Restrictions on the Morphosyntactic Marking of Dependencies: What Linkers Tell us[*]

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Abstract: This paper proposes a new generalisation concerning the morphosyntactic marking of grammatical dependencies. Important typological work by Nichols (1986) distinguished marking the head of a grammatical relationship (head-marking) from marking of the dependent (dependent-marking). In addition, the relationship between co-heads in an extended projection may also be marked. To these three forms of marking this paper adds a further parameter: the distinction between affixes and independent syntactic words as markers of the relevant relationship. Exploring this parameter leads to a more restrictive theory of marking grammatical dependencies, whereby of the three forms of marking, only dependent-marking is available for independent syntactic words. It is argued that this restriction can be derived from three assumptions: (i) independent syntactic words head a projection in their own right in the syntax; affixes do not; (ii) if the marker of a grammatical relationship heads its own functional projection, it is subject to a structural intervention requirement; (iii) principles of Extended Projection (Grimshaw 2000, 2005). The empirical means of testing the theory is provided by linkers – syntactically independent, semantically vacuous words indicating a relationship between two items. Using data from genetically and geographically diverse languages, it is shown firstly that linkers may be used to mark a variety of head-dependent relationships, but never the relationship between co-heads in an extended projection, and secondly that the linker always marks the dependent: constituency tests from fronting, coordination and deletion, as well as independent morphosyntactic properties, indicate that the linker is invariably attached to the dependent.

1 Introduction

The theory of grammar is to a large extent a theory of grammatical dependencies. Typological work has shown that the overt morphological marking, by phenomena such as case and agreement, of a number of these grammatical dependencies is a widespread phenomenon. Any theory of grammar will therefore not only need to account for the syntactic characteristics of such dependencies, but also address why and how such relationships are reflected by overt morphology.

The contribution of this article towards answering this latter question will be to motivate a new generalisation, given below in (1):

(1)   If the marker of a grammatical dependency is an independent syntactic word (as opposed to an affix), it must be attached to the Dependent.

That is to say that independent syntactic words serving to mark an independently existing grammatical dependency are more restricted in their distribution than their affixal counterparts: while the latter can serve as both as Head-markers and Dependent-markers (Nichols 1986, 1992), or mark the relationship between co-heads within an extended projection, an equivalent independent syntactic word (a linker) can only be employed where it marks a Dependent. This generalisation will be motivated by three assumptions: (i) independent syntactic words head a projection in their own right in the syntax; affixes do not; (ii) if the marker of a grammatical relationship is an independent syntactic word, it is subject to a structural intervention requirement; (iii) principles of Extended Projection (Grimshaw 2000, 2005).

Before considering the theoretical argument and empirical evidence supporting this generalisation, which will occupy the major part of this article, a certain background to the concepts it addresses will need to be given. Section 2 of this article will identify firstly what is meant here by grammatical dependency, and accordingly what it means to mark a Head or to mark a Dependent; secondly, criteria for distinguishing independent syntactic words from affixes will be established. In the light of this, section 3 will then elaborate a theory of morphosyntactic marking, focusing on the role of relational functional heads, or linkers. The predictions made by this theory will be tested in section 4 using cross-linguistic data primarily from linkers in the complex noun phrase, though it will also be shown that the relevant predictions are borne out elsewhere. The wider theoretical implications of these findings will then be discussed in section 5.

2 Morphosyntactic Marking of Dependencies

2.1 Grammatical Dependencies and Locus of Marking

Let us first consider the types of grammatical dependency, or syntactic relationship, that can have some overt morphosyntactic reflex. The majority of these fall into one or other of the following two categories: the Head-Dependent relationship and the relationship between co-heads in an extended projection. These relationships are illustrated by examples from the extended nominal projection in (2)-(5). The complex noun phrases in (2)-(4) illustrate the Head-Dependent relationship, where in each case the possessum is the Head of the construction, and the possessor the Dependent. The examples in (5)-(6) show co-heads in the extended nominal projection, the lexical head (the noun) and a functional head (the definite article in D):

The Head-Dependent relationship:

(2) *Head-marking:*
  (a) Mari kalap-*ja*-i   *Hungarian*
    the Mari hat-POSS-PL[1]
  'Mari's hats'   (Szabolcsi 1994:180, ex 2b)

(3) *Dependent-marking:*
  die   Geschichte Deutschland-*s*   *German*
  the.FSG.NOM   history   Germany-GEN
  'Germany's history'

(4) *No marking:*
  dz'heu   ǂxanu   *!Kung*
  woman   book
  'woman's book'   (Bickel & Nichols 2007:195, ex 32, citing Snyman 1970:92)

Co-heads in an extended projection:

(5) *Marking between heads:*
  a) l-*a*   jupe   *French*
    the-FSG   skirt(F)
    'the skirt'

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[1] Abbreviations in glosses are as follows: 1, 1a, 2, 4, 7, 9 noun class markers; 3 3rd person; ABL ablative; ACC accusative; CERT certitive; CL classifier; DECLAR declarative; EXP experiential; F feminine; FV final vowel; GEN genitive; HAB habitual; IMPF imperfective; INDEF indefinite; LNK linker; M masculine; N nominal; NT neuter; NOM nominative; OBL oblique; OM object marker; PART partitive; PERF perfective; PL plural; POSS possessive; PRED predicate marker; PRES present; PST past; SG singular; TOP topic

b) l-*es*   jupe-s
      the-PL skirt-PL
      'the skirts'

(6)   *No marking:*
      a) the skirt   *English*

      b) the skirts

As has been studied at length in typological work by Nichols (1986, 1992:46ff) and as is clear from comparing examples (2), (3) and (4), within the Head-Dependent relationship there is a further important subcategorisation concerning whether the relationship, if marked, is marked on the Head or the Dependent. There are therefore three significant kinds of morphosyntactic marking of syntactic relationships that will be considered here: Head-marking, Dependent-marking, and marking between heads.

In the Hungarian example in (2), displaying Head-marking, the possessive relationship is marked on the syntactic Head of the construction, the possessum *kalap* ('hat'), by an affix *-ja-*, signalling the presence of a possessor Dependent. In the German Dependent-marking example in (3), on the other hand, the Head of the construction, *Geschichte* ('history'), remains unmarked, while it is instead the possessor, *Deutschland* ('Germany'), as Dependent, that receives special marking, being inflected with genitive case. Finally, in the !Kung (or Kung-Ekoka, Southern Africa Khoisan) example in (4), we see the same Head-Dependent relationship between possessum and possessor, but this time the relationship receives no overt marking on either Head or Dependent.

The French examples in (5) display marking of the other syntactic relationship relevant to this article: marking between co-heads in an extended projection. This relationship is marked on the definite article, a functional head in D, by agreement in number and, where singular, gender, with the noun, the lexical head. Note that the number and gender features, although marked on the definite article, are introduced by the noun. The presence of these features on the definite article does not therefore make a semantic contribution, but simply marks the relationship with the noun by cross-referencing features of this noun. The English examples in (6) show the same relationship between the heads D and N, but in this case the relationship is unmarked: the definite article *the* has the same form irrespective of the number feature of the noun in its complement.

It is important to note that in each case the marker of the relationship, where present, does not contribute in any way to the compositional semantics, but simply serves as a morphosyntactic device for marking the presence of an independently existing relationship. The fact that the Head-Dependent and co-head relationships occur independently of any relationship-marking morphology can be seen by the !Kung and English examples, where such relationship-marking morphology is absent.

The Head-Dependent and co-head relationships exemplified in (2)-(6) I take to be strictly syntactic. The former relationship is concerned with the subordination relationship between a (projection of a) head in one extended projection (the Head) and a distinct extended projection as a whole (the Dependent). This relationship is mediated by means of s-selection: either the Head s-selects the Dependent, through θ-assignment, or the Dependent s-selects its Head, through modification. The co-head relationship is concerned with different heads within the same extended projection. It is important to distinguish here between the simple syntactic notion of head (a syntactic object lacking internal structure, which projects) and the notion of the syntactic Head of a subordination relationship. Throughout this paper I distinguish between the two by using a capital H for the latter. Working definitions of the relevant concepts are given below:[2]

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[2] These definitions, in their broad outlines, should not I think be controversial. Nichols (1986; 1992) and Bickel and Nichols (2013) consistently refer to locus as marking syntactic relations, while Nichols (1993:164-165) appeals for a 'strictly syntactic definition of Head and non-Head' (my capitals). Nichols cites the work of Mel'čuk (1979) as the basis she uses for determining the Head category of a constituent, which she defines as follows (again my capitals): 'The Head is the word which determines the syntactic type of the entire constituent and hence the privileges of occurrence and syntactic distribution of the constituent. If there is any government (by which I mean requirement of one word in a particular grammatical function by another [i.e.

