower garden" "flower" "garden"

b. καπνοκαλλιέργει(α) < καπν(ός) καλλιέργει(α)
[kapnokaliérjia] [kapnós] [kaliérjia]
"tobacco cultivation" "tobacco" "cultivation"

χαρτοπαίκτ(ης) < χαρτ(ί) παίκτ(ης)
[xartopéktis] [xartí] [péktis]
"card player" "card" "player"

1.4.1. *Coordinative compounds.*

Among the examples in (1), there are of course cases that do not involve a dependency relation between the lefthand and the righthand members of the construction. We find compounds showing a coordinative relation, such as 'ασπρόμαυρ(ος)' [asprómavros] (< 'άσπρ(ος)' [áspros] 'μαύρ(ος)'

[mavros] lit. "white (and) black" = "black and white"), 'γυναικόπεδ(α)' [jinekópeda] (< 'γυναίκ(α)' [jinéka] 'παιδ(ί)' [peδí] "women (and) children", 'μπαινοβγαίν(ω)' [benovγéno] (< 'μπαίν(ω)' [béno] 'βγαίν(ω)' [vγéno] "go in and out") where neither constituent modifies the other. In the context of our discussion, these compounds do not constitute counterexamples to the notion of headedness and to the application of the righthand head rule, because as far as the morphosyntactic information is concerned, there is generally agreement between the compound as a whole and its righthand constituent. What is different though, is the kind of relation between the two members of the construction, which cannot be characterized as that of a nucleus (the head) and a dependent part (the non-head). Both constituents are equal with respect to their syntactic and semantic relationship towards the compound. That explains why coordinative compound structures represent concatenations of constituents belonging to the same category, that is, associations of two nouns, two adjectives or two verbs.

In coordinative compound structures, constituent parts should, in principle, be placed in a relatively free order. Thus, it is not unusual to find alternating types showing a particular constituent as first or second member of the construction:

(16) στενόμακρ(ος) [stenómakros] / μακρόστεν(ος) [makróstenos]
lit. "narrow (and) long" lit. "long (and) narrow" = "oblong"
χιονόβροχ(ο) [xjonóvroxo] / βροχόχιον(ο) [vroxóxjono]
lit. "snow (and) rain" lit. "rain (and) snow" = "sleet"

However, there is only a tendency to allow both orders and it is limited to nouns and adjectives. Very often, there is a strict order between constituent parts (cf. 17a) and as far as verbs are concerned alternating compound types are not allowed (cf. 17b).

(17) a. αυγολέμον(ο) [avγolémono], but *λεμόναυγο [lémónavγo]
"sauce with egg (αυγ(ό) [avγó]) and lemon (λεμόν(ι) [lemóni])"

κουτοπόνηρ(ος) [kutopóniros], but *πονηρόκουτ(ος) [ponirókutos]
"silly (κουτ(ός) [kutós]) and sly (πονηρ(ός) [ponirós])" = "cunning"

b. ανοιγοκλείν(ω) [aniγoklíno], but *κλεινοανοίγ(ω) [klinoaníγo]
"open (ανοίγ(ω) [aníγo]) and close (κλείν(ω) [klíno])"

μπαινοβγαίν(ω) [benovγéno], but *βγαινομπαίν(ω) [vγenobéno]
"go in (μπαίν(ω) [béno]) and out (βγαίν(ω) [vγéno])"

One can assume that this order may be imposed by independent semantic reasons: for example in coordinative structures, constituents appearing first express more basic concepts than constituents occupying the righthand position.

1.4.2. *Exocentric compounds.*

There are not many compound types which do not fall into the general framework of headedness. Compounds such as these are said to be exocentric and their righthand member is not the head of the construction:

(18) υψηλόμισθ(ος) [ipsilómisΘos]
"who earns a high (υψηλ(ός) [ipsilós]) salary (μισθ(ός) [misΘós])"
καλότυχ(ος) [kalótixos]
"with good (καλ(ή) [kalí]) luck (τύχ(η) [tíxi])" = "lucky"
ολιγομελή(ς) [oliγomelís]
"who has few (ολίγ(α) [olíγa]) members (μέλ(η) [méli])" = "small"

The configuration [A – N] denoted by the structure of the compound types listed in (18) is not new. The same combination of constituents also appears in a number of endocentric compounds (cf. 1). However, exocentric compounds show a unique behavior with respect to a number of points. Consider the three compound types listed in (18). The meaning of each compound taken as a whole does not denote a subset of the entities denoted by the second member of the construction. For example, 'υψηλόμισθ(ος)' does not designate a salary which is high but rather someone who earns a high salary. With regard to their interpretation, it is obvious that exocentric compounds are semantically much less transparent in comparison with endocentric compounds.

Structurally, exocentric compounds differ from endocentric ones with respect to category assignment and to inflection added to the structure. Recall that most endocentric compounds bear the same kind of inflectional endings as their head, i.e., the righthand constituent. This is not true for exocentric compound types, for which inflectional endings are different from the endings allowed by their righthand members if the latter are taken as independent words. It seems plausible to assume that this is due to the fact that exocentric compound formations are unpredictably assigned a category other than the category of their righthand member. Consider for instance an example such as 'καλότυχ(ος)' [kalótixos] (cf. 18). 'τύχ-' [tíx] is a feminine noun stem taking the inflectional ending '-η' [i] in nominative singular. As the second member of an exocentric compound, however, it can be followed by the inflectional ending '-ος' [os]. 'καλότυχ(ος)' is an adjective and '-ος' is the most common inflectional ending for adjectival masculine types in nominative singular.

