The Licensing of Adnominal PPs:
The Case of Basque -*ko*[*]

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Adnominal postpositional phrases in Basque need to be licensed by the attributive linker -*ko* on the right edge of the PP, which is absent if the PP is not contained inside a DP. Rejecting an analysis in terms of Predicate Inversion, I suggest that the linker represents a functional category at the high end of the extended projection of P, which establishes the proper relation between modifier and modifiee *in situ*. Semantically, it adjusts the semantic type of its complement, so as to license semantic composition by means of Functional Application. Dispensing with the non-saturating operation of Predicate Modification allows a principled explanation of the linker's obligatory presence with adnominal PPs.

Keywords: *attributive linkers, Basque, PP, nominal modification*

1   Introduction

In a variety of languages attributive phrases can or have to be accompanied by a morpheme which is absent when they are used in other contexts. The term "attributive linker" has been introduced by den Dikken & Singhapreecha (2004) for such attribute-marking morphemes. Although I will not subscribe to their particular analysis, I will use the term as a descriptive label for morphemes that are indicative of attributes. Nevertheless, there might be differences within the class denoted by that cover term, for instance in terms of whether their presence is obligatory, and most certainly regarding the categories they appear with.

As noted by von Prince (2008:ch.9), the morpheme -*ko* in Basque seems to be an instance of such a linker morpheme. The contrast in (1) illustrates the phenomenon: only in the presence of -*ko* can the PP modify the following noun.[1] As evidenced by the grammaticality of (2), what is at issue here is not linear order, but the structure where the PP and the head noun are constituents of the same DP, hence an adnominal configuration.[2]

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[1] Note that Basque is right-headed and, consequently, has postpositions.

[2] I use the following glosses: 1,2,3 – person; ABL – ablative; ABS – absolutive; AL – attributive linker; ALL – allative; AUX – auxiliary; BEN – benefactive; CGN – case-gender-number marker; CLF – classifier; COM – comitative; COMP – complementizer; DAT – dative; DET – determiner; DIR – directional; ERG – ergative; GEN – genitive; INDEF – indefinite; INSTR – instrumental; LOC – locative; PART – partitive; PL – plural; REFL – reflexive; SG - singular; TERM – terminative.

(1) a. *[neska-ren-tza-ko   lore-a]$_{DP}$*
        girl-GEN-BEN-KO flower-DET
        'the flower for the girl'
    b. **[neska-ren-tzat lore-a]$_{DP}$*
        girl-GEN-BEN flower-DET

(2) *Neska-ren-tzat lore-a   erosi dut.*
    girl-GEN-BEN flower-DET(.ABS) buy AUX
    'I have bought a flower for the girl.'

While *-ko* appears with a number of other categories, this paper focuses on PPs. I argue against an analysis of attribution in terms of Predicate Inversion, where the attribute is the inverted predicate of a Small Clause. Instead, I suggest that *-ko* realizes a functional head that establishes the necessary structural and semantic relationship between a head noun and its modifier without movement.

In the next section, some basic assumptions will be introduced and followed by an overview of the uses of *-ko* as a linker for adnominal PPs. In section 3, I will review three theories of attributive structure and provide a short overview of recent approaches to the internal structure of PP. I will develop my syntactic and semantic analysis in section 4, and close with a short outlook in the final section.

2   Obligatory linkers — the database

2.1   Preliminary remarks

There are basically two groups of morphemes in Basque that I will treat as postpositions here: one a class of (mostly) unbound morphemes, which I will call *free postpositions*, and one of bound morphemes. To this latter group I will refer by the term *bound postpositions* and the more traditional notion *attributive cases* interchangably. The two classes differ most notably in their syntactic freedom: while free postpositions can generally be freely coordinated (3), bound postpositions depend on the repetition of their complement noun or a co-referring pronoun, cf. (4) cited after de Rijk (1993:157). For further treatment of these two classes the reader is referred to Hualde (2002) and de Rijk (2008:34f.).[3]

(3) *zu-re   kontra ala alde*
    2SG-GEN against or for
    'for or against you'   (Hualde 2002:333)

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[3] It should also be noted that there is variation with the analysis of some of the postpositions. The bound postposition *-gatik* 'because of' is treated as an attributive case marker by de Rijk (1993, 2008), but on par with the free postpositions by Hualde & Ortiz de Urbina (2003).

(4) a. *Sorgin-a-ren-tzat*   *eta *(sorgin-a-ren)-gatik*   *egin zen   hau.*
witch-DET-GEN-BEN and witch-DET-GEN-because.of do   AUX this
'This was done for the witch and because of the witch.'
    b. *Sorgin-a-ren-tzat*   *eta *(ha-ren)-gatik*   *egin zen   hau.*
witch-DET-GEN-BEN and 3SG.DEM-GEN-because.of do   AUX this
'This was done for the witch and because of her.'

Regarding the availability of the linker, however, both classes behave the same. I therefore assume in line with Eguzkitza (1993) that DPs marked by an adverbial case can be treated on par with PPs (cf. Asbury 2008:ch. 2 for discussion and an argumentation for the P status of Hungarian adverbial case endings).[4] For ease of exposition and contrary to Eguzkitza (1993), I will assume that they themselves head the PP instead of being a morphological reflection of a phonologically empty P head. Apart from notational considerations this does not seem to affect the argument to be advanced here, though.

An initial reason to distinguish the grammatical cases (the upper part of Figure 1) from the bound postpositions is the way they tend to be expressed cross-linguistically: the adverbial cases by and large correspond to adpositional expressions in other languages.

Figure 1: Inflectional paradigm of *leku* 'place' – excluding the proximal plural, the partitive and the prolative, as well as the "relational" case, which is the subject of this paper (modified from Hualde & Ortiz de Urbina 2003:173, Table 59)

	INDEFINITE	DEFINITE		Translation
		SG	PL	
ABSOLUTIVE	leku	lekua	lekuak	-
ERGATIVE	lekuk	lekuak	lekuek	-
DATIVE	lekuri	lekuari	lekuei	-
GENITIVE	lekuren	lekuaren	lekuen	of a place
BENEFACTIVE	lekurentzat	lekuarentzat	lekuentzat	for a place
COMITATIVE	lekurekin	lekuarekin	lekuekin	with a place
INSTRUMENTAL	lekuz	lekuaz	lekuez	with a place
LOCATIVE	lekutan	lekuan	lekuetan	at a place
ABLATIVE	lekutatik	lekutik	lekuetatik	(away) from a place
ALLATIVE	lekutara	lekura	lekuetara	to a place
DIRECTIONAL	lekutarantz	lekurantz	lekuetarantz	towards a place
TERMINATIVE	lekutaraino	lekuraino	lekuetaraino	up to a place

Moreover, the grammatical cases depend on the case assigning verb for their "referential content" in Eguzkitza's terms.[5] To my understanding, this is to say that grammatical case marking has significance only in the context of the verb assigning it (along with a θ-role like AGENT or PATIENT). As for the genitive, Eguzkitza (1993:167f.)

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[4] I will not deal with the partitive and prolative cases, although they seem to fit in with the grammatical cases. Cf. Hualde & Ortiz de Urbina (2003:184f.) for some remarks on their use.

[5] Note that this differs somewhat from the notion of referentiality I will make use of later on.

suggests that its referential content (POSSESSOR, THEME etc.) is similarly dependent on the head noun. The adverbial cases, on the other hand, "have their own referential content" (Eguzkitza 1993:166), i.e. they can be assigned some meaning independent of a larger context (which might mean that they themselves assign a θ-role).