(7) a) *head:* A projecting syntactic object lacking in internal structure (X^0).

b) *Head*: Any (projection of a) head in an extended projection α, this head having content that contributes to the compositional semantics of α.

c) *Dependent:* Any extended projection β that is dependent through s-selection (θ-assignment or modification) on a Head within extended projection α (whereby β will either occupy an A-position or be an adjunct in its base-position).

d) *Head-Dependent relationship:* A subordination relationship mediated by s-selection between a Head in extended projection α and a Dependent extended projection β.

e) *co-head relationship:* The relationship between two heads in a single extended projection.

It is important to recognise that the Head-Dependent, and the co-head, relationships encompass only a subset of syntactic relationships. Of course, there are other important syntactic relationships that do not concern either a Head and a distinct extended projection or two heads within the same extended projection, such as binding, A'-movement[3] and chain-formation. These relationships will not be relevant for the concerns of this article.

The type of marking that is involved will be determined firstly by the type of relationship, and secondly by the morphosyntactic site of attachment of the morpheme marking the relationship, known as its locus of marking (Bickel and Nichols 2007, 2013):

(8) a) *Head-marking* occurs where there is a marker of the Head-Dependent relationship that forms a morphosyntactic constituent with the Head.

b) *Dependent-marking* occurs where there is a marker of the Head-Dependent relationship that forms a morphosyntactic constituent with the Dependent.

c) *Marking between heads* occurs where an extended projection α contains a morphosyntactic marker of the relationship between co-heads in α.

To these three types of marking, I propose that a further parameter be added, concerning the status of the marker in the syntax; that is, whether or not the marker projects to head its own functional projection. I will assume here that while independent syntactic words project in their own right, affixes do not. While the existence of both affixes and independent syntactic words as markers of locus has been acknowledged in the literature, the potential significance of the distinction has generally remained unexplored. The main goal of this article will therefore be to show that a more restrictive theory of locus of marking results by treating affixes and independent syntactic words as distinct, this restriction taking the form of the generalisation in (1). Before motivating this generalisation, we must first briefly address a more fundamental question, concerning the difference between affixes and independent syntactic words. In so doing we will uncover the initial indications of an empirical puzzle that justifies taking the distinction between affixes and independent syntactic words seriously.

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subcategorisation]) within the constituent, it is the Head that governs the Dependent' (Nichols 1992:46; see also Nichols 1986:57).

The Head/Dependent distinction originates with Tesnière's (1959) Dependency Grammar. However, while not necessarily made explicit, the concept is found in a number of theoretical approaches to syntax. Here I define Head and Dependent using Grimshaw's (2000, 2005) notion of the extended projection. The same concept can however also be found in Lexical Functional Grammar, in the notion of co-heads and attributes (cf. Bresnan 2001:100-101).

[3] It is of course debatable whether A'-movement in some or all instances does not involve a relationship between a Head and a distinct extended projection (cf. Rizzi's *Wh*-criterion and topic and focus criteria, Rizzi 1996 and 1997 respectively). Whether or not this is the case, I take the primary relationship in A'-movement to be that between the antecedent and its trace/copy. In the interests of clarity of results, I therefore leave aside these debatable cases for future work.

2.2 Affixes Versus Independent Syntactic Words: A Mismatch

I have proposed that independent syntactic words and affixes are distinguished by the following property: independent syntactic words head a projection in their own right; affixes do not. Whether or not a given morpheme or feature projects in its own right in the syntax can be determined by examining a number of different criteria.[4]

The first criterion to be considered is whether or not the relevant features are fusional, or non-concatenative, with some other meaningful element. If a feature forms a single morphophonological unit with some other meaningful element, we can conclude that this feature does not head a projection in the syntax independent of this other meaningful element (Joseph and Smirniotopoulos 1993). Cinque (2002:6) similarly describes such behaviour as 'untypical of the syntactic component'. A classic example of fusional morphology is provided by English case-marking on pronouns: forms such as *he* (nominative) and *him* (accusative) are distinct, but the forms cannot be broken down into separate morphemes expressing φ-features (the pronominal features) and the relevant case-feature (the Dependent-marker). Cases such as these, where the morphological mechanism for marking the relevant relationship is fusional with either the Head or (some element within) the Dependent, will be classed as affixal marking of the relationship.

Where the morphology is agglutinating, or concatenative, affixes and independent syntactic words can be distinguished according to whether they attach to words or phrases respectively (see also Zwicky and Pullum 1983; Miller 1992; Anderson 2005; Bickel and Nichols 2007:§1.2 on the clitic/affix distinction). An affix will be highly selective in terms of the category it attaches to (see Zwicky and Pullum 1983:503, criterion A): either it will attach to a single word of a designated category within a phrase, or it will attach to multiple potential hosts within a given phrase. An independent syntactic word, on the other hand, will only appear once in a phrase, being aligned to one or other of its edges. The result is that an independent syntactic word attaches to whichever word is at the relevant edge of the phrase, irrespective of its category (*modulo* a low degree of productively motivated selection for special clitics). In some cases, the relevant edge of a phrase will always coincide with a word of a particular category (e.g. Japanese, which is uniformly head-final) and it will therefore be impossible to tell by this criterion whether or not the morpheme attaches to the word or the phrase.

In such a case, the coordination criterion can be used: all else being equal, independent syntactic words are able to take wide scope over coordination, whereas affixes cannot, but must be repeated on each coordinand (Miller 1992).

As regards the relationship-marking morphology we are concerned with, which makes no semantic contribution, a final criterion to be considered is whether or not this morphology is present in some default form in the absence of the relevant relationship. If we are dealing with an independent syntactic word, in the form of a functional head, that serves purely to mark the presence of a particular relationship, this head will not project in the absence of such a relationship. For example, in many languages the Head-Dependent relationship between a verb and its complement clause may be marked by means of a syntactically independent subordinating complementiser introducing the subordinate clause (such as *that* in English). Where we are dealing with a matrix clause, however, in which there is no Head-Dependent relationship, the subordinating complementiser must be absent. On the other hand, if the relationship-marking morphology is affixal – that is, it does not head its own projection in the narrow syntax – it may still be required in some default form in order for the stem to which it attaches to become a well-formed lexical item. For example, one defining property of agreement in the extended verbal projection (which is usually a form of Head-marking) is that it must appear in some default form – usually third person masculine or neuter singular – even in the absence of any Dependent (Corbett 2006:§§3.6.3, 5.2; Preminger 2009). Similarly, where case-marking is affixal, a noun phrase appearing in isolation is very often marked by some kind of default case – for example, the German noun phrase as a whole, appearing in isolation, is marked by default with nominative case on the determiner, as in the example in (3) above.

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[4] In some cases, the issues involved in differentiating affixes and independent syntactic words can be more complex (see, for example, Bickel and Nichols 2007:§1; Kenesei 2007). However, these issues do not tend to arise in the case of semantically vacuous relationship-marking morphology and hence the criteria below will be sufficient for the purposes of this paper.

We are now in a position to return to the question of interest: in marking syntactic relationships, how does the distribution of independent syntactic words, assumed to be purely relational functional heads, differ from that of affixes? If the syntax does indeed allow functional heads that are purely relational in nature, being otherwise semantically vacuous, it is meaningful to consider how the presence of these heads relates to the building of an extended projection, and accordingly to determine restrictions on their distribution. Most importantly, perhaps, such a study should shed some light on the purpose and behaviour of overt morphosyntactic licensing of syntactic dependencies. Of course, the answers to these issues will be interrelated.

In order to address these issues, let us consider firstly what such examples would look like. While the presence of both affixal and syntactically independent markers of at least the Head-Dependent relationship is accepted, work on locus of marking has generally devoted most of its attention to the former kind. The practical advantages of such an approach for broad typological surveys of the type conducted by Nichols are, I think, obvious: the morphological constituency of an affix is generally uncontroversial. The syntactic constituency of a given independent syntactic word, on the other hand, is less readily available, involving carefully constructed tests requiring specific configurations. Even when these conditions are met, particularly if the independent syntactic word is a clitic, the arguments for constituency may be quite subtle.