Given the less coherent semantics related to structural irregularities it is possible to assume that exocentric compounds are generated by rule (6a) which also underlies the structure of a number of less productive endocentric compounds. Independently of the rule generating their basic configuration, we propose that exocentric compounds should also require an additional special rule of the morphological component of the grammar which would account for the assignment of the different category.

2. *Compounding and derivation: a borderline case.*

It seems that compounding is a clearly distinct process from affixation in that it involves the combination of two stems and does not imply any subcategorization requirements. However, a borderline case between derivation and compounding, such as the one we present below, raises the question whether compounding must be treated as totally distinct from derivation.

Stems participating in the formation of compounds are generally items which after having been combined with the appropriate inflectional affix, can occur as free words:

(19)	παγόβουν(ο)	<	πάγ(ος)	βουν(ό)
	[paγóvuno]		[páγos]	[vunó]
	"iceberg"		"ice"	"mountain"

In a large number of cases, however, one constituent of the compound form (usually the righthand member) never appears as an independent word, even after having been submitted to an inflectional process.[12] In order to illustrate this latter point, we will examine the following list of items:

(20) a.		b.	
γλωσσολόγ(ος) [γlosolóγos] "linguist"		*λόγ(ος) [lóγos]	
σεισμογράφ(ος) [sizmoγráfos] "seismograph"		*γράφ(ος) [γráfos]	
αγγελιοφόρ(ος) [ageliofóros] "messenger"		*φόρ(ος) [fóros]	
κτηνοτρόφ(ος) [ktinotrófos] "cattle-breeder"		*τρόφ(ος) [trófos]	
αστρονόμ(ος) [astronómos] "astronomer"		*νόμ(ος) [nómos]	
μελισσοκόμ(ος) [melisokómos] "apiarist"		*κόμ(ος) [kómos]	
αεροπόρ(ος) [aeropóros] "aviator"		*πόρ(ος) [póros]	
ταυρομάχ(ος) [tavromáxos] "bullfighter"		*μάχ(ος) [máxos]	
πατροκτόν(ος) [patroktónos] "patricide"		*κτόν(ος) [któnos]	
λαοπλάν(ος) [laoplános] lit. "people seducer" "demagogue"		*πλάν(ος) [plános]	
δολοπλόκ(ος) [δoloplókos] "intriguer, schemer"		*πλόκ(ος) [plókos]	
πραγματοποι(ώ) [praγmatopió] "realize, fulfil"		*ποι(ώ) [pió]	
etc.			

Given the fact that items such as *λόγ(ος), *γράφ(ος), *φόρ(ος), etc. never occur as independent words, one could claim that they should be analysed as affixes. This, however, is an unsatisfactory analysis for a number of reasons:

(a) Contrary to what happens to affixes, items in (20b) do not bear a subcategorization frame, according to which a particular base must be selected in a derivational process.

[12] There are very few occurrences of possible stems at the lefthand side of compounds which do not accept an inflectional ending and never become independent words when they are taken in isolation. Consider for instance 'τηλε-' [tile] "tele-" in 'τηλεπικοινωνί(ες)' [tilepikinoníes] "telecommunications".

(b) Items of a verbal category, among those of the list above, may combine with very productive prefixes and formations such as the following are very common:

(21) παραποι(ώ) [parapió] < παρά- [pará] -ποι(ώ) [pió] "counterfeit"
αποπλαν(ώ) [apoplanó] < από- [apó] -πλαν(ώ) [planó] "mislead, seduce"

It is worth pointing out that the hypothetical structure [Prefix-Suffix-(Infl)] underlying the formations in (21) is very highly marked and does not occur with "true" affixes.

(c) All structures in (20) show a linking vowel [o] between the two members. In Greek morphology, this constitutes a major characteristic feature of compounding and never appears in derivational processes.

The problems raised above can be resolved if we treat the items in question as stems. But even this solution has a number of shortcomings:

(a) As we have already said, these stems never occur as free words. (b) Most of them are generally at the righthand side of compounds and cannot combine freely. Instead, a given stem may appear on both sides of a compound as the following example illustrates:[13]

(22) λεμονοδάσ(ος) [lemonoðásos] < λεμόν(ι) [lemóni] "lemon" δάσ(ος) [ðásos] "forest"
lit. "lemon forest" = "lemon grove"
αυγολέμον(ο) [avγolémono] < αυγ(ό) [avγo] "egg" λεμόν(ι) [lemóni] "lemon"
"egg (and) lemon (sauce)"

This concludes our general survey of the structure of Greek compounds. In the following section, we turn to a discussion of a subclass of compounds, namely the verbal compounds.

