1. Definition – basic characteristics

Compounding is a widespread process in Modern Greek (hereafter Greek), which creates morphologically complex words from the combination of two stems, most of which are linked together by the vowel /o/. Greek compounds belong to the three major grammatical categories, i.e. nouns, adjectives, and verbs:

(1a) domat-o-salata < domat-2 salata
    tomato salad tomato salad
b. mavr-o-aspros mavr- aspros
    black (and) white black white
c. pijen-o-erxome pijen- erxome
    come (and) go go come

There are also adverbial compounds (2), which are not primary formations, in that they are built on the basis of adjectival compounds with the addition of the adverbial ending –a:

(2a) kakotixa < kakotix- -a
    unluckily unlucky -ly
b. kakotixos < kak- tix- -os
    unlucky bad luck INFL

Crucially, compounds are inflected at the right-hand edge, and are phonological words, i.e. they contain one stress, which falls on one of the last three syllables. Very often, their stress and inflectional ending may be different from those of the second constituent part, when it is used as an autonomous word (see section 3 for an explanation):

(3) Compound-inflectional ending < stem1-inflectional ending stem2-inflectional ending
1 Greek examples are given a broad phonological transcription. Stress is not marked in the examples, unless it is necessary for the purposes of argumentation.
2 Stems end in a hyphen in order to show that the inflectional ending is missing.
3 There is no overt infinitival form in Greek. Conventionally, verbal compounds are given in the first person singular of the present tense.
2. Compound marker

As already mentioned, the internal constituents of Greek compounds are linked together by the vowel /o/. Items such as this -o- are traditionally called ‘linking elements’ (Scalise 1992), ‘interfixes’ (Dressler 1984) or ‘confixes’ (Mel’čuk 1982). As shown by Ralli (2007, forthcoming), -o- is a semantically-empty element, which originates from an ancient thematic vowel, and synchronically does not belong to any of the compound members. As an illustration, consider the example psarovarka ‘fish boat’ (< psar- ‘fish’ + varka ‘boat’), where the inflected form of the first constituent is psari ‘fish’ and not *psaro. Following Booij (2005), we could assume that psaro- is an allomorphic variation of the stem psar-, which is used in word formation. However, this is not an economic solution, since the form psaro- is restricted to compounding (see psarovarka), while in derivation only psar- is used (see psar-as ‘fisherman’). Moreover, it is worth stressing that –o- cannot be an inflectional ending, in spite of the fact that in certain cases (see the nominative singular of neuter nouns in –o-, e.g. vun-o ‘mountain-NOM.SG’), its form coincides with the inflection of the first constituent part when taken as an autonomous word. For instance, in the neuter form of an adjectival coordinative compound like asprokokino ‘white and red’ (< aspr- ‘white’ + kokino ‘red’), the form aspro could have been considered as the inflected type of the nominative singular of ‘white’. However, when the compound is used in the plural, aspro remains unchanged, and only the second member kokino ‘red’ acquires the appropriate plural form kokina ‘red.PL’. Compare asprokokina ‘white (and) red.PL’ vs. *asprakokina ‘white.PL (and) red.PL’. The impossibility to change form depending on the morphosyntactic context proves that aspro is not a fully inflected word, but must be analyzed as a combination of the stem aspr- with a fixed element –o-.

According to Ralli (2007, forthcoming) items such as this –o- constitute markers, the primary function of which is to indicate the process of compound formation. As already known, both inflection and derivation involve their own functional elements, i.e., –o- is the inflectional ending of the fifth class of neuter nouns (e.g. likoskilo), carrying the features of nominative/accusative/vocative singular. –os characterizes the first class of masculine nouns (e.g. likos, skilos). It carries the features of nominative singular. See Ralli (2000, 2005) for the inventory of nominal inflection classes in Greek.
affixes, which differentiate them from other linguistic processes. Within this spirit, Ralli has proposed that compounding, being a word formation process, also needs its own functional element that renders it distinct from the other two processes. Seen like a simple marker, and being semantically empty, this element has no affixal status, and does not need be assigned any derivational (or even inflectional/morpho-syntactic) properties. It is just a morphological element, deprived of any meaning, whose function is to indicate the word-formation process of compounding.