Extensive work on the purely affixal marking of syntactic relationships has shown that both Head-marking and Dependent-marking affixes exist, as well as affixes marking the co-head relationship. This is demonstrated by the examples in (9)-(13):

Affixal Head-marking:

(9) Juan   cant-ó   mejor   que   nadie.   *Spanish*
     Juan   sing-PST.3SG   better than nobody
     'Juan sang better than anybody.'

(10) Juma   *a*-li-kuwa   *a*-me-pika   ch-akula.   *Swahili*
     Juma   3SG-PST-be   3SG-PERF-cook 7-food
     'Juma had cooked food.'   (Carstens 2001:150, ex 5a)

(11) Masha pe-l*(-*a*)   i   tanceva-l-*a*.   *Russian*
     Masha sing-PST-FSG   and   dance-PST-FSG
     'Masha sang and danced.'

Affixal Dependent-marking:

(12) lu [waṯayi-ɣamṛa-*ma*   patʳa-*ma*]   pae-ni.   *Anguthimri*
     he old.man-GEN-ABL   canoe-ABL   come.out-PST
     'He got out of the old man's canoe.'   (Schweiger 1995:339, ex 1, citing Crowley 1981, ex 64)

Affixal marking between heads:

(13) a) het   huis   *Dutch*
        the.NTSG house
        'the house'

     b) de   man
        the man
        'the man'

In the Spanish Head-marking example in (9) the suffix -*ó* on the verb marks the latter's relationship with the subject by cross-referencing the person and number features of the subject; however, it simultaneously marks the tense/aspect/mood features of the verb. Since the agreement

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morphology is fusional with the verbal features, it is clear that we are dealing with an affix.[5] The same conclusion can be drawn regarding the subject-verb agreement in the Bantu language (Ki)swahili, exemplified in (10). This example shows a compound tense construction: the agreement prefix is realised on every verb in the clause, an indication that it is an affix. In the final, Russian, example of affixal Head-marking, given in (11), the subject-verb agreement is realised as a suffix on the verb, cross-referencing the gender and number feature of the subject. The coordination criterion shows that this agreement is affixal; since the suffix does not project it cannot scope over two coordinated verbs but must be realised on each conjunct. That the agreement is indeed affixal is confirmed by the fact that it is still required in a default form in the absence of any arguments, as shown below (note that in Russian, *pro*-drop is not licensed for arguments):

(14) Sveta-l*(-o).   *Russian*
      dawn-PST-NTSG
      'Day was dawning.'

Example (12) shows affixal Dependent-marking. This Anguthimri (Northern Paman) example exhibits the phenomenon known as Suffixaufnahme or case-stacking. Here the object of the verb is a complex noun phrase, containing the Head noun *patʰa* ('canoe') and its possessor *waṯayi* ('old man'). The possessor is marked with genitive case, the direct object as a whole with ablative case, case-marking being a form of Dependent-marking. However, the morpheme marking ablative case, *-ma*, appears not only on the Head noun of the direct object, or at the edge of the complex noun phrase as a whole, but on both elements – Head noun and possessor. As discussed above, this property indicates that it is an affix.

The examples in (13) demonstrate affixal marking between heads. In these Dutch examples, the definite article in D shows agreement with the noun, the lexical head of the extended projection: the form *het* is used for neuter singular nouns, while a completely different form, *de*, is used elsewhere. Since the agreement morphology marking the co-head relationship is completely fusional with the definiteness semantics of the determiner, it is clear that this relationship-marking agreement morphology does not have any syntactic status in its own right, but rather is affixed to one member of the co-head relationship: the definite article in D.

The examples in (9)-(13) therefore provide evidence that Head-marking, Dependent-marking and marking between heads may all be realised by affixes. If this situation is mirrored as regards independent syntactic words, we would expect six logical possibilities for the marking of the grammatical dependencies with which we are concerned (in addition to a combination of, or none of, these): affixal Head-marking, affixal Dependent-marking, affixal marking between heads, Head-marking by means of an independent syntactic word, Dependent-marking by means of an independent syntactic word and marking between heads by means of an independent syntactic word. In more concrete terms, for examples such as (9)-(13), cross-linguistically we would expect to find parallel examples whereby agreement and case are realised not as affixes, but as independent syntactic words – functional heads in their own right devoid of any inherent semantics.

It is fairly easy to find examples of Dependent-marking by means of an independent syntactic word. Bittner and Hale (1996) show examples from a variety of languages in the domain of case-markers. The example in (15) below is taken from Japanese, where the fact that the accusative case-marker *-o* can scope over two coordinated direct objects provides evidence that it is a (projecting) independent syntactic word, as opposed to a (non-projecting) affix. This is confirmed by the fact that the case-marker in Japanese does not appear where a noun phrase occurs in isolation – that is, where it does not function as a Dependent in a Head-Dependent relationship (see (23) and (57) below, where the noun phrase as a whole, headed by *ryokoo* ('trip') and *kokuseki* ('nationality') respectively, does not receive any case-marking). Similarly, subordinating complementisers, such as English *that* in (16), can be added to the class of syntactically independent Dependent-markers, since they

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[5] The conclusion that agreement of this kind is affixal, and does not project to head its own functional projection, need not force us to reject its having any head-like properties. Di Sciullo and Williams (1987) introduced the notion of relativised head, whereby specific features of an affix may percolate to word-level along with features of the stem. It is therefore possible for an affix to act as head with respect to certain features, without heading a projection in its own right.

uncontroversially form a constituent with the clausal Dependent they introduce, and serve only to mark the presence of a Head-Dependent relationship: they do not occur, as discussed above, on matrix clauses, and do not contribute anything new to the compositional semantics of the clause:[6]

Dependent-marking by means of an independent syntactic word:

(15) John=*ga* [Mary sosite Bill]=*o* mi=ta.   *Japanese*
      John=NOM Mary and   Bill=ACC see=PST
      'John saw Mary and Bill.'

(16) John saw [*that* Mary and Bill were approaching].   *English*

On the other hand, it is well established that Head-marking agreement morphemes do not project as heads in the narrow syntax in their own right, but that they attach affixally to other semantically contentful heads within the relevant extended projection (see Iatridou 1990; Speas 1991; Spencer 1992; Halle and Marantz 1993; Mitchell 1994; Holmberg and Platzack 1995:18-20; Julien 2002:235). Nor have I found any examples of Head-marking by means of an uninflected independent syntactic word, nor of an independent syntactic word of any kind marking the relationship between co-heads. The theory sketched below regarding the distribution of relational functional heads sheds some light on this state of affairs.

3 Relational Functional Heads

In the previous section we discussed how general assumptions about the morphosyntactic marking of syntactic relationships, and in particular the assumption that it can be realised by independent syntactic words as well as affixally, lead to the prediction that within the syntax will be found functional heads that serve only to mark the presence of an independently existing relationship, being otherwise semantically vacuous. Given these assumptions, we are led to ask not only whether such heads are permitted, but also, what will be the restrictions on their distribution? In this section I propose that the distribution of such heads, and consequently the generalisation in (1), can be derived from the interaction of three factors: firstly, the assumption that independent syntactic words project in the syntax, whereas affixes do not (see 2.2 above); secondly, a structural intervention requirement on the syntactic marking of relationships; and thirdly, the principles of projection in building an extended projection (Grimshaw 2000, 2005).

We begin by considering the structural intervention requirement. An affix with the purpose of marking a relationship does so by attaching directly to one member of the relationship – either Head/head or (some element of the) Dependent. A functional head, on the other hand, is a syntactic object in its own right, distinct from either Head/head or Dependent. Its only means of marking a relationship is via its hierarchical position. It seems reasonable to assume that, in order to mark a relationship between two items, the semantically vacuous functional head (which we will term LNK, for 'linker') should structurally intervene between these two. The notion of structural intervention can be defined as follows:

(17) *Structural intervention requirement*
      Every projection of LNK must dominate one member of the relationship, and no projection of LNK can dominate the other member of the relationship.

The implications of this for the definitions of various types of marking formulated in (8) above are as follows. In the case of Head-marking, where the marker of the relationship must form a constituent with the Head, every projection of LNK will therefore have to dominate the Head, and cannot dominate the Dependent. In order to dominate the Head in this fashion, then, the syntactically independent Head-marker must be a higher functional head within the Head's extended projection. In the case of Dependent-marking, where the marker of the relationship must form a constituent with the

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[6] While a complementiser such as *that* is marked for finiteness, it is not the complementiser, but rather the lower head T, that introduces the finite feature; the complementiser does not introduce any semantics.