Further, DPs bearing the grammatical cases Absolutive, Ergative and Dative are marked on the auxiliary. This is exemplified by the minimal pair in (5), where the auxiliary shows person-number agreement with the absolutive argument. Basque is a *pro*-drop language, therefore in the unmarked pattern first and second person referents need not be expressed by overt pronouns as indicated by brackets around the pronominal objects.[6]

(5) a. *Jon-ek (zu) ikusi z-aitu.*
         Jon-ERG you.ABS see 2SG.ABS-AUX
         'John has seen you$_{SG}$.'
     b. *Jon-ek (gu) ikusi g-aitu.*
         Jon-ERG us.ABS see 1PL.ABS-AUX
         'John has seen us.'

Similarly, the person and number of ergative and dative arguments are reflected in the form of the auxiliary in specific ways (cf. e.g. Arregi & Nevins 2012). In contrast, nouns bearing one of the adverbial cases do not trigger any marking on the auxiliary. As the genitive is restricted to the nominal domain, this argument does not bear on its classification.

Finally, nouns marked with the grammatical cases cannot appear as complements of the morpheme *-ko*, which is under consideration here. On the other hand, this is no problem for adverbial cases or postpositional phrases, cf. (6)/(7) vs. (8)/(9). Note that the definite determiner *-a* in (6)-(8) is not part of the *-ko* phrase, but belongs to an elided noun, which is modified by the *-ko* phrase, cf. *the one* in the translation. This is unspectacular, since NP ellipsis in Basque regularly strands the cluster of determiner, case endings and bound postpositions on the final overt constituent of the DP.

(6) **etxe-ri-ko-a*
     house-DAT-KO-DET

(7) **etxe-ren-ko-a*
     house-GEN-KO-DET

(8) *harri-z-ko-a*
     stone-INSTR-KO-DET
     'the one out of stone'

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[6] The examples are adapted from the lecture notes of Luis Vicente's 2009 seminar on Basque syntax at the University of Potsdam.

(9) *lotsa-gabe-ko   emakume-a*
     shame-without-KO woman-DET
     'the shameless woman'[7]   cf. Hualde & Ortiz de Urbina (2003:146)

So the overall structure that I will assume for adverbial "cases" is illustrated in (10).
Note that while I stipulate an empty D head for non-definite *harri*, an analysis as a
bare NP is also feasible.

(10) *harriz* 'with/out of stone'
      $[[\text{harri}]_{DP} \text{-z}]_{PP}$

2.2   The data

With the above remarks in mind, we can now turn to the data that are relevant to my
argument in more detail. In this section, I will illustrate the dependence of adnomi-
nal PPs in Basque on the presence of the *-ko* morpheme, covering the bound and free
postpositions addressed above. I will also give a short overview of the further distri-
bution of *-ko* as a linker. Unless indicated otherwise, the data were elicited by myself
from two consultants, both native speakers of Basque from the area of Gipuzkoa. The
reader is reminded that the judgements are not concerned with the mere producibility
of a given string of words, e.g. a PP followed by a DP, but rather with a structural
configuration sketched in (11), where a PP and the following NP are part of the same
DP.

(11) $[[\text{PP NP}]_{NP} \text{D}]_{DP}$

2.2.1   Bound postpositions

We have already seen in (1) above that a benefactive PP can be used adnominally in
the presence of *-ko*. While my consultants' comments indicate that in the case of the
comitative matters may be somewhat more complicated, examples like (12-a) show
that an adnominal use is also possible for comitative PPs in the presence of the linker
morpheme *-ko*.

(12)   a.   *emakume-eki-ko   diskriminazio-a*
              woman-COM-KO discrimination-DET
              'discrimination against women'
        b.   *[emakumeekin diskriminazioa]*$_{DP}$

Instrumental PPs can be used as nominal modifiers without complication as shown
in the following expression:

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[7] One of my consultants strongly preferred an analysis of *lotsagabe* as adjective, yielding *emakume
lotsagabea* without any *-ko*. In spite of the spelling, Hualde & Ortiz de Urbina (2003) classify *gabe* as
free postposition, cf. (22) for a more intuitive spelling variant.

(13) a. *euskara-z-ko*   *hitzaldi-a*
          Basque-INSTR-KO lecture-DET
          'a lecture (given) in Basque'   Hualde & Ortiz de Urbina (2003:146)
      b. *[euskaraz hitzaldia]$_{DP}$*

As evidenced by (14-a), a locative phrase accompanied by the linker can appear as nominal modifier as well. Moreover, the example in (15) shows that the same holds for complex locational postpositions, based on locational nouns marked by the locative P (similar to English *in front of*). Note that the locative singular gives rise to complications, as the morpheme *-an* is missing in the context of the linker (15). This happens with locational nouns like *azpi* as well as with regular nouns (**mendi-an-ko/mendi-ko aitzuloak* 'the caves on the mountain'). I assume that in these cases the locative morpheme is still present, but unpronounced.[8] Further treatment of this subject cannot be provided here, but cf. Höhn (in preparation).

(14) a. *mendi-eta-ko*   *haitzulo-a-k*
          mountain-LOC.PL-KO cave-DET-PL
          'the caves in the mountains'   Hualde & Ortiz de Urbina (2003:145)
      b. *[mendietan haitzuloak]$_{DP}$*

(15) a. *mahai azpi-∅-ko*   *katu-a*
          table   under-LOC.SG-KO cat-DET
          'the cat under the table'
      b. *[mahai azpi-an   katu-a]$_{DP}$*
          table   under-LOC.SG cat-DET

The situation seems to be somewhat more complicated for the ablative. My consultants were most reluctant to produce the combination ABL+KO in standard examples as (16-a). Instead, they suggest the use of a relative clause or a version without ab overt case marker/postposition (*Donostia-ko trena*). For reasons of space, I cannot elaborate on this topic here.[9]

(16) a. ?*Donostia-ti-ko   *trena*
          Donostia-ABL-KO train.DET
      b. *[Donostia-tik   trena]$_{DP}$*
          Donostia-ABL train.DET

In spite of this complication, instances of ablative PPs in adnominal contexts can be found and were judged acceptable, e.g. (17-a). Note that in the absence of *-ko* these phrases are deviant in either case, cf. (16-b) and (17-b).

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[8] Thence probably the "locative genitive" nature of *-ko* in traditional descriptions of Basque.

[9] An anonymous reviewer suggests that a general problem with ablative/source-related PPs as modifiers might be to blame, e.g. some sort of semantic restriction on the complement of the linker. This hypothesis is well worth exploring. In the light of the availability of an ablative interpretation for *Donostia-ko trena*, however, it seems more promising to me to consider a morphotactic explanation, possibly related to the behaviour of the locative singular noted above.

(17) a. *A-8 autobide-a-rekin   Bilbo-ra-ko   eta **Bilbo-ti-ko***
A-8 highway-DET-COM Bilbo-ALL-KO and Bilbo-ABL-KO
norabide-etan   konekta-tze-ko   bide-a
direction-LOC.PL to.connect-NOMINALIZER-KO road-DET
'the road to connect with highway A-8 in directions from and to Bilbao'[10]

b. **[Bilbo-tik   norabide-a]*ᴅᴘ*
Bilbo-ABL-KO direction-DET

The case of the allative, directional and terminative is more straightforward again, as they uncontroversially appear in adnominal position. Again, *-ko* mediates between the PP and the modified head noun.