3. *Verbal compounds.*

Verbal or synthetic compounds are considered to be endocentric adjective or noun compounds whose head is morphologically complex, having been derived from a verb, and whose non-head may add a specification to the head or may be interpreted as an argument to the head.[14] Such items are abundant in Greek and new ones are frequently coined. Consider the following examples. They are classified according to the suffix of the head noun or adjective:

[13] There is only the example of 'φίλ(ος)' [fílos] "who loves" which can appear on both sides: 'φιλόμουσ(ος)' [filómusos] "who loves art", 'μουσικόφιλ(ος)' [musikófilos] "who loves music".

[14] According to Selkirk (1982), compounds in which the non-heads add a locative, manner or temporal specification to the head but do not bear a thematic relation to it should not be regarded as verbal compounds. In this paper, independently of considerations relative to argument structure, all compounds whose second member is a deverbal element will be considered as verbal.

(23) a. NOUNS

-μα [ma]

μαλλιοτράβηγμα [maljotravíγma]	<	μαλλ(ί) [malí] "hair"	τράβηγμα [travíγma] "tearing"
lit. "hair tearing" = "rough fight"			
ηλιοβασίλεμα [iljovasílema]	< <	ήλι(ος) [íljos] "sun"	βασίλεμα [vasílema] "set"
"sunset"			
χαροπάλεμα [xaropálema]	<	χάρ(ος) [xáros] "death"	πάλεμα [pálema] "fighting"
lit. "death fighting" = "death-rattle"			
κονταροχτύπημα [kondaroxtípima]	<	κοντάρ(ι) [kondári] "pole"	χτύπημα [xtípima] "stroke"
lit. "pole stroke" = "joust"			

-ι(α) [ia]

καπνοκαλλιέργει(α) [kapnokaliérjia]	<	καπν(ός) [kapnós] "tobacco"	καλλιέργει(α) [kaliérjia] "cultivation"
"tobacco cultivation"			
ορμονοθεραπεί(α) [ormonoΘerapía]	<	ορμόν(η) [ormóni] "hormone"	θεραπεί(α) [Θerapía] "therapy"
"hormone-therapy"			

-τ(ης) [tis]

χαρτοπαίκτ(ης) [xartopéktis]	<	χαρτ(ί) [xartí] "card"	παίκτ(ης) [péktis] "player"
"card player"			
νεκροθάφτ(ης) [nekroΘáftis]	<	νεκρ(ός) [nekrós] "dead"	θάφτ(ης) [Θáftis] "burier"
lit. "dead burier" = "grave digger"			
θηριοδαμαστ(ής) [Θirioðamastís]	<	θηρί(ο) [Θirío] "beast"	δαμαστ(ής) [ðamastís] "tamer"
lit. "beast tamer" = "tamer"			

-σ(η) [si]

σταυροπροσκύνησ(η) [stavroproskínisi]	<	σταυρ(ός) [stavrós] "cross"	προσκύνησ(η) [proskínisi] "worship"
"worship of the cross"			
λαοσύναξ(η) [laosínaksi]	<	λα(ός) [laós] "people"	σύναξ(η) [sínaksi] "reunion"
"people reunion" = "mass meeting"			
τριχόπτωσ(η) [trixóptosi]	<	τρίχ(α) [tríxa] "hair"	πτώσ(η) [ptósi] "falling"
lit. "hair falling" = "loss of hair"			

-σιμ(ο) [simo]

φιδοσύρσιμ(ο) [fiðosírsimo]	<	φίδ(ι) [fíði] "snake"	σύρσιμ(ο) [sírsimo] "crawling"
lit. "snake crawling" = "crawling of a snake"			
γυναικοφέρσιμ(ο) [jinekoférsimo]	<	γυναίκ(α) [jinéka] "woman"	φέρσιμ(ο) [férsimo] "behavior"
lit. "woman behavior" = "female behavior"			

-μ(ός) [mos]			
σημαιοστολισμ(ός)	<	σημαί(α)	στολισμ(ός)
[simeostolizmós]		[siméa]	[stolizmós]
lit. "flag decoration" = "bunting"		"flag"	"bunting"
κοσμοχαλασμ(ός)	<	κόσμ(ος)	χαλασμ(ός)
[kozmoxalazmós]		[kózmos]	[xalazmós]
lit. "world destruction" = "havoc, chaos"		"world"	"destruction"

b. ADJECTIVES

-μέν(ος)[15] [menos]			
δεντροφυτεμέν(ος)	<	δέντρ(ο)	φυτεμέν(ος)
[δendrofiteménos]		[δéndro]	[fiteménos]
"planted with trees"		"tree"	"planted"
ερωτοχτυπημέν(ος)	<	έρωτ(ας)	χτυπημέν(ος)
[erotoxtipiménos]		[érotas]	[xtipiménos]
"hit (by) love" = "lovesick"		"love"	"hit"
ανεμοδαρμέν(ος)	<	άνεμ(ος)	δαρμέν(ος)
[anemoδarménos]		[ánemos]	[δarménos]
"beaten (by the) wind" = "wind-swept"		"wind"	"beaten"

-τ(ος) [tos]			
λαομίσητ(ος)	<	λα(ός)	μισητ(ός)
[laomísitos]		[laós]	[misitós]
"hated (by the) people"		"people"	"hated"
νερόβραστ(ος)	<	νερ(ό)	βραστ(ός)
[nerόvrastos]		[neró]	[vrastós]
"boiled (in) water"		"water"	"boiled"

In accordance with the definition given above, a verbal compound should have the following structure:

(24) [[stem] – o – [[stem]affix]]

This definition denies that it is the verb which determines the range of interpretations of the verbal compound. On the contrary, it contends that the deverbal noun or adjective performs that role. A compound based on the structure of (24) is a morphologically complex item, built by the combination of a given derived stem with another stem, the former having first been obtained by the application of a word formation rule associating a stem to a derivational affix.