Dependent, every projection of LNK will have to dominate the Dependent, and cannot dominate the Head. The syntactically independent Dependent-marker must therefore be the highest head in the extended projection of the Dependent. (If it occurs internally to the extended projection of the Dependent, its first projection will not dominate either the Dependent as a whole or the Head, so violating the structural intervention requirement.) Finally, in order for a projection of a semantically vacuous functional head to mark the relationship between co-heads in an extended projection, it will have to dominate the lower head, and be dominated by the higher head, thereby appearing internally to this extended projection.
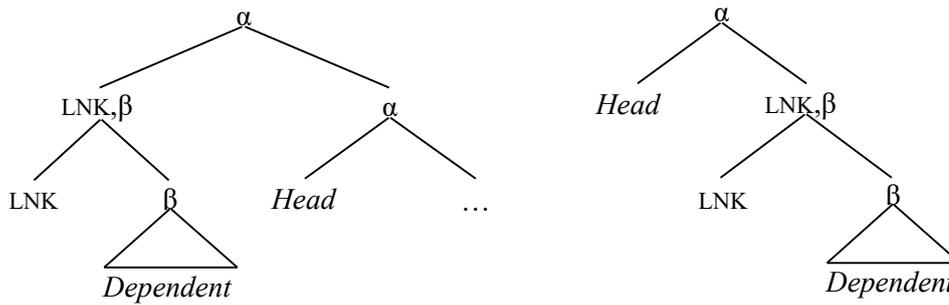
All this explains the point at which the relationship-marking functional head will have to be introduced into the derivation, in order to meet the requirement that it dominate one member of the relationship. However, we also have to take into account the second part of the structural intervention requirement, whereby no projection of the relationship-marking functional head can dominate the other member of the relationship: in other words, no projection of a syntactically independent Head-marker should dominate the Dependent; no projection of a syntactically independent Dependent-marker should dominate the Head of the relationship; and no projection of a syntactically independent head marking the relationship between co-heads in an extended projection should dominate the higher head. We therefore need to consider what happens to LNK after its merger with the relevant projection of the Head/head or Dependent. In the former case, it is introduced internally to the extended projection. In the latter case, it is the highest head in its extended projection. As explained by Grimshaw (2000, 2005), extended projections are built when features of the complement of a functional head continue to project or percolate along with this functional head. For example, if the head Asp takes VP as its complement, the phrase as a whole will be headed not only by the Asp feature, relating to aspect, but also by the categorial feature V. When this new projection is itself a complement of a new functional head (say T), all the features of this projection (Asp and V) percolate in the same manner, such that the new projection has all three features (T, Asp and V). This process continues until a complete extended projection is built: that is, the completion of the extended projection prevents further percolation, and the cessation of percolation closes off the extended projection. There is no option for a head internal to the extended projection not to percolate, or to percolate only partially.

This means that when LNK, as a Head-marker, merges with the Head, this sub-tree will be headed both by LNK and by the features of the Head (represented in the trees below in (18) and (19) by α). When this sub-tree is merged with the Dependent (a distinct extended projection, represented by β), both LNK and the features of the Head will again project to head the structure as a whole. This is represented by the tree in (18)a. (Note that these trees represent purely hierarchical structure, and do not make any claims about linearisation.) However, this tree does not meet the structural intervention requirement, since a projection of the relationship-marking LNK dominates both some instance of the Head, and its Dependent. This problem cannot be repaired by LNK failing to percolate up the extended projection, without violating the principles of extended projection. Therefore Head-marking by means of an independent syntactic word is ungrammatical.
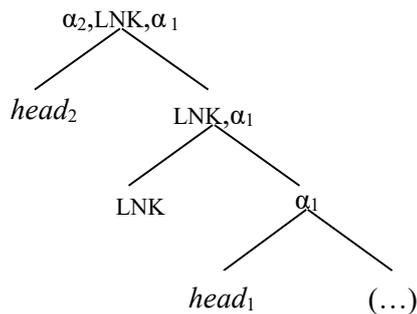
(18) a) * *Head-marking by means of an independent syntactic word:*
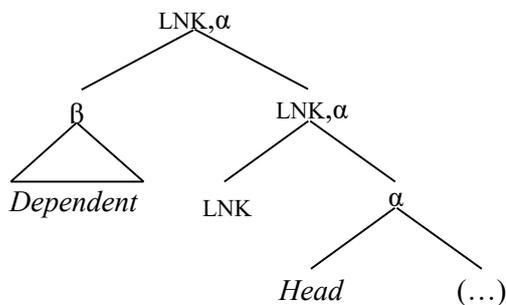
b) *Dependent-marking by means of an independent syntactic word:*

α
 ├ LNK,β
 │ ├ LNK
 │ └ β
 │   └ *Dependent*
 └ α
    ├ *Head*
    └ …

α
 ├ *Head*
 └ LNK,β
    ├ LNK
    └ β
       └ *Dependent*

c) * *Marking between heads by means of an independent syntactic word:*

α_2,LNK,α_1
 ├ *head$_2$*
 └ LNK,α_1
    ├ LNK
    └ α_1
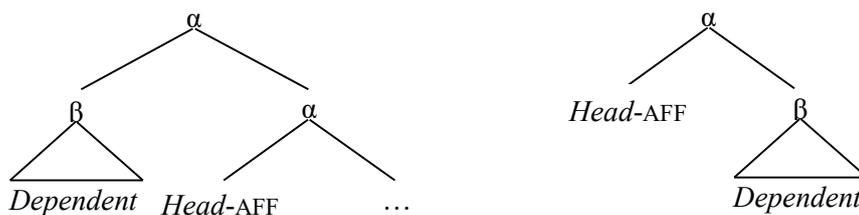   ├ *head$_1$*
       └ (…)

The same problem arises where the functional head LNK is used to mark the relationship between two heads, shown in (18)c): since, by the principles of extended projection, LNK must continue to percolate up the entire extended projection, some projection of LNK will necessarily dominate both heads.

On the other hand, this problem does not arise where LNK is a Dependent-marker, shown in (18)b). In this case, LNK merges with the Dependent, and the features of this Dependent project along with LNK to head the entire extended projection. This sub-tree is then merged with the Head, and it is the features of the Head that project to head the resulting tree. LNK does not project any further, since it belongs to the completed extended projection of the Dependent, rather than that of the Head.
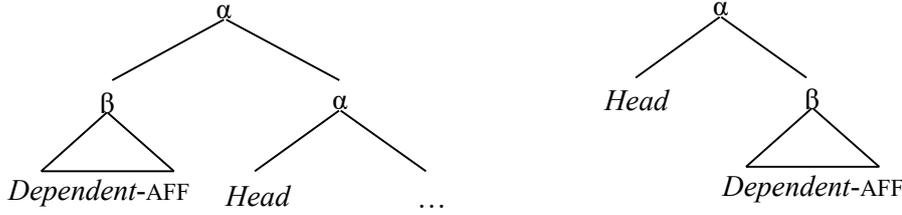
Therefore, combining the proposed structural intervention requirement with independently motivated principles of extended projection leads to the prediction that a syntactic relationship between a Head/head and some other element can only be marked by means of a semantically vacuous functional head – that is, an independent syntactic word – if this head marks a Dependent.