(18) a. *Thessaloniki-ra-ko   hegaldi-a*
Thessaloniki-ALL-KO flight-DET
'the flight to Thessaloniki'

b. **[Thessalonikira hegaldia]*ᴅᴘ*

(19) a. *Donostia-ranz-ko bidai-a*
Donostia-DIR-KO journey-DET
'the trip towards Donostia'

b. **[Donostiarantz bidaia]*ᴅᴘ*

(20) a. *Bilbo-raino-ko   bidai-a*
Bilbo-TERM-KO journeyDET
'the trip until Bilbo'

b. **[Bilboraino bidaia]*ᴅᴘ*

2.2.2   Free postpositions
With free postpositions we can observe the same behaviour, that is, they can head a phrase modifying a head noun if the linker is present. Note that several of the free postpositions in Basque are actually nouns marked for one of the adverbial cases in turn, like the complex locational expressions earlier in this section. The word *buruz* 'towards, about', for instance, consists of *buru* 'head' plus the instrumental postposition (Hualde & Ortiz de Urbina 2003:189). Hence, in a significant subset of the free postpositions we might actually be dealing with composite postpositions, headed by one of the bound postpositions already reviewed above.

(21) a. *fonetika-ri   buruz-ko liburu*
phonetics-DAT about-KO book
'a book about phonetics'   Hualde & Ortiz de Urbina (2003:189)

b. **[fonetikari buruz liburu]*ᴅᴘ*

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[10] Retrieved from `http://web.bizkaia.net/home2/Bizkaimedia/`
⇒ `Contenido_Noticia.asp?TNo_Codigo=0&Not_Codigo=3415&Tem_Codigo=6` on May 31 2011.

(22) a. *Muga-rik   Gabe-ko   Sendagile-a-k*
           border-PART without-KO doctor-DET-PL
           'Doctors Without Borders'
      b. **[Mugarik Gabe Sendagileak]$_{DP}$*

The crucial observation in all the cases, as evident from the deviance of the (b) examples, is that the presence of the linker *-ko* is obligatory, i.e. without its presence no attributive relationship can be established between a PP and the potential head noun. This is also the case in the expressions where I reported the adnominal use to be more controversial, namely the comitative and the ablative, cf. (12-b) and (16-b).

2.2.3   Further uses of the linker
It should be noted that the distribution of *-ko* as a linker in Basque is more pervasive than presented so far. While my main concern here is with the PP complements discussed before, an overview over the actual range of contexts the linker appears in is helpful to appreciate its significance in the grammatical system. A list of the relevant applications of the morpheme is given in (23).[11]

(23)   *general type*   *classification in Hualde & Ortiz de Urbina (2003)*
                                    ⎧ "classical" PPs
                                    ⎪ NPs marked for comitative case
        PP   ⎨ NPs marked for instrumental case
                                    ⎪ NPs marked for any local case
                                    ⎩ "bare NPs"
                                    ⎧ lexical adverbs
                                    ⎪ adverbs made by suffix *-la(n)*
        adverbs   ⎨ morphologically complex adverbs
                                    ⎩ adverbs constructed from NPs by *-ka*
        non-finite clause { adverbial participles with *-ta/-(r)ik*
        finite clause   ⎧ finite adverbial clauses
                           ⎨ finite complement clauses

A concise overview and further examples are provided by Hualde & Ortiz de Urbina (2003:144-148). The examples in (24) and (25) are adapted from there to illustrate the adnominal use of adverbs and adverbial finite clauses respectively. The glosses are my own.

(24)   *atzo-ko   egunkari-a*
        yesterday-KO newspaper-DET
        'yesterday's newspaper'

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[11] While there is not sufficient space to address the issue here, I assume that the apparent bare NP complements of the linker can actually be analyzed as PPs.

(25)   a.   *izarr-a   agertu zitzaiene-an*
             star-DET appear AUX.(COMP$_{en}$)-LOC
             'when the star appeared to them'

        b.   *izarr-a   agertu zitzaiene-ko   garai-an*
             star-DET appear AUX.(COMP$_{en}$)-KO time-LOC
             'at the time when the star appeared to them'

Most of the questions raised by the last three classes of complements in (23) have to remain unaddressed here. Nonetheless, a unified analysis of all these cases seems desirable, and I think the general spirit of the proposal made here for PPs should eventually be extensible to the remaining instances of the linker.

3   Theories of attribution and PP structure

In this section I will give a short overview over three approaches to the syntactic structure of attributive modification, in particular as involving attributive linkers, and outline a recent take on PP structure.

     The analysis of attributive linkers by den Dikken & Singhapreecha (2004) is based on a series of movement operations, first of all Predicate Inversion, for which the linkers are supposed to be (semantically void) markers. The other two approaches resemble each other in that they both assume a functional projection as a direct mediator of the attributive relation. But while Rubin (2002) proposes to introduce a new functional head Mod, Struckmeier (2007) and von Prince (2008) extend the notion of the independently established head C.

3.1   Small Clause origins: The PI-approach

Dealing primarily with French *de* and Thai *t^{h}îi*, den Dikken & Singhapreecha (2004) propose an analysis of linker constructions in terms of Predicate Inversion (PI), i.e. movement of a predicate around its subject.[12]

     In their view, the obligatory presence of a linker morpheme between a modifier and a modifiee in quantificational contexts is an indication for the application of PI. In particular, the linker is found in conjunction with wh-phrases and indefinite pronouns, and it is at least preferred in constructions involving focus as well, as exemplified in (26).

(26)   den Dikken & Singhapreecha (2004:4, (5))   (French)

        a.   *Qui *(de) sérieux as-tu   recontré?*
            who DE   serious have-you met

        b.   *Rien   *(d') extraordinaire n'est arrivé   ce   matin.*
            nothing DE   extraordinary not-is happened this morning

        c.   *Je n'ai   mangé que DEUX pizzas ?(de) chaudes.*
            I not-have eaten but two   pizzas DE hot

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[12] The same kind of analysis is also advocated by den Dikken (2006).

The authors cite the accounts of Moro (1997) and den Dikken (1995) of the distribution of the copula in Small Clause constructions like (27). In the canonical order in (27-a) the copula is optional, while it is obligatory in (27-b). According to the proposed analysis, Predicate Inversion has taken place in (27-b) and the copula is required "to signal the fact that there has been syntactic movement of the predicate of the SC [...] across its subject" (den Dikken & Singhapreecha 2004:10). Regarding the attributes in (26), den Dikken & Singhapreecha argue that they also are predicates that have been inverted around their subject.

(27) a. *I consider John (to be) my best friend.*
      b. *I consider my best friend *(to be) John.*

This movement is triggered by a functional head, realized by the attributive linker (*de* in French and *tʰîi* in Thai), that hosts the inverted predicate in its specifier. This would yield a word order with the attribute preceding the head noun. In their view, this effect can be reverted again in the subsequent derivation[13] by movement to a classifier phrase (ClP), in which case the attributive linker remains as the only segmental indication of the PI process.

 Moreover, den Dikken & Singhapreecha suggest that another indication of PI is the inversion of information structure in the sense depicted in den Dikken & Singhapreecha (2004:8, (10)), reproduced here in (28): the inverted predicate *my best friend* in (28-b) has to be interpreted as old information.[14]

(28) a. *John is my best friend.*
          OLD   NEW
      b. *My best friend is John.*
          OLD   NEW

Analogously, in the given analysis the attributive expression in linker constructions is assumed to have topic status, giving rise to a contrastive (topic) reading (den Dikken & Singhapreecha 2004:26), e.g. on *chaudes* in (26-c).

3.2 A new functional category: The Mod-approach

Rubin (2002, 2003) proposes a new functional category Mod to account for nominal and sentential modification. Among others, his discussion is based on data from Taga-

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[13] "In fact, the surface word order is much closer to what we would have had if we had not moved *chaude* around its subject. [...] Apparently, the word-order effect of Predicate Inversion is undone later in the derivation." (den Dikken & Singhapreecha 2004:16)

[14] Note that contrary to the glossing, the sentence in (28-a) can answer not only question (i), but also (ii) with appropriate intonation. The important point is that (28-b) is a proper reply only to (ii).