[15] Compounds in '-μέν(ος)' [ménos] are treated here as adjectives. However, it should be noted that derived items in '-μέν(ος)' are verbal participles. We will assume that adjectives may be based on passive participles of verbs and some of their features (e.g., argument structure) are inherited by the adjectives.

Note that by 'affix' in (24), we denote the derivational affix of the head and not the inflectional ending.[16] The addition of the latter has the effect of creating an ambiguity with respect to the structure of the compound word which can either conform to the schema generated by rule (6a) or to the schema generated by rule (6b):

(25)

rule 6a	rule 6b
[[[stem] – o – [[stem]affix]]infl]	[[stem] – o – [[[stem]affix]infl]]

As pointed out earlier, the choice of one of the two structures may be related to broader considerations such as those involving degree of structural regularity and semantic transparency.

Independently of inflection and by not taking into consideration the definition proposed above, a second structure seems to be equally correct for representing verbal compounds:

(26) [[[stem] – o – [stem]]affix]

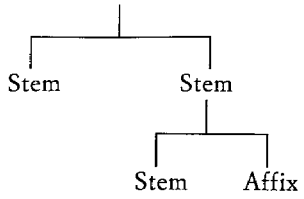
This structure is generated by the application of two word formation rules describing compounding and derivation, in Greek, which may follow a strict ordering:

(27) a. Stem → Stem Stem (compounding)
b. Stem → Stem Affix (derivation)

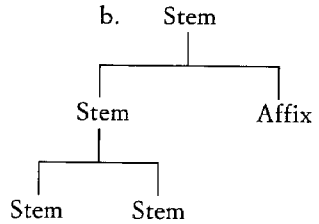
Let us suppose that a compound stem is generated first by application of (27a). In order to become a derived item, addition of a derivational affix is accounted for by (27b). Under this hypothesis, the derivation of items such as 'γλωσσοπλάστη(ης)' [γlosoplástis] lit. "molder of the language" (< 'γλώσσ(α)' [γlósa] "language" 'πλάστ(ης)' [plástis] "molder") and 'ελαιοκαλλιεργητ(ης)' [eleokalierjitís] "cultivator of olives" (< 'ελαί(α)' [eléa] "olive" καλλιεργητ(ής) [kalierijtís] "cultivator") presupposes the construction of the verbs 'γλωσσοπλάθ(ω)' [γlosopláΘo] "mold the language" and 'ελαιοκαλλιεργ(ώ)' [eleokalierγó] "cultivate olives". These verbs, however, are not existing words. They might be accepted as possible words by invoking the existence of the configuration [N V] to account for some other examples, such as the items 'χαρτοπαίζ(ω)' [xartopézo] "play cards" (< 'χαρτ(ί)' [xartí] "card" 'παίζ(ω)' [pézo] "play") and 'αφισοκολλ(ώ)' [afisokoló] "stick up posters" (< 'αφίσ(α)' [afísa] "poster" 'κολλ(ώ)' [koló] "stick up"). The internal structure of these compounds suggests that application of rule (27a) ordered before that of rule (27b) constitutes a viable possibility in compound formation and representations given by (26) are well-formed. Do we have to draw the conclusion that the structure of verbal compounds is generated in two ways, both available in the grammar of Greek?

[16] As it is stated in Ralli (1988a), inflectional endings are affixes but they differ from derivational affixes in a number of points. For example, they are never heads of inflectional structures.

(28) a. Stem[17]



b.



In what follows, we will try to show that only (28a) offers a satisfactory explanation regarding verbal compound formation. Evidence will be taken from the argument structure of heads which can be satisfied by information provided by non-heads.

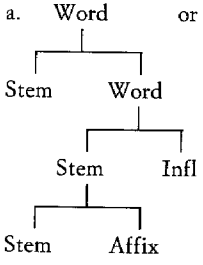
3.1. *Argument structure.*

In verbal compounds, where the argument structure of the head requires to be satisfied by the non-head, we can draw the following generalization: a non-head may, but does not necessarily satisfy one of the arguments of the head (cf. Selkirk, 1982 and Di Sciullo and Williams, 1987).

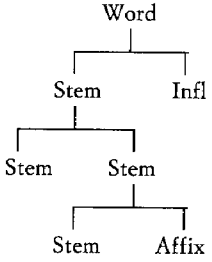
In our attempt to analyze the argument structure of Greek compounds, we adopt Selkirk's (1982) analysis which is to a large extent based on Lexical Functional Grammar (henceforth LFG, cf. Bresnan, 1982).[18] According to this theory, a lexical entry has a lexical form associated with it. A lexical form consists of a number of arguments, the semantic relations borne by these arguments (thematic roles) and the grammatical functions (subject, object, etc.) associated to the arguments.[19] As we will see below, the role

[17] In (28), we do not take into account inflection. If inflection is added according to the approach elaborated in the first section, the structures in (28) become as follows:

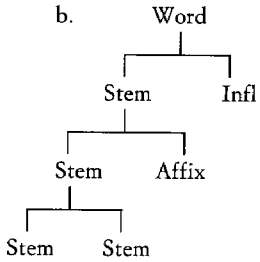
a.



or



b.