Furthermore, Ralli (2007, forthcoming) has suggested that the occurrence of a compound marker marker, as well as its systematic or non-systematic form, depend on a number of parameters, which refer to the typology of the particular language we deal with. For instance, she has argued that in an inflectionally-rich language like Greek, the existence of -o- is related to the paradigmatic character of inflection, and its systematic use and form are due to the fact that Greek morphologically-complex words are stem based. These two parameters explain the absence of markers in languages the inflection of which has no particular paradigmatic character (e.g. English), and also account for the rather unsystematic behaviour of compound markers in languages with word-based morphology (e.g. German).

Generally, -o- does not surface when the second constituent begins by a vowel, as in the example ayrianthropos ‘wild man’ (< ayri- ‘wild’ + anthropos ‘man’). However, there are also examples where -o- appears even in front of a vowel (see vorioanatolikos ‘north-east’ < vori- ‘north’ + anatolikos ‘east’). Crucially, the existence of these examples reinforces the hypothesis of -o- having the function of a compound marker, since in coordinative compounds, like vorioanatolikos, whose members are in a rather loose structural relation, the presence of a compound marker ensures a high degree of cohesion between the constituent parts.

3. Structure

As already pointed out in the previous sections, the stem plays an important role in the formation of Greek compounds. In fact, compound structures, in their vast majority, have a stem as their first constituent.6 As far as the second constituent is concerned, compounds are distinguished into those whose second member is a stem and those whose

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5 A more or less similar idea is found in Mel’čuk (1982), where the so-called ‘confix’ is assumed to indicate the combination of two roots to form a compound.
second member is a word (see Drachman & Malikouti-Drachman 1994, Nespor & Ralli 1996, Malikouti-Drachman 1997). According to Ralli (2007), compound structures are generally determined on the basis of two criteria: the position of stress, and the form of the inflectional ending. Formations which diverge as far as the position of stress is concerned, and inflect differently from the second constituent when used as an autonomous word, are considered to display a stem as their right-hand member. On the contrary, formations whose second part is a word preserve both its stress and inflection. Following these criteria, [stem stem] and [stem word] are the two possible structures of most Greek compounds.

This point can be illustrated by the following examples (inflectional endings and other irrelevant parts, which appear when stems are used as autonomous words, are given in parentheses):  

\[(4)a. \text{[stem stem]: rizóga}lo < ríz(i) yál(a) \]
\[\text{rice pudding} \quad \text{rice} \quad \text{milk}\]

There are only few compounds whose first constituent is a word, namely those with certain adverbs (e.g. *eksoji* lit. ‘out-earth’, ‘out-place’ < *ekso* ‘out’ + *ji* ‘earth’), and numerals (e.g. *penindaδraxmo* ‘fifty drachmas (bill)’. < *peninda* ‘fifty’ + *δraxm(i)* ‘drachma (Greek currency before Euro)’).

Note that there is no inflection class specific to compounds. Compounds whose second member is a stem may inflect differently from their second constituent when taken in isolation, but their particular inflection class belongs to the set of the eight inflection classes of Greek nouns and adjectives.

Two more structures, [word stem] (ia) and [word word] (ib) can also be detected in the language, but only a handful of examples belong to them. In both cases, and as already mentioned in footnote 6, the first constituent is an uninflected adverb or numeral, i.e. a word without any inflectional part, since inflection is not generally allowed within Greek compounds.

\[(i)a. \text{word stem: eksópor}ta < ékso pórta \]
\[\text{outdoor} \quad \text{out} \quad \text{door}\]
\[b. \text{word word: ksanayráfo} < \text{ksaná yráfo} \]
\[\text{write again} \quad \text{again write}\]

–*i* of *rízi* and –*a* of *yál(a)* are parts of the stem, while –*o* and –*os* of *péfko* and *dásos* respectively are the inflectional endings. –*os* is not put in parenthesis because it is the inflectional ending of the compound as well.
b. [stem word]: peφkοδάsos<  péfk(o) δάsos

We observe that rizóγalo (4a) is stressed on the antepenultimate syllable, and inflects differently from its second member, γάλ(a), which bears a ø inflectional ending. On the contrary, with respect to stress and inflection, peφkοδάsos (4b) does not diverge from its second inflected constituent δάsos. Note that the different behavior of the two examples is not due to headedness, since, as argued in section 5, both examples are endocentric and right-headed. It can be explained though if we appeal to the different structures which are responsible for their formation, along the lines of Nespor & Ralli (1996). In (4b), the second constituent is a fully inflected word. As such, it keeps its stress and inflectional properties when it undergoes compounding. As opposed to it, the second constituent of formations like the one in (4a) is a stem, i.e. a morphological category, which is neither a phonological word nor a fully inflected item. Thus, when it is combined with another stem it is submitted to laws and properties which are specific to compounding: a compound-specific stress rule places stress on the antepenultimate syllable of the formation (e.g. rizóγalo) when an –o inflectional ending is added to it.