(i) Who is John?

(ii) Who is your best friend?

log, Romanian and Mandarin Chinese – languages also considered by den Dikken &
Singhapreecha (2004). In his model, ModP closes off the extended projection of any
category that acts as a modifier, cf. the sketch in (29).

(29)   [$_{\text{ModP}}$ Mod [$_{\text{XP}}$ …]]   Rubin (2002:ch.1, p.2, ex. (1))

Rubin motivates this view by the appearance of linkers in a variety of languages,
claiming also that they are not exclusively *attributive* linkers, but that they are used
for modification in the nominal and the sentential domain. Additionally, he argues
that adopting a functional category Mod can help to solve the theory-internal prob-
lem of generating adjuncts.

     In a Bare Phrase Structure model of grammar (cf. Chomsky 2001), the basic op-
eration for constructing syntactic objects is Merge, which has two variants: set-Merge
and pair-Merge. The former one – which "comes 'free,' in that it is required in some
form for any recursive system" (Chomsky 2001:6) – applied to two syntactic objects
α and β produces an unordered set (30). Pair-Merge, on the other hand, yields an or-
dered pair (31), α adjoined to β, exempt from relations like contain and c-command
(Chomsky 2001:18).

(30)   set-Merge(α, β) $= \{\alpha, \beta\}$[15]

(31)   pair-Merge(α, β) $= \langle \alpha, \beta \rangle$

As in this conceptualization it is not an *a priori* property of a constituent to be an
adjunct, but rather an artifact of the derivation, the question arises how the computa-
tional system decides when to apply pair-Merge instead of set-Merge. Rubin suggests
that it is a formal property of Mod that secures that pair-Merge is used whenever
ModP is combined with another constituent (Rubin 2002:ch.5, Rubin 2003).

     Semantically, he proposes that Mod is "essentially relational in nature, linking
the extended projection of which it is part to some other extended projection" (Rubin
2002:ch.5, p.10). Insofar, Mod compares to Rizzi's (1997) Force head in the C-field
and to the (root) functional projection in the nominal domain (either D or K), which
perform their relational duty by turning their complements into arguments. Mod
only differs from them in that it makes a modifier instead of an argument out of its
complement.

     He proposes a denotation along the lines of (32) for the Mod head, which opens
up ways to simplify the semantic machinery involved in modification. One of those
will be taken up in my analysis in section 4.2.

(32) $\lambda P \lambda Q \lambda x . P(x) \wedge Q(x)$

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[15] This formalization fits the characterization of (set-)Merge as symmetrical (Chomsky 2001:18).
Note that Chomsky (1995:246), on the other hand, explicitly characterizes Merge(α, β) as asymmetric
and uses a formalism in which the head α is directly indicated: $\{\alpha, \{\alpha, \beta\}\}$.

3.3 The C-approach and a typology of referential types

In the class of theories presented by Struckmeier (2007, 2009, 2010), Kremers & Struckmeier (2007) and von Prince (2008), the relation between head and modifier is also brought about by a functional head, but the linkers are analyzed as a subclass of the established category C.

Struckmeier (2007, 2009, 2010) takes attribution in German as a starting point for a unified analysis of prenominal attributive structures in this language. That theory is extended to Standard Arabic by Kremers & Struckmeier (2007). Prenominal attributes in German have a morpheme on their right edge, commonly viewed as Case-Gender-Number agreement (CGN) with the head noun, cf. (33).

(33)   *die sich$_i$ treu-e   Frau$_i$*
        the REFL.DAT true-CGN woman
        'the woman who is true to herself'

Struckmeier, however, suggests that the apparent CGN-agreement represents a functional head which defines a phase and probes for an argument from inside its complement. That argument, a silent operator *op*, is raised to the specifier of the CGN-head and can be identified with the head noun from that position in the edge of the phase. Like Rubin, Struckmeier assumes adjunction of the modifier to the modified constituent. By assimilating relative clauses to his analysis for participles and adjectives, his theory can account for the different kinds of prenominal modifiers in German.

Struckmeier introduces the notion of referential heads to capture the relationship between CGN, D and C as in (34). In his conception, these categories can be arranged along two dimensions in a 2×2 scheme. On the one hand, they differ in the domain they operate on. Matrix and subordinate C relate to the sentential domain and hence operate on sets of indices,[16] whereas D and CGN are associated with the nominal domain and operate on sets of individuals. On the other hand, the referential heads can be distinguished with respect to the way they operate on these sets. One class, comprising matrix C and D, independently establishes reference. Subordinate C and CGN, by contrast, only serve to restrict the reference of a given set.

(34)   Struckmeier's (2009) R heads

	Reference to sets of indices	Reference to sets of individuals
<u>Matrix</u>	CP (head = V_{fin} in German)	DP (head = D in German)
<u>Sub-ordinate</u>	CP (head = complementizer)	Attribute (head = attributizing morphology in German)

Each of the heads represented above is, in turn, expected to be available with four possible feature combinations: with or without an EPP feature depending on whether

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[16] Or whatever it is that sentences refer to.

a constituent is moved into the specifier of the phase head; and another, possibly binary, feature that determines whether the complement is finite.

Von Prince (2008) investigates attributive linkers (AL) in Mandarin Chinese, Hindi and Swahili,[17] which can link a variety of different categories to a head noun: finite and non-finite TP, adverbs and NPs, as well as numerals in Swahili and PPs in Mandarin Chinese. The latter case provides a particularly neat parallel to the Basque data addressed here, cf. (35) cited from von Prince (2008:7, (14)).

(35)   *nǎi lǐ de dànbáizhǐ*
           milk in AL protein
           'the protein (contained) in milk'   (Mandarin Chinese)

She advances a typology of C heads that basically corresponds to the lower cells of (34), relating ALs to subordinate C. Although her analysis differs in technical details, it is basically compatible with Struckmeier's approach to German, indicating a unification of CGN and ALs under the "Attribute" cell of the table.

An initial reason for adopting an analysis for ALs and CGN as C is, rather trivially, the inappropriateness of two other well established functional categories, D and T, for the job and a tendency to avoid the introduction of new functional categories. More importantly, though, their "subordinating" character relates them to subordinate C in general as displayed in (34), and even more so to relative clauses, which are rather commonly assumed to be headed by C. Note, furthermore, that in Struckmeier's typology the heads of (restrictive) RCs do not pattern with the C that introduces subordinate clauses because of the different domain they operate on (sentential vs. nominal reference). On a similar note, the inclusion of participles – themselves arguably TPs – in Struckmeier's analysis necessitates a projection on top of TP to allow semantic abstraction and coindexation of a TP-internal argument with the head noun. In parallel to relative clauses, CP is the projection of choice (Struckmeier 2007:50ff.). Nonetheless, this move necessitates an extension of the understanding of the category C, as in contradistinction to classical C, AL and CGN do not head argument clauses and they potentially take complements other than TP.

I will reject the PI-approach for my analysis in section 4 and adopt the general line of thought that the linker heads a functional projection that "glues" together the modifier and the modifiee in Rubin's terms. While it will not be possible to distinguish between the Mod- and C-approaches empirically here, a general comparison of their theoretical implications will be provided in section 4.1.

3.4   The higher end of PPs

Regarding the internal structure of PPs, several recent proposals have advanced the idea that they show a similarly fine-grained skeleton of functional projections as sentential and nominal projections (Svenonius 2008; Koopmann 2010; den Dikken 2010 among others). Some authors, notably den Dikken (2010), have suggested parallels between these domains.

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[17] In her conclusion, she also mentions Basque *-ko* as a possible AL.