However, this restriction does not apply where the semantically vacuous marker of a relationship is an affix, rather than a syntactic word in its own right. The non-projecting affix does not mark the relevant relationship by its hierarchical position in the syntax, because it doesn't have one. Instead, it attaches directly to either the Head/head or (some element of the) Dependent. This is schematised below, where relationship-marking affix is represented by AFF. We have seen examples attesting to this in (2), (5), (9), (10), (11) and (13), in addition to the wealth of typological work that already exists on locus of marking by means of an affix.
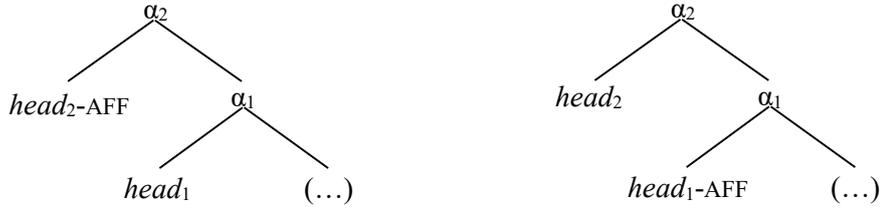
(19) a) *Affixal Head-marking:*

α
 ├ β
 │ └ *Dependent*
 └ α
    ├ *Head*-AFF
    └ …

α
 ├ *Head*-AFF
 └ β
    └ *Dependent*

b) *Affixal Dependent-marking:*

α
├─ β
│   └─ *Dependent*-AFF
│   *Head* ...
└─ α

α
├─ *Head*
└─ β
    └─ *Dependent*-AFF

c) *Affixal marking between heads:*

α₂
├─ *head₂*-AFF
└─ α₁
    ├─ *head₁*
    └─ (…)

α₂
├─ *head₂*
└─ α₁
    ├─ *head₁*-AFF
    └─ (…)

We can therefore return to our point of interest: the place of relational functional heads within syntactic theory, and more specifically in marking grammatical dependencies. On the basis of the theoretical assumptions outlined in this section, the following predictions result: firstly, the syntax allows purely relational functional heads – that is, syntactically independent, semantically vacuous words serving only to mark a grammatical dependency; however, they can only be used in Dependent-marking. That is to say that if there is a marker of a grammatical dependency that does not otherwise contribute to the compositional semantics, and if this marker meets the criteria for independent syntactic words, it must be a Dependent-marker, leading to the generalisation in (1). The resulting predicted possibilities for the morphosyntactic marking of grammatical dependencies are given in Table 1 below:

	Head-marking	*Dependent-marking*	*Marking between heads*
Affix	✓	✓	✓
Independent syntactic word	*	✓	*

Table 1: Means of marking grammatical dependencies

Before exploring the empirical evidence for this generalisation, let us first consider what a lexical entry for this syntactically independent Dependent-marker would look like in terms of its syntax and semantics – that is, how the notion of the marking of an independently existing relationship by means of a functional head can be formalised. A general lexical entry for LNK as a semantically vacuous functional head serving to mark an independently existing syntactic relationship by means of structural intervention is given in (20) below. We have already established that LNK does not introduce any features referring to semantics, but inherits the properties of its complement. In terms of semantics, therefore, LNK simply consists of an identity function λx.x. In terms of syntax, we consider the selectional properties of both LNK as a head (its internal selectional requirements) and those of its maximal projection (its external selectional requirements). These are formulated in terms of any requirements on the sister and the mother of the relevant level of projection of LNK. In both cases the sister of the relevant level of projection is compulsory: LNK must take a complement (the Dependent) and the extended projection headed by LNKP must take a sister (the Head). These requirements ensure that LNK appears only in the context of marking a relationship, since both Head and Dependent are compulsory whenever LNK is present. In terms of the internal selectional requirement for the mother of LNK, LNK as a head in its own right within an extended projection is required to project. In terms of the external selectional requirement for the mother of this new projection, LNKP, it is the sister of LNKP, rather than the extended projection headed by LNK, that projects. These properties together ensure that LNK meets the structural intervention requirement: the projection of LNK dominates the Dependent, but no projection of LNK dominates the Head. When combined with the principles of extended projection, therefore, the syntactic selectional requirements of LNK give us the previously established tree in

(18)b) above. It should be noted that LNK is by no means alone in specifying syntactic selectional requirements at the external level (that is, the level of the maximal projection) in its lexical entry. The same applies to any modifier that c-selects for the category of its Head (see Ernst 2002:§2.2).

(20)   *Lexical entry for subordinating linker*

INTERNAL SELECTION:
Sister: compulsory
Mother: bears the same lexical index as LNK

EXTERNAL SELECTION:
Sister: compulsory
Mother: extends the projection of the sister of LNKP;
         does not extend the projection headed by LNK

SEMANTICS: λx.x

It is possible that the lexical entry for an individual Dependent-marking functional head within a given language or construction may be more specific in terms of its selectional requirements: it may c-select for a specific category of complement (for example, *that* in (16) selects exclusively for a finite clause as its complement, while the Japanese case-markers in (15) select for nominal complements), or only appear where the Head is of a particular category – that is, it may c-select for a sister/mother of a particular category at the external level.

We return now to the prediction, and the consequent generalisation in (1), whereby any independent syntactic word serving to mark a grammatical dependency will mark a Dependent – that is, that any functional head serving purely to mark an independently existing relationship will be compatible with the lexical entry in (20). We have already seen some evidence that this is the case in section 2.2. This evidence was taken from the clausal level, where, firstly, the presence of semantically vacuous relationship-marking independent syntactic words such as case-markers and complementisers is well attested; secondly, the constituency of these – and therefore their status as Dependent-markers – is uncontroversial. On the other hand, typological research reveals that semantically vacuous relationship-marking functional heads internal to the extended projection of the Head/head do not seem to be attested. Having established that the predictions outlined above seem to hold at the clausal level, we therefore turn our attention to independent syntactic words for which the constituency has not been determined. In the next section we will see empirical evidence from linkers primarily, but not solely, in the complex noun phrase both of the existence of purely relational functional heads, and of the restriction to Dependent-marking (cf. Limburg 1985).

4 Linkers: Distribution and Constituency

Firstly, there is empirical evidence for the presence of relationship-marking functional heads in the form of the morphemes known as linkers. Linkers are generally defined as syntactically independent, semantically vacuous words with the sole function of indicating a relationship between two items (Den Dikken and Singhapreecha 2004; Samvelian 2006:26; Philip 2013). Since their function is to mark a relationship, linkers only occur where this relationship exists. The term 'linker' is more commonly used to refer to the use of such words within the complex noun phrase. Notice however that this definition also covers some instantiations of more familiar categories, including purely subordinating complementisers, purely functional adpositions, such as *of* in English, and in some languages purely structural case-markers, where these are independent syntactic words – that is, realisations of the functional head K (such as *-o* in the Japanese example in (15)). There is independent evidence to regard this set of heads as forming a class: Philip (2013) shows that linkers are unique among syntactic heads in invariably conforming to principles of harmonic word order.

In this section we will be concerned primarily, though not exclusively, with linkers in the complex noun phrase, since other more familiar linkers such as subordinating complementisers, functional adpositions, and syntactically independent case-markers uncontroversially form a constituent with the Dependent they introduce, and hence by the definition in (8)b) are Dependent-

markers, so bearing out the prediction established in the previous section. Linkers in the extended nominal projection are found in genetically and geographically diverse languages, both with postnominal Dependents (such as in Bantu, Chadic, Germanic, Italic and Western Iranian), and with prenominal Dependents (such as in Indo-Aryan, Japanese and Sino-Tibetan). In its base-generated, and usually also its surface, position, the linker invariably intervenes linearly between the Head noun (phrase) and its Dependent, giving the linear orders in (21)a) and b) below (Philip 2013):

(21) a) N(P) LNK Dependent
      b) Dependent LNK N(P)

Given the theory outlined in the previous section, it is predicted that the linker – as a semantically vacuous independent syntactic word serving to mark a relationship – must be a Dependent-marker. More concretely, it is predicted firstly that the linker will be used only to mark the relationship between a (projection of a) Head and a Dependent, and secondly that the linker will be the highest head in the extended projection of this Dependent. The evidence given in the subsections below will show that both predictions are borne out.

4.1 Distribution

As demonstrated by the examples below, linkers may be used to establish a relationship between a Head noun and a number of different types of Dependent, including possessors (as in (22)), complements (as in (23)-(24)), and attributive modifiers, including examples of predicate modification (as in (25)-(28)), of intensional adjectives (as in (29)) and where the Dependent is demonstrative (as in (30)) or quantificational (as in (31)). Not every relationship will be marked in every language.

(22) wo *de* shu   *Mandarin Chinese*
      I   LNK book
      'my book'   (Den Dikken & Singhapreecha 2004:34, ex 46b)

(23) gaikoku=e=*no* ryokoo   *Japanese*
      abroad=to=LNK   trip
      'trip to abroad'

(24) səmy-a   *cə*   Habi   *Zina*[7]
      listen.to-N.F LNK.F Habi
      'listening to Habi'   (Oprina 2002:124, ex 64d)

(25) hao *de*   shu   *Mandarin Chinese*
      good LNK   book
      'good books'   (Den Dikken & Singhapreecha 2004:34, ex 46a)

(26) wo mai *de* shu
      I   buy LNK book
      'the book that I bought'   (ex 46d)

(27) vɛ̃^{42} tse^{21}tsɑ̠^{42} *no^{33}* sɤ^{55} *Bai*[8]
      write tidy   LNK word
      'words that are written tidily'   (Dryer 2008, ex 39, citing Xu & Zhao 1984:73)

(28) guanyu   Chomsky *de* shu   *Mandarin Chinese*
      about   Chomsky LNK book
      'book about Chomsky'   (Paul 2007:9, ex 22a)

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[7] Zina (or Jina) is a Central Chadic language.