Furthermore, on the basis of these considerations, it follows that compounds exhibit a binary structure. As with other grammatical structures, it can be recursive, in the sense that more constituents can be added to the left of the structure, according to the patterns described above. The compound meγalokapnemboros ‘big tobacco merchant’, for instance, is analyzed as [[meγal- [kapn-emboros]] (< [meγal- ‘big’ + [kapn- ‘tobacco’ + emboros ‘merchant’].

It is also important to add that in addition to inflection, which does not appear within compounds –yet with some exceptions– derivation is also excluded. As argued by Ralli & Karasimos (2007), the particular absence of compound-internal inflection is due to a constraint, the so-called Bare Stem constraint, according to which in languages with stem-based morphology, like Greek, the bond between the two constituents of a compound

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10 As explained in the first paragraph of section 2, –ο- in peφkοδάsos is a compound marker, and not an inflectional ending.

11 Nespor & Ralli (1996) have proposed that the preservation of its properties is due to the Structure Preservation Principle, as has been formulated by Emonds (1985).

12 See Ralli (2007) for certain fossilized cases of compound-internal inflection originating from Ancient Greek.
word is better guaranteed if the first stem is as bare as possible, that is a stem without any suffixes.

4. Compound-internal relations

With respect to the functional relation between the two compounding parts, Greek compounds can be divided into two basic categories: those which display a dependency relation (5a) and those whose parts are coordinated (5b):

(5)a. aγrioyáta < aγri- yáta
    wild cat               wild   cat
b. laδoksiðo < laδ- ksið(i)
    oil (and) vinegar      oil     vinegar

The first category corresponds to what Bloomfield (1933) calls determinative compounds, but also appears under the Sanskrit term *tatpurusha*. It includes subordinative and attributive compounds.\(^{13}\)

(6)a. Subordinative compounds:  nixtopuli < nixt- puli
    night bird             night  bird
b. Attributive compounds:       xazokoritso < xaz- korits(i)
    silly girl               silly  girl

Coordinative compounds have their members in an additive relation, and are also given the Sanskrit name *dvandva* compounds;\(^ {14}\) It is worth noting that coordinative compounds became productive in Greek after the Hellenistic period (3rd c. BC – 3rd c. AC) (Browning 1969), and belong to all three major grammatical categories:

(7)a. Verbs:  aniγoklino < aniγ- klino
    open (and) close       open   close
b. Nouns:    alatopipero < alat- piper(i)
    salt (and) pepper      salt    pepper
c. Adjectives: γlikopikros < γlik- pikros
    sweet (and) bitter     sweet  bitter

Note that in coordinative compounds, constituents of the same category are juxtaposed, and express a parallel or an opposite meaning. For instance, *alat-* ‘salt’ has a

\(^{13}\) See also Bisetto & Scalise (2005) for a cross-linguistic classification of compounds.

\(^{14}\) I choose not to include appositive compounds (e.g. *iðopios-trauðistis* ‘actor-singer’) in this category. Following Ralli (2007), these are not typical Greek compounds but belong to a special category of multi-word units.
parallel meaning to *piperi* ‘pepper’ and *aniy*- ‘open’ has an opposite meaning to *klino* ‘close’. Moreover, in verbal compounds, constituents display a parallel argument structure, as coordinative constituents do not generally differ in transitivity.

The kind of functional relations between the first and the second compounding part does not seem to differ from the functional relations found in corresponding phrases when the same constituents participate in such constructions as independent words. However, compounds seem to be different from phrases when it comes to form, meaning and structure in general. Structurally, the first constituent is always a stem, quite often the second one is a stem too (section 1), and there is a compound marker between the two members (section 2). Phonologically, compounds undergo certain rules of lexical phonology, a compound-specific stress rule (section 3), and semantically, they often develop a semi- or non-compositional meaning (e.g. *psixokori* ‘adopted daughter’ < *psix-* ‘soul’ + *kori* ‘daughter’).

5. Headedness

The majority of Greek compounds are endocentric and right-headed. The head is responsible for transmitting to the compound its morphosyntactic features, but not the form of the inflectional ending (contra Zwicky 1985), since, as already mentioned, there are headed [stem stem] compounds which display a different ending from the one of the head (second constituent) when taken in isolation. Endocentric compounds may belong to all three major categories and their constituents are in a subordinative or in an attributive relation.