For current purposes I will not go into the details of the different proposals. What is relevant for my argument is that at least two of them, namely Koopmann (2010) and den Dikken (2010), assume the availability of a C projection at the high end of the extended projection of P, motivated mainly by the possibility of certain types of pronouns to move out of the PP in Dutch. While Koopmann restricts C to Place, den Dikken's model is more permissive in the sense that he allows C at the top of both the Path and Place projections, cf. the structure in (36).

(36) $[_{CP(Path)}$ **C(Path)** $[_{DegP(Path)}$ Deg(Path) $[_{PathP}$ Path $[_{CP(Place)}$ **C(Place)**
       $\Rightarrow [_{DegP(Place)}$ Deg(Place) $[_{PlaceP}$ Place $[_{AgrP}$ Agr $[_{PP}$ P$_{LOC}$ DP $]]]]]]]]$

I take these proposals about the structure of PPs as an independent indication that more functional structure is present in PPs than meets the eye. Incidentally, these accounts choose to label the highest available functional projection as CP, thereby opening up a parallel to the C-approach to attribution introduced before.

4   Licensing attributive PPs

In this section I will outline an analysis for Basque *-ko* as a realization of a functional category at the high end of the extended projection of PPs. My analysis, obviously, relates to the two theories of attribution introduced in the previous section which assume a functional head, either Mod or C, to be responsible for creating an attribute. I will first discuss the syntactic part of the analysis and then consider its semantic aspects. The section concludes with some further observations regarding my proposal.

4.1   Syntactic considerations

Remember what the data presented in section 2 has shown us: the *-ko* morpheme appears obligatorily on the right edge of a number of categories in adnominal contexts, in particular its presence is mandatory for licensing PPs in adnominal position. Now what is it that brings about the obligatoriness of *-ko*, and how does it figure in the grammatical system of Basque?

        My answer to the first question hinges on the crucial role *-ko* plays at the syntax-semantics interface, so part of the answer needs to be postponed until the next subsection, where I will deal with the linker's semantic contribution explicitly. On the other hand this question is also closely related to the syntactic analysis of *-ko*, and the issue of its role in the grammatical system at large. Therefore I will start by addressing these questions first.

4.1.1   Classical analyses
As mentioned in fn. 8, traditional descriptions of Basque often classify *-ko* as part of the case system, in particular as a "locative genitive". Even if one takes into consideration the possibility of compound postpositions, this seems obviously flawed in the light of the distribution of *-ko* as presented in section 2: it attaches to a lot of PPs that

are not spatial, and even in the bulk of the spatial PPs it would be rather unexpected to find a locative P following a directional one, cf. for instance (18-a) repeated as (37).

(37)   *Thessaloniki-ra-ko*   *hegaldi-a*
        Thessaloniki-ALL-KO flight-DET
        'the flight to Thessaloniki'

Directional PPs are unanimously assumed to be structured the other way around, with a locative projection dominating the directional one, cf. (36). Assuming a right-headed structure for Basque, a locative morpheme should therefore linearly precede a directional morpheme. This can, for instance, be observed in the indefinite ablative *leku-ta-tik* (Figure 1), where *-ta* could feasibly be analyzed as allomorph of the locative *-tan* (Höhn in preparation). Even invoking postsyntactic processes of morpheme reordering would not solve the problem of the non-spatial complements. The various non-PP complements to *-ko* are even harder to reconcile with an account in terms of a locational case marker (or postposition) in any contentful understanding of the notion, so the "locative genitive" classification does not offer a particularly helpful description, let alone an explanation of the distribution of *-ko*.[18]

    A relational property seems to come closer to the actual contribution of *-ko*. Its description as a relational suffix in Hualde & Ortiz de Urbina (2003) is therefore much more enlightening. Nonetheless, they include it in their list of case endings.[19] I will not adopt this analysis because it would force us to adopt a very broad notion of what (even morphological as opposed to abstract) "case" means. In my opinion, this move would render the term "case" too blurry to be of much use.

4.1.2   *Functional head*

In order to proceed, I want to first establish that *-ko* is a functional head. Consider the following characteristic properties of functional elements cited from Abney (1987:43f.):

1. Functional elements constitute closed lexical classes.

2. Functional elements are generally phonologically and morphologically dependent. They are generally stressless, often clitics or affixes, and sometimes even phonologically null.

3. Functional elements permit only one complement, which is in general not an argument. The arguments are CP, PP, and (I claim) DP. Functional elements select IP, VP, NP.

4. Functional elements are usually inseperable from their complement.

5. Functional elements lack what I will call "descriptive content". Their semantic contribution is second-order, regulating or contributing to the interpretation of their complement. They mark grammatical or relational features, rather than picking out a class of objects.

    Almost all of these apply to *-ko*. Even pending further insights into what – if any – other elements might belong to the same category as *-ko* (possible candidates

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[18] Cf. fn. 8 for a hint to a possible source of this classification.
[19] Without necessarily subscribing to particular theoretical claims, though.

being the relative marker *-n* and the genitive marker *-(r)en*), it seems clear that the number of items is fairly restricted. Quite obviously, the linker is phonologically dependent and inseparable from its complement. Also, its semantic contribution can be characterized in the manner proposed by Abney as "regulating the interpretation of [its] complement", cf. the notion of *relational* suffix. The only property with a problematic result is the third one: while I am only dealing with PP complements in this thesis, according to the overview in section 2.2.3 it seems that *-ko* can take various other complements, such as Adverbs, TPs and CPs.

As Abney (1987:43) notes, however, "none of the [...] properties are *criterial* for classification as a functional element". So under the plausible assumption that *tertium non datur*, i.e., something is a functional category or not, I submit that the evidence supporting an analysis as a functional element outweighs the possible complications. Abstracting away from possible additional functional structure, this yields the minimal configuration in (38), with a functional element taking PP as its complement in my dataset. In principle, this works analogously for complements of other categories.

(38)   FP
           ⟨‾‾‾⟩
         PP   F
               -ko
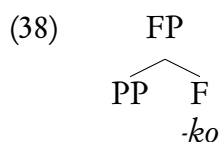
4.1.3   *A categorical question of categorization*

Now what kind of functional category may *-ko* realize? An alternative to the analysis as a case marker mentioned before would be to sever *-ko* from the grammatical cases and to treat it as a postposition. This is proposed by Eguzkitza (1993), in analogy to the analysis of the adverbial cases as postpositions put forward in section 2.1. If one adopts the view that adpositions are a functional category, this seems a valid option indeed. The fact that the linker takes a variety of complements other than NP/DP might be seen as an admissible extension of our understanding of P in the light of the provisions that had to be made above for the violation of Abney's third criterion (only complements of one type).

Nonetheless, this kind of extension would mean that we have an instance of P that cannot take DP complements at all (39).

(39)   **etxe-a-ko*
         house-DET-KO
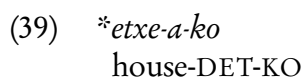
This is contrary to the behaviour typically expected for P cross-linguistically. While cases of Ps with non-DP complements can arguably be observed, e.g. *before he came*, giving rise to analyses collapsing the categories P and C (Emonds 1985), it is part of their traditional core properties that adpositions can take DP complements. Therefore I think the costs for a P analysis of *-ko* are overly high, considering that presumably less costly – and I think eventually more insightful – alternatives are available.

The PI-approach for attributive linkers of den Dikken & Singhapreecha (2004) and den Dikken (2006) does not seem to be applicable either. None of the criteria for

PI apply to the Basque data presented above. Neither is the presence of *-ko* sensitive to quantification in any way, nor does *-ko* give rise to any shift in terms of information structure for a DP containing a *-ko* phrase. Under this approach one should expect to find *-ko*-less variants of the adnominal phrases usually found with the linker. Yet there are no minimal pairs alternating in the presence/absence of the linker. Also, according to speaker's intuitions, *-ko* constructions do not give rise to a marked information structure.