[18] In Grimshaw (1990), argument structure is a structured representation which represents prominence relations among arguments. These relations are determined by both the thematic and the aspectual properties of the predicate. Reasons of space do not permit us to discuss how these ideas may account for grammaticality and interpretation of compound structures.

[19] In LFG, grammatical functions corresponding to arguments are assigned to non-heads by the grammar, and there is a matching between them and the grammatical functions associated to lexically specified arguments of heads.

that grammatical functions play in this theory allows us to explain a number of facts regarding verbal compound structures in Greek particularly well.[20]

To give an account of argument structure satisfaction within Greek compounds, let us first exemplify the arguments of the heads which may be satisfied by the non-heads.

a. An object argument which semantically corresponds to a theme:

(29)	καπνοκαλλιέργει(α)	<	καπν(ός)	καλλιέργει(α)
	[kapnokaliérjia]		[kapnós]	[kaliérjia]
	"tobacco cultivation"		"tobacco"	"cultivation"
	θηριοδαμαστ(ής)	<	θηρί(ο)	δαμαστ(ής)
	[Θirioδamastís]		[Θirío]	[δamastís]
	lit. "beast tamer" = "tamer"		"beast"	"tamer"

b. A by-complement argument which semantically has the role of an agent:

(30)	ηλιοκαμέν(ος)	<	ήλι(ος)	καμέν(ος)	
	[iljokaménos]		[íljos]	[kaménos]	
	"sunburnt"		"sun"	"burnt"	
	ποντικοφάγωμα	<		ποντικ(ός)	φάγωμα
	[pondikofáγoma]			[pondikós]	[fáγoma]
	lit. "rat eating" = "gnawing by mice/rats"			"mouse/rat"	"eating"

c. An argument corresponding to a complement which is syntactically realized either by a prepositional phrase or by a noun phrase in genitive case. This argument may express different thematic roles such as an instrument, a locative (for certain verbs), etc.

(31)	κονταροχτύπημα	<	κοντάρ(ι)	χτύπημα
	[kondaroxtípima]		[kondári]	[xtípima]
	lit. "pole stroke" = "joust"		"pole"	"stroke"
	νερόβραστ(ος)	<	νερ(ό)	βραστ(ός)
	[nerόvrastos]		[neró]	[vrastós]
	"boiled in water"		"water"	"boiled"

Argument satisfaction in compounds is also subject to a number of restrictions as stated by Selkirk (1982: 36-38). One restriction concerns the non-occurrence of a non-head bearing the role of a subject argument. Another restriction, namely the first order projection condition, accounts for the fact that all non-subject arguments of a head Xi must be locally satisfied; in other words, all non-subject arguments must be sisters to the head within the first-order projection of Xi.[21] Let us illustrate this last restriction with an example. Consider a compound such as

[20] According to Williams (1981) and Di Sciullo and Williams (1987), the grammatical functions have no role to play. Arguments are distinguished in external (more or less the subject) and internal arguments (all the others).

[21] In Selkirk's (1982: 38) terminology, the first order projection of a category Xni is the category Xmi that immediately dominates Xni in word structure.

'πληροφοριοδότ(ης)' [pliroforioδótis] "informer" (< 'πληροφορί(α)' [pliroforía] "information" 'δότ(ης)' [δótis] "donator"). The argument structure of the deverbal head 'δότ(ης)' requires a non-subject argument to be satisfied and, in fact, this argument is supplied by the non-head 'πληροφορί(α)'. 'πληροφοριοδότ(ης)', in turn, may become the basis for the formation of another compound by recursive application of a compound formation rule, let us say rule (6b).[22] 'μεγαλοπληροφοριοδότ(ης)' [meγalopliroforioδótis] "big informer" (< 'μεγάλ(ος)' [meγálos] "big" 'πληροφοριοδότ(ης)' [pliroforioδótis] "informer") would be an example of such a formation where the stem 'μεγάλ-' adds a manner modification to the basis. Note, however, that recursive application of the compound formation rule does not always result in a grammatical structure. A formation like *'κρατοπληροφοριοδότ(ης)' [kratopliroforioδótis] meaning "somebody who gives information to the state" (< 'κράτ(ος)' [krátos] "state" 'πληροφοριοδότ(ης)' [pliroforioδótis] "informer" is intuitively rejected despite the fact that it has the same structure as 'μεγαλοπληροφοριοδότ(ης)'. Note that the two constituents in the structure of 'κρατοπληροφοριοδότ(ης)', 'κράτ(ος)' and 'πληροφορί(α)', bear the roles of an indirect and a direct object respectively. Thus, it seems plausible to assume that the ungrammaticality of such a construction is due to the fact that 'κράτ(ος)', satisfying an indirect object argument of the head, is not dominated by the same node that immediately dominates the head.

To sum up, given the argument requirements of the heads of verbal compounds and by taking into consideration the restrictions applicable to argument structure satisfaction, we can account for the analysis and the interpretation of compounds with deverbal heads.