Headedness should not normally apply to coordinative compounds, which have their items juxtaposed one after the other. This absence of head makes certain compounds consisting of two items of the same category to display an unfixed order between their constituent parts. For instance, [adjective-adjective] compounds like *pikroylíkos* ‘bitter-sweet’ (< *pikr-* ‘bitter’+ *ylíkos* ‘sweet) and *kitrinoprasinos* ‘yellow-green’ (< *kitrin-* ‘yellow’ + *prasinos* ‘green’) may appear as *ylíkopikros* ‘sweet-bitter’ and *prasinokitrinos* ‘green-yellow’ as well. However, not all coordinative compounds show this free constituent order. Most [noun-noun] and [verb-verb] formations have a rather fixed order, which, as argued by Ralli (2007), is mostly due to pragmatic reasons. For instance, compounds like *alatopipero* ‘salt (and) pepper’ (< *alat-* ‘salt’ + *piper(i)* ‘pepper’) and *troyopino* ‘eat (and) drink’ (< *troy-* ‘eat’ + *pino* ‘drink’) do not appear as *piperoalato*
‘pepper (and) salt’ and *pinotroyo ‘drink (and) eat’ respectively, because ‘salt’ and ‘eating’ are probably considered to have priority over ‘pepper’ and ‘drinking’.

It is worth noting that in Greek, a considerable number of compounds constitute exocentric formations, i.e. constructions without a head, such as the following examples:

(8)a. anixtoxeris < anixt- xer-
    open-handed open hand
b. kokinomalis < kokin- mal-
    red-head red hair

Exocentric compounds were abundant in Ancient Greek (see Tserepis 1902), and are still very productive today, especially in Modern Greek dialects. Ralli (2007) has proposed that while these constructions contain no head within the confines of the two stems, a suffix, which is added to the compound structure as a whole, assumes the role of the head, i.e. the role of the element which gives the construction its basic morpho-syntactic features. In the examples above, this suffix has the form of –i- (-s is the inflectional ending). It should be specified that this suffix has derivational properties: it bears a lexical meaning (‘the one who has the property of…’) and the feature of gender (gender in Greek is a property of stems and derivational affixes, see Ralli 2002). Moreover, it displays an allomorphic variation (–iδ-) in the paradigm of the plural number, which is not typical of the inflectional endings:

(9) [Stem-derivational suffix-inflectional ending]
   a. Singular: [kokinomal-i-s] [anixtoxer-i-s]
   b. Plural: [kokinomal-iδ-es] [anixtoxer-iδ-es]

6. Synthetic compounds

Synthetic compounds are particularly developed in Greek. They consist of a verbal (10a) or a deverbal head (10b), and a noun at the non-head position:

(10)a. xartopezo < xart- pezo
    play cards card play
b. eleokalierjia < ele- kalierjia
    olive cultivation olive cultivation

A typical property of synthetic compounds is the internal theta-role saturation. For instance, in the examples above, the stems xart- and ele- satisfy the Theme role of the verb pezo ‘play’ and the underlying verb kaliergo ‘cultivate’, respectively. Crucially, not only a
Theme, but a wide range of theta-roles seem to be saturated inside Greek synthetic compounds:

(11)a. Agent: \( \theta \)alaso\( \delta \)armenos < \( \theta \)alas- \( \delta \)armenos
    sea beaten          sea    beaten

c. Instrument: kondaroxtipima < kondar- xtipima
    pole stroke, joust   pole      stroke

d. Location: nerovrastos < ner- vrastos
    boiled in water      water     boiled

e. Goal: a\( \gamma \)rot\( \delta \)ani\( \delta \)otisi < a\( \gamma \)rot- \( \delta \)ani- \( \delta \)otisi
    farmer-loan-giving  farmer  loan  giving

d. Material petroxtistos < petr- xtistos
    stone-built          stone     built

As shown by Ralli (1992) and Di Sciullo & Ralli (1999), compound-internal theta-role saturation is often facilitated by the rich suffixation, which characterizes the Greek language. For instance, the agent role could not be saturated if the head constituent was not a derived item. This is illustrated by the ungrammaticality of a compound such as *\( \theta \)alaso\( \delta \)erni ‘sea beats’, where the stem \( \theta \)alas- ‘sea’ functions as the subject (external argument) of the verbal head \( \delta \)erni ‘beats’.\(^{15}\) Nevertheless, the presence of a suffix such as –men(os) on the deverbal head \( \delta \)armenos\(^{16}\) ‘beaten’ transforms this function into one of a by-phrase, renders the structure a possible site for theta-role saturation, hence, making grammatical a compound like the one in (11a).