[8] Bai is Tibeto-Burman.

(29) weilai *de* laoshi
future LNK teacher
'future teacher'　　　　　　　　　(Ortmann 2003:24, ex 61b, citing p.c. from Yi-Chun Yang)

(30) chi *ve* qhaʔ-šɛ nî gâ　　　　　　　　　　　　　　　　　　　　　*Lahu*[9]
this LNK headman two CL
'these two headmen'　　　　　　　　(Den Dikken & Singhapreecha 2004:36, fn 23, ex iii)

(31) ghayak-i *tə* darra　　　　　　　　　　　　　　　　　　　　　　　*Zina*
knife.PL-PL LNK.PL many
'many knives'　　　　　　　　　　　　　　　　　　　　(Demeke 2002:96, ex 74c)

Linkers may also be used to mark the relationship between a non-nominal Head and its Dependent, as in the examples with adjectival ((32)-(34)) and verbal Heads ((35)-(37)) below, with both complements ((32)-(33) and (37)) and adverbials ((34)-(36)) as Dependents:

(32) âšeq=*e* Hasan　　　　　　　　　　　　　　　　　　　　　　　　*Persian*
in.love=LNK Hasan
'in love with Hasan'　　　　　　　　　　　　　　　　　　(Larson 2009, ex 6a)

(33) puɯ³¹ nuɯ⁵⁵ *no³³* ɕi³¹xuã⁵⁵　　　　　　　　　　　　　　　　　　*Bai*
for you LNK happy
'happy for you'　　　　　　　　　　　　(Dryer 2008, ex 41b, citing Xu & Zhao 1984:44)

(34) tshɛ̱⁴⁴ *no³³* xã⁵⁵tɕɛ̱⁴²
red LNK good-looking
'red in a beautiful way'　　　　　　　　　　　　(ex 40b, citing Xu & Zhao 1984:54)

(35) Ni keyi [manman *de* zou].　　　　　　　　　　　　　　　*Mandarin Chinese*
you can slow LNK walk
'You can walk slowly.'　　　　　　　　　　　　　　　　(Rubin 2002:25, ex 28a)

(36) si⁵⁵ɣɯ³³ lɯ³¹ tsɯ³¹ [xɛ̱⁵⁵ *no³³* tuĩ⁵⁵].　　　　　　　　　　　　　*Bai*
willow this CL grow LNK straight
'This willow has grown straightly.'　　　　(Dryer 2008, ex 40a, citing Xu & Zhao 1984:53)

(37) ɑ³¹nɛ̱⁴⁴ [suã⁵⁵ xo̱⁴⁴ *no³³* li⁵⁵ ko̱²¹]lɯ³³.
grandma grandchild PL.INDEF LNK also love DECLAR
'Grandma loves grandchildren.'　　　　　　　　　(ex 38, citing Xu & Zhao 1984:77)

Crucially, however, my research into linkers in a wide variety of genetically and geographically diverse languages has not revealed a single language in which the linker can mark the relationship between a noun (phrase) and a higher head in its extended projection.[10] This can be seen particularly clearly in the Kotoko languages (Central Chadic). In these languages, the relationship between a Head noun (phrase) and any kind of Dependent, including demonstratives, can be marked by a linker, irrespective of the Dependent's function or category (Demeke 2002; Tourneux and Mahamat 2009; Shryock and Brahim 2011:17-20, 2014:184-187; Allison 2012:59-61, §§4.2.9, 6). However, the relationship between a noun and a determiner head is never marked by a linker, even though in some cases the phonological form of the determiner head – which does not co-occur with a linker – is

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[9] Lahu is Tibeto-Burman.

[10] My sample includes 18 Indo-European languages, 13 Austronesian languages, 12 Nilo-Saharan languages, 11 Niger-Congo languages, 10 Afro-Asiatic languages, 8 Sino-Tibetan languages, 2 Creole languages, 1 Kwadi-Khoe language, 1 Mayan language, 1 Penutian language, 1 Tai-Kadai language, 1 Trans-New Guinea language, Japanese and Korean.

identical to a demonstrative, which must co-occur with a linker (as in the Afade (or Afadɨ) examples in (39)a) and b)). That the determiner head and the demonstrative occupy different syntactic positions in these languages is confirmed by the fact that they can co-occur, as in (38)b)-c) and (39)c). (See Giusti 1995 *et seq*; Bernstein 1997; Brugè 2002 and references cited in these works for cross-linguistic evidence that articles are functional heads in the extended nominal projection, whereas demonstratives are phrasal, occupying specifier positions.) The different behaviour of definite articles and demonstratives in these languages is exemplified below:

(38) a) kitabə   de   *Zina*
        book(M) the
        'the book'

     b) kitabə   *yi*=nde   (de)
        book(M) LNK.M=this the
        'this book'

     c) kitabə   *y*=adde   (de)
        book(M) LNK.M=that the
        'that book'   (Demeke 2002:90-91)

(39) a) gɨlew   do   *Afade*[11]
        dog(M)   the.M
        'the dog'

     b) gɨlew   *an*   do
        dog(M)   LNK.M this.M
        'this dog'

     c) gɨlew   *an*   to   do
        dog(M)   LNK.M that the. M
        'that dog'

Having established that the linker is used only to mark the Head-Dependent relationship, and not the relationship between co-heads, we now turn to the second question of interest: the locus of the linker's marking. It is predicted that the linker is a Dependent-marker, and therefore, as the highest functional head in the Dependent's extended projection, forms a constituent with the Dependent.

It is therefore predicted that the linearisations in (21) should invariably result from the following constituency:

(40) a) N(P) [LNK Dependent]
      b) [Dependent LNK] N(P)

Constituency tests that apply within the complex noun phrase are limited. It is perhaps for this reason that, while there are a number of works approaching linkers in the noun phrase from a theoretical viewpoint (see, for example, Rubin 1997 *et seq*; Carstens 2001:151ff; Den Dikken and Singhapreecha 2004; Rebuschi 2002, 2005:§4; Den Dikken 2006), and while these theories necessarily make predictions concerning the constituency of linkers, whether these predictions are borne out empirically has generally remained an unanswered question.

Here I will argue that data from fronting (subsection 4.2), coordination (4.3) and deletion (4.4) are best accounted for if the linker uniformly forms a constituent with the Dependent, as predicted. Moreover, I will show that this constituency is more in keeping with general morphosyntactic properties, both of individual languages and typologically (subsection 4.5).

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[11] Afade data is taken from material written by Madam Alifa Kassala, a native speaker, during an SIL course directed by James Roberts.

4.2 Fronting

One of the most robust constituency tests is displacement, or movement. However, it is well known that movement out of a complex noun phrase is generally difficult, if not impossible. Nevertheless, there are languages with linkers that allow either movement or some other kind of fronting operation of the Dependent of a noun. Fronting of the linker with the Dependent should only be possible if the two form a constituent. Fronting of this kind can be found in certain languages with *wh*-movement, such as French and English. This is shown in the examples below, where *de* is the linker in French and *of* in English (cf. Den Dikken and Singhapreecha 2004).[12,13] These examples show pied-piping of the linker with the *wh*-moved Dependent:

(41) a) Elle est l-a [femme [*de* François]].   *French*
         she is the-F woman(F) LNK François(M)
         'She is François's wife.'

     b) [*De* quel mari]ᵢ   est -elle l-a [femme *t*ᵢ]?
         LNK which husband(M) is she the-F woman(F)
         'Of which husband is she the wife?'

(42) a) We need to fix the [roof [*of* the third house]].   *English*
     b) [*Of* which house]ᵢ do we need to fix the [roof *t*ᵢ]?