Before turning now to the question of the correctness of structure (28a), instead of that of (28b), allow us to first tackle an important point of LFG as it has been adopted by Selkirk (1982). This theory takes the deverbal noun or adjective to be the base of the compound and denies that particular role to the verb which underlies the formation of the deverbal element. There is, however, a very close relation between the verb and the deverbal head arising from the derivational process which is responsible for the formation of the head. This relation, according to LFG framework, is represented in the form of a lexical rule or rules associated with the affix appearing in the structure of the derived deverbal head. This kind of lexical rule has the power to modify the assignment of grammatical functions to arguments in the lexical form of the entries. For example, a rule associated with an affix indicating the passive, states that in a passive form (e.g., the passive participle), the argument associated to the subject is assigned an object function in the corresponding active form. On the contrary, the subject argument of the active form is associated to a by-object (or nothing)

[22] For reasons of space, I will not discuss the property of recursivity in compounds.

in the passive form. Lexical rules are listed in the lexical representation of affixes along with other specifications, such as the category, the subcategorisation frame, etc. As Selkirk notes (p. 41), the notion of lexical rules associated to deverbal affixes is very important, because in most cases, a deverbal noun does not inherit the argument structure of the verb.

Consider now a compound ending in '-μέν(os)' [ménos], such as 'ηλιοκαμέν(ος)' [iljokaménos] "sun burnt". Its structure contains a morphologically simple stem ('ήλι-' [íli] "sun") and a verbal element ('καμέν(os)' [kaménos] "burnt"). The latter is derived from the verb 'καί(ω)' [keo] "burn" through affixation of the suffix '-μέν(os)'. The verbal base has an argument structure with the grammatical functions of a subject and an object. On the contrary, the deverbal item has a modified argument structure, a by-object/Ø subject structure, obtained by the lexical rule associated to '-μέν(os)'. As a first step, let us examine the structure in (28b) which presupposes the formation of a compound like *'ηλιοκαί(ει)' [iljokéi] "the sun burns". Note that the non-head member of the structure should satisfy one of the arguments of the verbal head. Satisfaction of the subject argument results in a totally unacceptable formation and this is predicted by Selkirk's subject argument restriction (cf. above). Satisfaction of the object argument gives a possible theme interpretation ("burn the sun") to the compound, but this is not the agent interpretation "burnt by the sun" that we have in 'ηλιοκαμέν(os)'.[23] Thus, *'ηλιοκαί(ει)' is ruled out. Suppose now that the derived adjective in '-μέν(os)' is created before the formation of the compound. 'καμέν(os)' is the head of the compound, and its argument structure, as is specified by the lexical rule associated to the lexical form of '-μέν(os)', requires a by-object argument to be satisfied by the non-head. In this last structure, the agent interpretation is obtained and, therefore, we can conclude that the only correct structure providing the desired interpretation is the one matching (28a).

Consider next the case of the verbal compound 'αετοπέταγμα' [aetopétaγma] meaning "flying ('πέταγμα' [pétaγma]) like an eagle ('αετ(ός)' [aetós])". This interpretation is possible if there is no non-subject argument to be satisfied. And indeed, this is what follows from the argument structure of the deverbal noun 'πέταγμα' which, affected by the lexical form of the deverbal suffix '-μα' [ma], demands that the non-subject argument must not necessarily be satisfied by the non-head constituent:

(32)

πετ(ώ)$_V$: [petó] "fly"	subj | agent
πέταγμα$_N$: [pétaγma] "flying"	by-object/Ø | agent

[23] Compounds with a theme interpretation are possible in Greek (e.g. 'χαρτοπαίζ(ω) [xartopézo] "play cards").

However, the interpretation corresponding to the non-subject argument must also be available and this occurs in a compound like 'ποντικοφάγωμα' [pondikofáγoma] meaning "eating ('φάγωμα' [fáγoma]) by a rat ('ποντικ(ός)' [pondikós])". Were the well-formedness of the verbal compound determined on the basis of the verb "eat", the only available interpretation would be that of a theme.

In conclusion, considerations concerning argument structure satisfaction within a verbal compound constitute strong evidence in favor of the structure (28a) as the only reliable structure in generating verbal compounds. The fact that these compounds are constructed on the basis of the deverbal elements, rather than on verbs underlying the formation of the latter, is also predicted by the wide range of deverbal compounds, nouns and adjectives, whose correspondent verb forms are totally absent. Compare the following examples:

(33) a. θηριοδαμαστ(ής)' [Θirioδamastís]
lit. "beast tamer"
νυχοκόπτ(ης) [niχokóptis]
"nail clipper"
οργανοπαίκτ(ης) [oγanopéktis]
lit. "instrument player"
ελαιοκαλλιέργεια [eleokaliérjia]
"olive cultivation"
etc.

b. *θηριοδαμάζ(ω) [Θirioδamázo]
"tame beasts"
*νυχοκόβ(ω) [niχokóvo]
"clip nails"
*οργανοπαίζ(ω) [oγanopézo]
"play instruments"
*ελαιοκαλλιεργ(ώ) [eleokalieγó]
"cultivate olives"

The non-attested cases of (33b) may serve as an argument for stating the non productivity of the compound verb formation process. It is, however, of some interest to note that [N V] structures, bearing a theme interpretation, are not completely unknown in Greek. Recall, for instance, the examples 'αφισοκολλ(ώ)' [afisokoló] "stick up posters" and 'χαρτοπαίζ(ω)' [xartopézo] "play cards" listed in (1). According to a proposal forwarded by Ralli (1988b), they may well constitute backformations based on commonly used deverbal noun compounds such as 'αφισοκόλλησ(η)' [afisokólisi] "sticking up posters" and 'χαρτοπαίκτ(ης)' [xartopéktis] "player". In terms of our discussion, this is clearly a desirable solution given the extremely low frequency of appearance of these [N V] verbal compounds.