It should be noted though that, with the exception of the agent role, theta-role saturation is common within compounds with a verbal head. The theme role appears more frequently (e.g. afisokolo ‘stick posters’ < afis- ‘poster’ + kolo ‘stick’), but also other roles, such as the instrument (e.g. kondaroxtipo ‘hit with a pole’ < kondar- ‘pole’ + xtipo ‘hit’), the location (e.g. ematokilo ‘steep in blood’ < emat- ‘blood’ + kilo ‘roll’), and the material (e.g. plakostrono ‘pave (a surface) with tiles/slates’ < plak- ‘tile, slate’ + strono ‘spread/cover’).

7. Borderline cases

\(^{15}\) In the literature, the impossibility of the subject to appear within compounds is assumed to be due to the First-sister Principle, as proposed by Roeper & Siegel (1978).

\(^{16}\) \( \delta \)ern- and \( \delta \)ar- are allomorphs of the verb ‘to beat’.

In Greek, as in other languages, there is no clear borderline between derivation and compounding. Suffice it to mention the property of categorial neutrality that is shared by prefixes and the left-hand constituents of compounds. In fact, a considerable number of prefixed structures have been usually confused with compounds, and vice-versa. For example, there is a long tradition in Greek grammars of treating verbs preceded by preverbs as compounds (cf. Triantaphyllidis 1941), and not as derived words, in spite of the fact that several preverbs are not separable items, and have no prepositional or adverbial use, at least on synchronic grounds\(^{17}\) (e.g. \textit{anayrafo} ‘write on’ < \textit{ana-} + \textit{yrafo} ‘write’, \textit{katayrafo} ‘write down/register’ < \textit{kata-} + \textit{yrafo} ‘write’, \textit{epiyrafo} ‘inscribe’ \textit{epi-} + \textit{yrafo} ‘write’, etc.). It is only recently that Greek preverbs have been analyzed as instances of prefixes (see Holton et als. 1997, Ralli 2002, 2004), on the basis of several criteria of structural (combinability properties) and semantic (unclear lexical meaning) nature, which distinguish prefixes from adverbs and prepositions.

Another typical borderline case is a set of formations consisting of one stem and one bound deverbal element, that is an element which cannot appear as an autonomous word with the appropriate inflectional ending (similar constructions exist in the vocabulary of other languages, under the class of neoclassical formations):

(12)a. k tinotrofos < k tin- – trof- (< verb trefo) 
cattle-breeder animal/beast to raise 
b. anthropofagos < anthrop- -fay- (< verb troo)\(^{18}\) 
cannibal man to eat 
d. kinonioloys < kinoni- -loy- (< verb leyo) 
sociologist society to talk

According to Ralli (1992, to appear), these formations constitute a particular type of compounds, very productive in Greek, which share properties with derivational structures (e.g. boundness, closed-class right-hand heads). However, they are governed by the basic structural principles of compounds and there is substantial evidence for their [stem stem] structure, compound-internal theta-role saturation, and compound marking. In addition, Ralli (to appear) demonstrates that their second bound constituent is a deverbal noun, which cannot be treated as an affix, since it bears a lexical meaning, inherits the argument

\(^{17}\) One of the main reasons for such a position is the fact that most of these preverbs are formally identical to ancient adverbs or prepositions, and diachronically derive from them.

\(^{18}\) There are two basic allomorphic variations of the verb stem with the meaning of ‘eat’: \textit{tro-} (the present stem) and \textit{fay-} (the aorist stem).
structure of its root verb (e.g. angeliofor(os) ‘lit. who brings messages, messenger’ < angeli- ‘message/announcement’ + -for- (< fero ‘bring/carry’), and may combine with a prefix (e.g. afor(os) ‘lit. who has not been put on, infertile, barren’ < a- + -for- (< fero ‘bring/carry’)).

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 an issue as to 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 the basis of properties such as structural boundness and lexical meaning. 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, such as, for example, the boundness property displayed by both affixes and bound stems.

References


See Bybee (1985) for the general notion of the continuum in linguistic theory.