Similar examples can be found from topicalisation. In the following examples from the Bantu language (Chi)chewa, the possessor or attributive NP is obligatorily introduced by a linker (known as the associative marker) -*a*, which is marked for agreement in noun class with the Head noun. Where this possessor is topicalised in clause-initial position, in (43)c), it is accompanied by the linker. Note that this must be due to pied-piping of the linker; the linker itself cannot be part of the topic, since it has no semantic contribution:

                                                                            Chichewa
(43) a) [Anyaní [*á*   mísala]] a-ku-(chí-)pwány-a [chipanda [*ch-á*   kazitápé]].
         2baboons 2LNK   4madness 2-PRES-7OM-smash-FV 7calabash   7-LNK 1a.spy
         'The mad baboons are smashing the spy's calabash.'

     b) Chipanda [anyaní [*á*   mísala]] a-ku-chí-pwány-a [*ch-á*   kazitápé].
         7calabash 2baboons 2LNK   4madness 2-PRES-7OM-smash-FV 7-LNK 1a.spy
         'The calabash, the mad baboons are smashing the spy's.'

---

[12] Note that the analysis of English *of* and French *de* as linkers and their generally accepted status as prepositions are not mutually exclusive. A lexical item can be both a linker (a semantically vacuous relationship-marking word appearing as the highest head in the extended projection of the Dependent) and adpositional (having the property of checking Case), as independently exemplified by the prepositional complementiser *for* in English. On the other hand, if (as is more common) an adposition makes some contribution to the compositional semantics, it will not belong to the class of linkers, and if a linker does not have the property of checking Case, it will not be regarded as an adposition. For example, in i) below *for* checks accusative Case on *her* and is therefore prepositional, but since it contributes to the compositional semantics it does not belong to the class of linkers. In example ii)a), on the other hand, *for* again checks accusative Case on *her* (and is therefore prepositional), but in this case qualifies as a linker in that it does not introduce its own relationship but serves simply to mark the independently existing relationship between the Head *hope* and its Dependent clause. Finally, in ii)b) we have an example of a non-adpositional linker: like *for* in ii)a), *that* marks the relationship between *hope* and its Dependent clause, but unlike *for* does not check Case:

i) The prize will hopefully be [*for* her].   *English*

ii) a)   I hope [*for* her to win].
    b)   I hope [*that* she will win].

[13] Note that *'s* in English is not a linker (*contra* Den Dikken and Singhapreecha 2004:46-48), because it is not semantically vacuous: it introduces a definiteness feature to the compositional semantics of the extended projection of the Head noun.

c) [*Ch-á* kazitápé][anyaní [*á* mísala]] a-ku-chí-phwány-a [chipanda].
7-LNK 1a.spy 2baboons 2LNK 4madness 2-PRES-7OM-smash-FV 7calabash
'Of the spy, the mad baboons are smashing the calabash.'

(Morimoto & Mchombo 2004:355, ex 16)

These examples therefore bear out the prediction that any linker, as a semantically empty functional head serving only to mark a Head-Dependent relationship, must form a constituent with the Dependent.

A similar, though perhaps more subtle, argument can be made for the linker *de* in Mandarin Chinese. Cinque (2005) and Abels and Neeleman (2009, 2012) propose the unmarked word order in the extended nominal projection is derived from the universal base-generated hierarchy of demonstrative > numeral > adjective > noun (where '>' indicates c-command). In Chinese, the hierarchy demonstrative > numeral > noun is fixed, but adjectives and relative clauses accompanied by *de* may appear in any prenominal position within the extended nominal projection (Aoun and Li 2003:146-147, citing Tang 1990; Y.-H. Li 1998). Therefore, where the adjective precedes the numeral it must be a derived structure. What is relevant as regards constituency is that when the adjective is fronted, as in (44)b) and c) below, it must be accompanied by *de*, supporting our prediction that *de*, as a linker, must form a constituent with the Dependent, here the adjective. Examples (44)d) and e) show that *de* cannot be stranded by fronting of the adjective.

(44) a) na san ben [[youqu *de*] shu]   *Mandarin Chinese*
     that three CL interesting LNK book

    b) na [[youqu *de*] [san ben shu]]
      that interesting LNK three CL book

    c) [youqu *de*] [na san ben shu]
      interesting LNK that three CL book

    'these three interesting books'

    d) * na youqu san ben *de* shu
      that interesting three CL LNK book

    e) * youqu na san ben *de* shu
      interesting that three CL LNK book

It has been proposed that adjectives accompanied by *de* are in fact predicates in relative clauses (C. Li and Thompson 1981:118; Huang 1987:47, fn 3; Sproat and Shih 1988, 1991). If this were the case, it would explain the free distribution of such adjectives in Chinese, without recourse to derived structure. However, Aoun and Li (2003:148) and Paul (2005:§2) show that there are certain adjectives that can appear with *de* as noun phrase modifiers, but cannot be used predicatively, with co-occurrence of either the intensifier *hen* ('very') or the negator *bu* constituting evidence of predicatehood. Compare the behaviour of *zhongyao* ('important') in (45), which can be predicative, with *zhuyao* ('main') in (46), which cannot be:

(45) a) [zhongyao *de*] shiqing   *Mandarin Chinese*
     important LNK matter
     'important matters'

    b) Zhe jian shiqing (hen /bu) zhongyao.
      this CL matter very/not important.
      'This matter is (very/not) important.'

    c) [[hen /bu zhongyao] *de*] shiqing
      very/not important LNK matter
      'very/not important matters'

(46) a) [zhuyao *de*] daolu
         main   LNK road
      'main road'

   b) * Daolu (hen /bu)   zhuyao
        road   very/not   main

   c) * hen /bu   zhuyao *de*   daolu
        very/not main   LNK road   (Aoun & Li 2003:147-8)

Moreover, such non-predicative adjectives, accompanied by *de*, show the same free distribution as any other adjective, with fronting of the linker *de* with the adjective obligatory:

(47) a) na   san tiao [[zhuyao *de*] daolu]   *Mandarin Chinese*
        that three CL   main   LNK road

   b) na   [[zhuyao *de*] [san   tiao daolu]]
        that   main   LNK three CL road

   c) [zhuyao *de*] [na   san tiao daolu]
        main   LNK that three CL road

   'those three main roads'   (Aoun & Li 2003:150, ex 45)

   d) * na   zhuyao san tiao *de* daolu
        that main   three CL LNK road

   e) * zhuyao na   san tiao *de* daolu
        main   that three CL LNK road

Therefore, since the modifiers showing this free distribution are genuine APs, the examples where the adjective precedes the numeral must be derived structures, and the fact that *de* must accompany the adjective in these derived structures constitutes evidence that the adjective and *de* form a constituent.

   This conclusion is confirmed when we look at examples where *de* marks the relationship not between a noun and its adjectival Dependent, but between a verb and its adverbial Dependent. This can be seen in the examples in (48) below: the example in (48)b shows fronting of the Dependent, *kexue* ('science'), with pied-piping of *de*, confirming that the two form a constituent, while (48)c shows that, just as in the noun phrase examples in (44)d)-e), movement of the Dependent cannot strand *de*:

(48) a) Women   [[kexue *de*] yanjiu   nei ge   wenti].   *Mandarin Chinese*
        we   science LNK research that CL   problem
        'We will research that problem scientifically.'   (Rubin 2002:26, ex 28d)

   b) [Kexue *de*]ᵢ, women [tᵢ yanjiu   nei ge   wenti].
        science LNK we   research that CL problem
        'Scientifically, we will research that problem.'

   c) * Kexue, women *de* yanjiu   nei ge   wenti.
        science we   LNK research that CL   problem

   Finally, we consider examples from the Southeast Iranian language Pashto. This language is unusual in displaying the word order LNK-Dependent-noun, where the linker *de* marks the relationship between a Head noun (phrase) and its possessor:

(49) [*de* Asad] [moṭar]   *Pashto*
       LNK Asad   car
      'Asad's car'   (Larson 2009, ex 56)

Larson (2009) argues that this word order is result of movement of the possessor, accompanied by *de*. His argument is based on the fact that where the relevant extended nominal projection is the complement of a preposition, the linker and possessor obligatorily precede this preposition, as exemplified in (50) below. Compositional semantics suggests that in such cases the possessor must have moved out of the nominal complement of the preposition.