4. *Word constructs: noun phrases or compounds?*

In Greek linguistic studies, there is general agreement on identifying as compounds one-unit morphematic structures. The morphological behavior of these formations has been examined in detail in the preceding sections of this paper. Very recently, however, Ralli (1990), has claimed that a particular set of noun phrases deserves special attention as they are very

close to compounding.[24] The following list of examples illustrates the structure of these cases:

(34) a. A + B
ατομική βόμβα [atomikí] [vómva]
"atomic bomb"
δημόσιος υπάλληλος [δimósios] [ipálilos]
"civil servant"
οδικό δίκτυο [oδikó] [δíktio]
"road network"
διαστημικό λεωφορείο [δiastimikó] [leoforío]
lit. "space bus" = "spaceship"
εκδοτικός οίκος [ekδotikós] [íkos]
"publishing house"
ψυχρός πόλεμος [psixrós] [pólemos]
"cold war"

b. N + Ngenitive
πρακτορείο ειδήσεων [praktorío] [iδíseon]
lit. "agency (of) news" = "news agency"
ομάδα εργασίας [omáδa] [eryasías]
lit. "team (of) work" = "working team"
οίκος μόδας [íkos] [módas]
"fashion house"
φόρος εισοδήματος [fóros] [isoδímatos]
lit. "tax (on) revenue" = "income tax"
βούρτσα μαλλιών [vúrtsa] [maljón]
lit. "brush (for) hair" = "hair-brush"
άρμα μάχης [árma] [máxis]
lit. "chariot (for) fighting" = "tank"

c. N + N
1. νόμος πλαίσιο [nómos] [plésio]
lit. "law-frame"
επιστολή καταγγελία [epistolí] [katagelía]
lit. "letter (which is an) accusation"
λέξη κλειδί [léksi] [kliδí]
lit. "word key" = "key word"
2. παραγωγός σκηνοθέτης [paraγoγós] [skinoΘétis]
"producer director"
ηθοποιός τραγουδιστής [iΘopiós] [traγuδistís]
"actor singer"
μεταφραστής διερμηνέας [metafrastís] [δierminéas]
"translator interpreter"

Let us proceed by looking into the basic characteristics of the structures given above, particularly into their similarities or dissimilarities or dissimilarities with compounds on one hand and common noun phrases on

[24] In fact, the special status of these constructions had already been recognized in a number of linguistic works (cf. Anastasiadi-Simeonidi, 1986, Horrocks and Stavrou, 1989), and some proposals had been put forward for analyzing them as a special case of noun phrases within the syntactic component.

the other. First, there is good reason to believe that these items are productive formations and not lexicalized or frozen elements: new items like those in (34) are continuously created at will. Semantically, for native speakers of Greek most of the constructions in (34) do not have a fully compositional interpretation, as noun phrases usually do. Although there are no valid criteria for defining a semantic drift, we may claim that a considerable number of these constructions undergo a semantic drift which leads us to regard them as lexical units. For instance, 'άρμα μάχης' [árma] [máxis], meaning "tank", no longer has a real link to chariots ('άρματα' [ármata]) though originally it meant the chariot used for fighting. Phonologically, however, all structures in (34) include two primary stresses and they do not exhibit any kind of phonological amalgamation or phonological sandhi processes. They are, therefore, very different from the compounds examined so far which are assigned only one primary stress and are generally submitted to lexical phonological processes. From the syntactic point of view, the items listed in (34) apparently ask for a phrasal treatment, mainly because they are inflected internally and their constituent parts are considered fully autonomous words in the same way as phrasal constituents are. However, syntactic arguments in favor of considering these structures as syntactic atoms (in the terminology of Di Sciullo and Williams, 1987) and, therefore, insertable in X^0 positions, are easy to find.[25] For one thing, the syntax does not provide them with any structure as phrasal constituents: normally, we do not find APs preceding the head nouns in (34a) or NPs following the heads in (34b) and (34c). No syntactic operation can affect their internal structure by moving, inserting or replacing a constituent. For example, functional categories (e.g., determiners) are excluded from their internal representations and this restriction makes these structures distinct from common noun phrases. Consider the examples in (35) where this observation is illustrated:

(35)

[A N]	[A Det N]
ψυχρός πόλεμος	*ψυχρός ο πόλεμος
[psixrós] [pólemos]	[psixrós] [o] [pólemos]
"cold war"	
[N N]	[N Det N]
άρμα μάχης	*άρμα της μάχης[26]
[árma] [máxis]	[árma] [tis] [máxis]
"chariot (for) fighting"	

[25] Cf. Di Sciullo and Williams (1987) for details about syntactic atomicity.