Moreover, the PI approach takes the linker to be the trigger for movement of a predicate around its subject, implying a structure like (40) for the phrase in (37). It seems plausible that *-ko* heads its own phrase: the common element in the variety of possible expressions involving the linker and behaving as adnominal modifiers is in fact *-ko*. That makes it natural to assume that *-ko* is in fact the head of the modifying phrase. The predicted structure in (40), however, makes *-ko* or the head of the whole phrase. Under the assumption that D is responsible for argumenthood, it is not at all clear to me how (40) would account for the fact that the argumenthood of the whole phrase seems to be contingent on the deeply embedded D head of *hegaldia*.

(40) $[_{FP} [$ Thessalonikira $]_1$ F/-*ko* $[_{SC} [_{DP}$ hegaldia $]$ t_1 $]]$

Eventually, it seems more plausible to me to assume that *-ko* is not semantically empty as suggested by the PI theory, but that it represents a functional category with some interpretive contribution (even if no "descriptive semantic content"), namely the establishment of a relation between its complement and its head noun. I will elaborate on this in the next subsection. I conclude that - irrespective of the possible benefits of a PI approach for the explanation of other phenomena - it does offer a conclusive explanation for the Basque data at hand.

As for functional categories such as T or D, they do not seem to be plausible candidates either, as they are rather associated with temporal properties and argumenthood, respectively. This leaves us with the two options taken by the two remaining theories for attributive linkers reviewed above: either the C-approach presented in section 3.3 or the Mod-approach from section 3.2.[20]

4.1.4   *Two equivalent alternatives*

Superficially, it seems that both approaches agree in holding a functional element in the extended projection of modifiers[21] responsible for bringing about attribution, but they differ in which label they assign to the head. Yet, as the theoretical status of labels is not quite clear, I deem it worthwhile to leave notational issues aside and to attempt to uncover their basic point of divergence.

Their crucial difference seems to be rooted in Rubin's strong claim about the role of Mod in structure building, namely that it triggers pair-Merge and thereby "creates" adjuncts. Consequently, his Mod covers adnominal as well as adverbial modifiers (including both manner and sentential adverbs if my understanding is correct). The

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[20] Marcel den Dikken (p.c.) raises the further possibility of analyzing *-ko* as a RELATOR in terms of den Dikken (2006). A comparison with the C/Mod-approach pursued below has to be left to future research.

[21] Note that only Rubin is explicitly using this notion, for the C-approaches it is my interpretation.

C-approaches, on the other hand, do not show this close relationship between the features or the category involved in attribution and the type of syntactic merger.

Both analyses make use of a larger system of assumptions about the relation between certain functional categories. In accordance with his claim about the workings of adjunction, Rubin's approach relies on the function of functional projections as the "glue" of structure building. He distinguishes C and D from Mod. The former two are responsible for the argument status of their complements (this also extends to main clause C, cf. Rubin 2002:ch.5, fn.4), while Mod identifies its complement as a modifier. In contrast, the C-approaches concentrate on the impact of the functional heads at the conceptual-interpretive interface, i.e. how they induce reference (independently vs. restrictively) to what (indices, or however one characterizes the reference of sentences, vs. individuals). Figure 2 visualizes these relations.

Figure 2: Referential systems

	indices	individuals		sentential	nominal
independent	C_{main}/R1	D/R3	argument	C	D
restrictive	C_{subord}/R2	CGN,AL/R4	modifier	Mod	
	(a) C-approach			**(b)** Mod-approach	

The representation of the Mod-approach is my interpretation of Rubin's exposition. The illustration of the C-approach is adapted from Struckmeier (2007:169), in particular the alternative R labels for "referential head". The fact that Struckmeier introduces these labels indicates that the labelling difference between the two approaches is indeed just that. As a matter of fact, even the C-approaches introduce a "new" functional head, and at least Struckmeier implies yet another distinction between main and subordinate C.
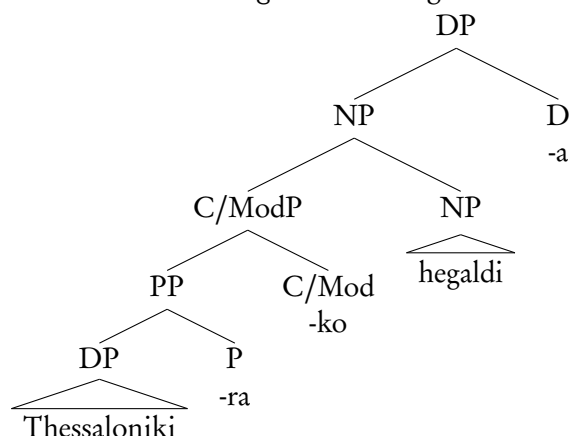
Thus, the choice of C as a label for CGN and AL seems to be mainly a pointer to the parallel between Struckmeier's R2 and R4 in terms of their role as restrictors (cf. especially von Prince 2008:42f. for an argument along this line), and might additionally owe to an implicit convention that it is often C or an equivalent (D) that closes an extended projection. This, in turn, seems to parallel den Dikken's (2010) C(Place) and C(Path) heads, which are the highest heads in the extended projection of PP in his conception and seem to be identified as C mainly for that reason. In any case, at no rate is labelling the defining difference between the C- and Mod-approaches.

In fact, regarding nominal modification, the lower right cell in both of the above representations, it seems that the two theories are indiscernible in practice. Apart from plain adverbs, which do not seem to figure at all in the C-approach system, another domain for which I would assume them to make different predictions are complementizers: in my understanding, the complementizers that introduce complement clauses (*that, if*) should fall in the R2 category of the C-approach and pattern with adverbial complementizers (*when, while*), while under the Mod-approach the former should assimilate to (plain) C and the latter to Mod.

On the basis of the current dataset, however, a decision between the two models

is not possible, as it neatly falls into the R4 or "lower right" category, for which both approaches seem to make the same predictions. Nevertheless, this serves to corroborate an analysis of *-ko* as a functional category at the top of the extended projection of various categories, in the present case that of P.[22] This yields a structure like (41) for the DP in (37).

(41)   *Thessalonikirako hegaldia* 'the flight to Thessaloniki'

```
                        DP
                       /  \
                     NP     D
                    /  \    -a
                   /    \
              C/ModP     NP
              /    \      /\
            PP    C/Mod  hegaldi
           /  \    -ko
         DP    P
        /\     -ra
    Thessaloniki
```

Now we can begin an answer to the initial question about the obligatoriness of *-ko*. The C-approach tells us that *-ko* is crucial in restricting reference to individuals, that is, for the establishment of an attributive relation between an NP and another constituent. If *-ko* is missing, this relationship cannot be established.

   If we follow the Mod-approach, we get an even stronger prediction because the presence of *-ko* is an essential marker for the computational system in order to introduce its complement PP into the syntactic derivation by means of pair-Merge. In the absence of the linker, the PP could only be set-Merged, or alternatively the derivation might crash altogether.

4.2   Semantic considerations

I will now go on to examine the semantic contribution of the linker in more detail. The general framework for semantic composition I assume here is type-driven interpretation as developed by Heim & Kratzer (1998). They introduce two basic compositional operations: Functional Application for argument saturation, and Predicate Modification for non-saturating composition.

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[22] A reviewer raises the question why that FP should be part of an extended projection. Considering that it might not (strictly) select for the category of its complement (section 2.2.3), it could be a category-neutral functional head. This is an important concern. Note, however, that a denotation like (32) does not trivially extend to cases with an adverbial complement or other non-PP complements. Insofar, while all these instances of *-ko* are clearly related, they could still be homophones, differing in their selectional properties and semantic specification. In that case they should share their complement's categorial features and therefore form an extended projection with their selected complement.

   On a different note, Grimshaw (2005:9) suggests that functional heads might "take only complements that they form extended projections with." If this is true, even a category-neutral C/Mod head has to form an extended projection with its complement.
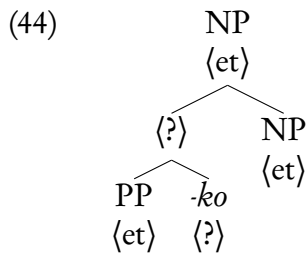
(42) Functional Application (Heim & Kratzer 1998:44)
If α is a branching node, $\{\alpha, \beta\}$ is the set of α's daughters, and $[\![\beta]\!]$ is a function whose domain contains $[\![\gamma]\!]$, then $[\![\alpha]\!] = [\![\beta]\!]([\![\gamma]\!])$.

(43) Predicate Modification (Heim & Kratzer 1998:65)
If α is a branching node, $\{\alpha, \beta\}$ is the set of α's daughters, and $[\![\beta]\!]$ and $[\![\gamma]\!]$ are both in $D_{\langle e,t \rangle}$, then $[\![\alpha]\!] = \lambda x \in D_e.[\![\beta]\!](x) = 1 \wedge [\![\gamma]\!](x) = 1$.

In this section, I will argue that a non-saturating semantic operation like Heim & Kratzer's (1998) Predicate Modification (PM) is not necessary for the semantic analysis of the data at hand and that, in fact, the assumption that no such operation is available for attribution in Basque can explain the obligatoriness of the linker with attributive PPs. My approach parallels a proposal by Nicolae & Scontras (2011). On the basis of Tagalog data, they argue that linker morphology provides an argument for simplification of the semantic component by abandoning PM. This train of thought, although with a different focus, is also manifest in Rubin (2002).

4.2.1 Compositionality

As noted in the preceding section, by virtue of heading a modifying phrase the linker is responsible for restricting the reference of the NP it adjoins to. Assuming with Heim & Kratzer (1998:65f.) that PPs denote properties, i.e. they are functions from individuals to truth values, let us consider how the linker brings about the relation between the predicates denoted by the PP and the NP.

In terms of semantic types, *-ko* connects two constituents of the type $\langle$e,t$\rangle$. Adopting the structure (44) as proposed in the previous section, *-ko* may be either of two types depending on the semantic operations one allows.

(44)
$$
\begin{array}{c}
\text{NP} \\
\langle \text{et} \rangle \\
\diagup \diagdown \\
\langle ? \rangle \qquad \text{NP} \\
\diagup \diagdown \qquad \langle \text{et} \rangle \\
\text{PP} \quad \textit{-ko} \\
\langle \text{et} \rangle \quad \langle ? \rangle
\end{array}
$$

Under the assumption that a non-saturating operation like PM as defined in (43) is available, one could assume the linker to be effectively semantically void, so that the composition of PP and *-ko* yields a semantic object of type $\langle$e,t$\rangle$. At the two crucial nodes the interpretation of (37) would work as shown in (45).

(45) Type(*-ko*) $= \langle \langle \text{e,t} \rangle, \langle \text{e,t} \rangle \rangle$
  a. FA($[_{\text{PP},\langle et \rangle}$ Thessaloniki-ra $]$, $[_{\text{C},\langle et,et \rangle}$ -ko $]$)
     $\Rightarrow [_{\text{CP},\langle et \rangle}$ Thessaloniki-ra-ko]
  b. **PM**($[_{\text{CP},\langle et \rangle}$ Thessaloniki-ra-ko], $[_{\text{NP},\langle et \rangle}$ hegaldi $]$)
     $\Rightarrow [_{\text{NP},\langle et \rangle}$ Thessaloniki-ra-ko hegaldi]

Under this view, *-ko* might function as an indicator or flag for the semantic component that Predicate Modification should be applied (Chung & Ladusaw 2004; Nicolae & Scontras 2011). Essentially, then, composing the [PP *-ko*] complex with its sister NP in Basque is tantamount to directly composing an attributive PP with an NP in an English-type language without a linker.

Alternatively, the contribution of the linker might be to map the type of its complement, $\langle e,t\rangle$, onto the higher type $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$. In that view, the linker itself is of type $\langle\langle e,t\rangle,\langle\langle e,t\rangle,\langle e,t\rangle\rangle\rangle$. Consequently, the NP containing the head noun is contained in the domain of the resulting semantic object. Every step in the composition is saturating then and only Functional Application is needed for semantic interpretation (46). Both approaches yield the same interpretation for the NP including the adjoined *-ko* phrase: a crude approximation to its denotation is represented in (47).

(46)   Type(*-ko*) $= \langle\langle e,t\rangle,\langle\langle e,t\rangle,\langle e,t\rangle\rangle\rangle$

    a.   FA($[_{\text{PP},\langle et\rangle}$ Thessaloniki-ra]$_{,}$ $[_{\text{C},\langle et,\langle et,et\rangle\rangle}$ -ko])
          $\Rightarrow [_{\text{CP},\langle et,et\rangle}$ Thessaloniki-ra-ko]

    b.   **FA**($[_{\text{CP},\langle et,et\rangle}$ Thessaloniki-ra-ko], $[_{\text{NP},\langle et\rangle}$ hegaldi])
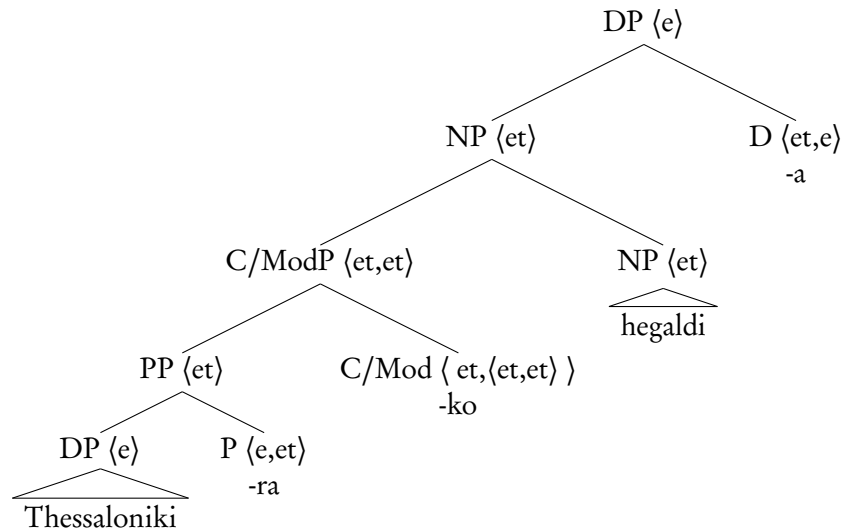 $\Rightarrow [_{\text{NP},\langle et\rangle}$ Thessaloniki-ra-ko hegaldi]

(47)   ⟦ Thessalonikirako hegaldi⟧ $= \lambda x.\text{flight}(x)\wedge\text{to}(x, \text{thessaloniki'})$

While both possibilities yield the same interpretive result (47), abandoning PM potentially results in a simplification of the semantic component, in line with Nicolae & Scontras's (2011) argument. Moreover, the PM approach raises the question why some languages need to encode the compositional mechanism overtly (and structurally, assuming the syntactic discussion above), while languages like English get by without that. Pending an answer to this question and considering the economic advantage, I opt for the second view, which makes use of only one compositional mechanism. This version is also implied by Rubin's discussion of Mod, with the denotation in (32), repeated here for convenience as (48).