[26] Note, however, that sometimes a determiner may appear before the noun in genitive as in the example 'τεχνολογία της πληροφόρησης' [texnologiía] [tis] [plirofórisis] "information technology". It has been shown by Anastasiadi-Simeonidi (1986) that this item is not a real determiner because it does not have a referential function.

λέξη κλειδί	*λέξη το κλειδί
[léksi] [kliδí]	[léksi] [to] [kliδí]
"key word"	
μεταφραστής διερμηνέας	*μεταφραστής ο διερμηνέας
[metafrastís] [δierminéas]	[metafrastís] [o] [δierminéas]
"translator-interpreter"	

As it has been claimed by Di Sciullo (1992), the lack of functional categories is a feature displayed by word structure. A further property which links the structures in question with words, i.e., compounds, is that of non-referentiality. It we look at the non-heads of the cases illustrated so far, we find that they never refer to specific objects. For instance, 'κλειδί' "key" in 'λέξη κλειδί' "key word" does not serve to pick out any specific "key". Thus, on the basis of semantic and structural criteria, we might come to the conclusion that constructions like the ones given in (34) can be regarded as word constructs although they phonologically behave like syntactic phrases. According to Ralli (1990), they constitute a kind of "loose" or "phrasal" compound and their formation may be accounted for by the lexical component of the grammar.[27]

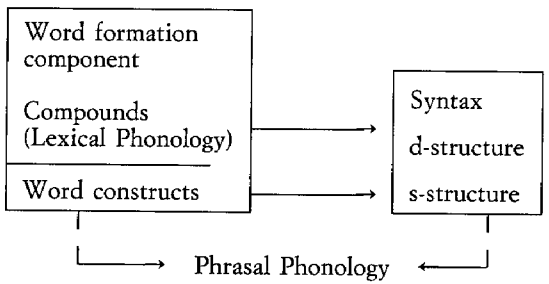
Before turning to Ralli's proposal for a lexical representation of these items, we should examine more closely their constituent structure. Representations involved in the examples listed in (34) are made up of either two nouns or an adjective and a noun. The constituent parts of (34a) and (34b) generally are in a dependency relation, the head-modifier relation. In (34c) the non-head is used attributively to the lefthand head except in the last case (34c2) where both constituents are coordinated (e.g. 'μεταφραστής διερμηνέας'). It is important to note that headedness and inflection operate differently in comparison with compounds. As we have already pointed out, inflectional information marks both of their constituents while, in compounds, inflection appears word finally and to the right. Furthermore, only items based on an [Adjective-Noun] structure are righthand headed. [Noun Noun] structures have a lefthand head and, therefore, do not undergo William's (1981) righthand head rule.

According to these remarks, it is clear that an appropriate treatment of the items in question should take into account not only their word properties but also their phrasal properties. If we acknowledge that they are productive word formations displaying several characteristics of phrasal constructions, it is necessary to find a way of generating a number of phrases in word grammar. Ralli's proposal is to regard these constructions as having been formed within a word formation component operating in parallel with the syntactic component. The idea of such a component can be found in Borer (1988) and it allows us to account for the fact that some word

[27] Cf. Ralli (1990) for more information concerning the lexical treatment of word constructs.

formations are prior to all syntactic operations (e.g., compounds) and some others are not (e.g., word constructs). For example, there is no agreement operation applying within a compound. Therefore, a compound is available to syntax prior to the level of d-structure and its internal structure is not transparent to any syntactic operation. As far as phonology is concerned, a compound is governed by rules of lexical phonology which account for compound stress assignment. The internal structure of word constructs, on the other hand, is subject to syntactic operations such as case assignment. This makes them available to a level following d-structure, providing that their structure does not violate any well-formedness conditions which are applicable at the syntactic level. Furthermore, phonologically, they are affected by phrasal phonology and the existence of two primary stresses is well accounted for. Schematically, Ralli's proposal about the word formation component and its relation to syntax and phrasal phonology could be represented as follows:

(36)



As a final word, we would like to add that the structures treated here under the category of word constructs are increasingly used by technical and scientific terminology. In translating terms from other languages, particularly English, people tend to prefer word constructs over compounds. This may be due to the fact that their internal structure does not involve any application of phonological amalgamation processes.

5. *Summary.*

Our main topic, in this paper, has been the issue of compounding in Greek. We have offered a general description of the internal structure of compounds, by taking into consideration information provided by their constituent parts. We have also proposed an analysis of the empirical facts in this area, relying on formal and conceptual characteristics of the lexical morphological approach. In particular, we have claimed that compounds are generated by a general context free word formation rule which is constrained by considerations regarding the notion of headedness, as well as by the interaction with other word formation rules generating derivation

and inflection. Special attention was given to verbal compounding; it has been argued that Selkirk's (1982) approach can account for the phenomenon of argument structure satisfaction within compounds. Finally, a borderline case between compounds and noun phrases has been discussed, namely the set of word constructs. We have adopted the view that a lexical treatment of these constructions is sufficiently justified by empirical facts as well as by theoretical developments in the direction concerning word formation within a lexical component.

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