(48) $\lambda P\lambda Q\lambda x.P(x)\wedge Q(x)$

Thus, the linker is an operator that takes two properties (type $\langle e,t\rangle$), conjoins them and has them apply to the same individual as introduced by the lambda-bound variable x. For a representation of the semantic types of the constituents of the phrase (37) under this view, compare the illustration in (49). This shows that semantic composition can be restricted to the same saturating operation, FA, for these attributive structures.

(49)

DP ⟨e⟩
NP ⟨et⟩   D ⟨et,e⟩
-a
C/ModP ⟨et,et⟩   NP ⟨et⟩
hegaldi
PP ⟨et⟩   C/Mod ⟨ et,⟨et,et⟩ ⟩
-ko
DP ⟨e⟩   P ⟨e,et⟩
-ra
Thessaloniki

4.2.2 Obligatoriness at last!

Eventually, dispensing with PM also offers the missing part of my explanation for the obligatoriness of the linker with attributive PPs: if only FA is available in the semantic component, then there is no way to directly combine two elements of the same semantic type such as a PP and an NP (50).

(50) a. *[[Thessaloniki-ra]$_{PP}$ hegaldi]$_{DP}$
      b. FA([$_{PP,\langle et \rangle}$ Thessaloniki-ra], [$_{NP,\langle et \rangle}$ hegaldi])
          ⇒ ???

In the absence of *-ko* the input to the semantic interpretation fails to fulfill the precondition for FA that one sister be contained in the domain of the other. If indeed no non-saturating operation is available, then no interpretation can be assigned to the mother node of the PP and the NP because both are of the same semantic type. In consequence, the term linker finds itself justified in a rather technical sense, as it is indeed needed to semantically link the modifier and the modifiee.

4.2.3 The role of PM

I want to conclude with a few architectural considerations that my analysis gives rise to. The hypothesis of the unavailability of non-saturating compositional mechanisms, which lies at the heart of my argument, comes in three variants. The weakest claim is that PM or the likes of it are banned in the domain of modification in Basque, but may be available in other parts of the grammar. A stronger hypothesis asserts the complete absence of non-saturating operations (at least of the type envisaged here) in Basque. The strongest claim would completely eliminate non-saturating operations from the semantic component.

The first option, while compatible with the data, does not seem very attractive. In fact, not even my initial motivation for investing the linker with a semantic function would hold: by allowing PM elsewhere in the grammar we would not simplify the semantic component in the first place. Moreover, it seem neither *a priori* plausible nor conceptually desirable that semantic operations should be excluded from apply-

ing in certain domains. So in the absence of strong evidence in favour of such domain sensitivity, I propose to reject this option.

Let us therefore dismiss the first variant, and instead refer to the second variant as the weak claim. The gist of that view is that languages differ parametrically in whether or not they offer a non-saturating compositional operation.[23] In this case, the presence of linking morphology in languages like Basque would indicate the absence of PM, while languages without overt linkers, e.g. English, would feature PM to deal with apparent type clashes, for instance when dealing with attribution. In consequence, overt linkers could function as a bootstrap for language acquisition.

The strong alternative holds that all semantic composition is homogenuously saturating. In order to maintain the tenets of compositionality and type-driven interpretation, this implies that attributes cross-linguistically need to be of type $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$ at the point of composition with the modified head, also in languages like English. This, in turn, seems to call for lexical ambiguity between predicative and attributive modifiers: $\langle e,t\rangle$ for predicative (one-place) adjectives, $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$ for attributive ones; $\langle e,\langle e,\langle e,t\rangle\rangle\rangle$ for predicative two-place adpositions and $\langle e,\langle\langle e,t\rangle,\langle e,t\rangle\rangle\rangle$ for their attributive version.[24]

There is, however, a conceivable alternative that avoids lexical ambiguity and still retains strict compositionality. It could be that functional heads of the kind described here are universally present, and languages just differ in whether or not these heads are expressed overtly by attributive linkers or comparable morphological means. English, for instance, would basically generate the same structure as proposed here for Basque, with the surface difference that the functional morpheme connecting the modifier and the modifiee is not realized phonologically in the former. In my understanding, this is the view implied by Rubin (2002).

Which approach is the correct one is not clear to me at this moment. Obviously, the answer hinges crucially on the question if and to what extent PM can be effectively dispensed with as a mechanism of semantic composition – within Basque and, more importantly, across languages.

5   Conclusion

In this paper I have investigated adnominal PPs in Basque. They mandatorily contain the morpheme *-ko* that is absent outside the domain of nominal modification and represents an instance of the class of attributive linkers that have been observed in a host of different languages.

I have rejected a syntactic analysis of the linker as an otherwise meaningless reflection of Predicate Inversion. Instead, I have taken up a line of argument developed by Rubin (2002, 2003), Struckmeier (2007, 2009, 2010), Kremers & Struckmeier (2007) and von Prince (2008) that (adnominal) modifiers can be headed by functional morphemes that establish the necessary relationship between modifier and modifiee. In the view advocated here, *-ko* realizes such a functional head closing off the extended

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[23] I am grateful to Luis Vicente for pointing out this possibility.
[24] Cf. Heim & Kratzer (1998:65-73) for discussion.

projection of P and is essential for the establishment of an attributive relation between the PP and the head noun. Without it, PPs in Basque are unable to appear in a DP. In a manner of speaking, thus, the linker *-ko* licenses adnominal PPs in Basque.

The linking properties of *-ko* are hard-wired into my proposal for the semantics of this morpheme: I have submitted that it introduces the link between the meaning of a modifier and its modifiee in a very concrete sense. In a way, it "syntacticizes" what has been modelled as non-saturating semantic composition elsewhere, that is, it serves as a catalyst to connect two predicates by means of the basic semantic operation of Functional Application. Insofar as this analysis can be extended, it allows us to envisage a simplified semantic component without recourse to non-saturating operations like Predicate Modification. Under this hypothesis, the workload of inducing modification is shifted from semantics to syntax, in particular to the functional structure of modifiers. That view augments the explanation of the obligatoriness of the linker in so far as without PM two predicates cannot be composed semantically for reasons of type incompatibility. The functional head realized by linking morphology is then necessary to facilitate semantic composition by producing a properly typed predicate, so as to accord with the conditions on Functional Application.

An extension of the present proposal to include the other applications of *-ko* mentioned in section 2, namely with adverbs, finite and non-finite sentences, is certainly desirable and will probably call for adaptions in the analysis. Another matter deserving further attention is the observation that the linker seems to be insensitive to the distinction between clearly attributive PPs as in (15) and PPs that might be viewed arguments, like the one in (37).[25] This might mean that the latter ones are not really arguments. Or, as a reviewer points out, if they can be shown to be arguments, they might provide an argument against the Mod-account of *-ko*, since Mod crucially introduces adjuncts.

It becomes ever clearer that modification is associated with specific morphological marking in a variety of languages: apart from the ones already mentioned this also holds for the Persian *ezafe* marker, Amharic *yä-* and Turkish *-ki*.[26] So, as befits a universalist approach to the faculty of language, the phenomenon merits further crosslinguistic scrutiny for a better understanding of its impact on theories of modification in general. Previous work has prepared a fertile foundation – and it is my hope that this paper may represent a small contribution to that project.

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[25] My thanks to Elena Anagnostopoulou for pointing out this issue.

[26] Katalin É. Kiss (p.c.) and a reviewer point out the Hungarian morpheme *-i* as a linker that appears with prenominal PPs and other categories. It is not a trivial question if the present system would extend to this kind of linker, since the alternation between (i) and (ii) sets it apart from the Basque cases considered here, where the linker is always obligatory with adnominal PPs.

(i) *a   szék   alatt-*(i) doboz*
     the chair under-i   box
     'the box under the chair'

(ii) *a   doboz a   szék   alatt-(*i)*
     the box   the chair under

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