(50) a) [*de* Asad]ᵢ [pə   chāqú tᵢ]   *Pashto*
          LNK Asad   with knife
         'with Asad's knife'   (Larson 2009, ex 58a)

      b) * pə [*de* Asad] chāqú
           with LNK Asad   knife   (ex 57a)

4.3 Coordination

A second means of testing the constituency of linkers is found in coordination. It is predicted that, where two or more Dependents of a single Head noun (phrase) are conjoined, the linker will be able to appear with each conjunct, but where two or more Head noun (phrase)s are conjoined, with the same Dependent associated with each conjunct, the linker will only appear once (*modulo* Right/Left Node Raising), taking the Dependent as its complement.

   We have already seen evidence from fronting supporting our prediction that the linker *de* in Mandarin Chinese forms a constituent with the Dependent that precedes it, as opposed to the noun or verb (phrase) that follows it. This same conclusion is reached by Aoun and Li (2003:250), on the basis of coordination data; in the example below, a coordinated adjective and relative clause modifying the unique noun *shiqing* ('matter') are each (optionally) followed by a separate occurrence of the linker *de*:

(51) a) [[zhuyao   *de*] erqie [women yijing taolun guo *de*] shiqing   *Mandarin Chinese*
          important LNK and   we   already discuss EXP LNK matter
                                                               (Aoun & Li 2003:150, ex 48a)
      b) [[zhuyao]   erqie [women yijing taolun guo]] *de*] shiqing
          important and   we   already discuss EXP   LNK matter

      'the main matters that we have discussed'

This conclusion is confirmed by the following example, where a single AP *hen da* ('very big') modifies two conjoined Head nouns:

(52) [hen da *de*] [mao   he   (* *de*) gou]   *Mandarin Chinese*
       very big LNK cat   and   LNK dog
      'very big cat and dog'

   The same results can be seen where *de* is used to mark the Head-Dependent relationship between a verb (phrase) and an adverbial: *de* cannot be repeated on each conjunct where two VPs are under the scope of a single adverbial Dependent, but can (or for some speakers, must) be repeated where it is two adverbial Dependents that take scope over a single VP:

                                                                       Mandarin Chinese
(53) Women [congming *de*] [yanjiu   nei ge wenti   erqie (* *de*) jiejue nei ge wenti].
       we   intelligently LNK research that CL problem and   LNK solve   that CL problem
      'We will [research that problem and solve that problem] intelligently.'

(54) a) Women [[[kexue *de*] erqie [congming *de*]] yanjiu　nei　ge　wenti].
　　　　we　　　science LNK and　　intelligent LNK research that CL　problem

　　b) %　Women [[kexue erqie congming] *de*] yanjiu　nei　ge　wenti].
　　　　we　　　science and　intelligent　LNK research that CL　problem

'We will research that problem scientifically and intelligently.'

Taken together, the evidence from these examples that *de* must form a constituent with the Dependent is strong. However, Huang (1987:70-72, 1989:41-42) draws the opposite conclusion – that *de* forms a constituent with the Head noun or noun phrase – from the following example, a marked construction found only in literary Mandarin; the possessor *beiyapozhe* ('the oppressed') has scope over all conjuncts, yet *de* is repeated before each noun:

Mandarin Chinese

(55) Yinwei　cong nei limian kanjian-le　　[[bei-yapozhe　*de*]　[shanliang　*de*]
　　because　from that inside see-PERF　　　the-oppressed LNK　　benevolent　LNK

linghun], [[ø *de*] xinsuan], [[ø *de*] zhengzhi]]…
soul　　　　LNK heart.sour　　LNK　struggle

'Because from there, one saw the oppressed ones' [good soul, bitterness, struggle]…'
　　　　　　　　(Huang 1987:71, ex 34, 1989:42, ex 34, citing Chao 1968, citing Lu Xun)

The issue can be resolved by considering the intonation of the apparently contradictory examples in (51) and (52) and in (55). The intended interpretation in the marked construction in (55) is only possible with 'comma' intonation after each conjunct. This, together with the fact that its usage is limited to literary contexts, indicates that (55) is in fact an example of Left Node Raising. The examples in (51) and (52), on the other hand, are compatible both with neutral intonation and ordinary spoken language. It therefore seems that Aoun and Li are correct in concluding that *de* forms a constituent with the prenominal Dependent.[14]

An analogous argument can be made for genitive case marker, *no*, in Japanese, which acts as a linker, being a semantically vacuous syntactically independent word serving to mark a particular relationship. The view that *no* is a linker is also taken by Den Dikken and Singhapreecha (2004) and Den Dikken (2006), while Kitagawa and Ross (1982) and Simpson (2001) point out the significance of its similarity to Mandarin *de*. Like Mandarin, Japanese has prenominal Dependents and therefore the word order in (21)b. Coordination data in Japanese shows the same properties as for *de* in Mandarin Chinese, therefore supporting the looked-for result; the linker *no* cannot be repeated when two coordinated Head nouns are under the scope of a single possessor, as in (56), but may be where a single Head noun has two possessors, as in (57):

(56)　[John=*no*]　[tuma sosite(*=*no*) kodomo]　　　　　　　　　　　*Japanese*
　　　John=LNK　wife and=LNK　　child
　　'John's wife and child'

(57) a) [[John=*no*]　　sosite [Taroo=*no*]] kokuseki
　　　　John=LNK　　and　　Taroo=LNK　nationality

　　b) [[John sosite　Taroo]=*no*] kokuseki
　　　　John and　　Taroo=LNK　nationality

'[John and Taro]'s nationality'

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[14] Huang (1987, 1989) offers a second argument for *de* forming a constituent with the Head noun (phrase). While the Head noun (phrase) will consistently be of the same semantic type, the semantic type of its Dependent varies; therefore, assuming *de* itself has a single lexical entry and accordingly does not vary in semantic type, it cannot combine with items of varying semantic type – i.e. the Dependent. However, since the linker itself does not have any semantics, this argument does not apply.

These results are again seen in Hindi-Urdu, another language with prenominal Dependents. Like Japanese, Hindi-Urdu has a syntactically independent genitive case marker, serving as a linker marking the relationship between a Head noun and its nominal Dependent. The linker in Hindi-Urdu has the form *k-*, with a suffix marking agreement in number and gender with the Head noun. Where the Head noun is masculine singular, the suffix also varies depending on whether the Head noun phrase as a whole is nominative or non-nominative (generally termed 'direct' and 'oblique' in descriptive grammars).

(58) [Rām   *k-ī*] [billī   aur (* *k-ā*)   sher]   *Hindi-Urdu*
      Ram(M) LNK-F cat(F)   and   LNK-MSG.NOM lion(M)
      'Ram's cat and lion'

(59) a) [[Nādyā   *k-ī*]   aur [Rām   *k-ī*]]   billī
         Nadya(F) LNK-F and Ram(M)   LNK-F cat(F)

      b) [[Nādyā   aur Rām]   *k-ī*]   billī
         Nadya(F) and Ram(M) LNK-F cat(F)

      '[Nadya and Ram]'s cat'

We have seen then evidence from coordination in three languages with prenominal Dependents that the linker forms a constituent with the Dependent, as predicted. The evidence is mirrored in languages with postnominal Dependents. We begin with English, for which we have already used evidence from *wh*-movement to show that the linker forms a constituent with the Dependent. This result is confirmed by coordination data given in (60)-(61) below; like Mandarin Chinese, Japanese and Hindi-Urdu, the linker, *of*, cannot be repeated when two coordinated Head nouns are under the scope of a single Dependent, but may be where a single Head noun has two Dependents:

(60) the [[branches (*of)[15] and leaves] [*of* [the tree]]]   *English*

(61) a) pictures [[*of* trees] and [*of* flowers]]

      b) pictures [*of* [trees and flowers]]]

Evidence from coordination data can also be found in three further languages with postnominal Dependents, the West Iranian languages Persian (or Farsi) and Zazaki (or Dimli), and Lagwan (or Logone), a Central Chadic language of the Kotoko group. The phonological properties of the linker in these languages, however, are such that the argumentation for constituency must be more subtle.
The linker in West Iranian, known as the ezafe or izafe(t), is a phonological enclitic that attaches to the right-edge of a nominal or adjectival phrase where this phrase is followed by a Dependent. Fronting cannot be used as a test for constituency, since movement out of the ezafe domain is impossible (Samvelian 2006:4) (perhaps because the enclitic ezafe would have to move with the (syntactic) Dependent but would have no phonological support). There is however relevant coordination data, given in examples (62)-(64):

(62) Ez   [[kıla(*=*yê*) o   palto][=*yê* Alik]=i   vinen-a.   *Zazaki*
      I   hat=LNK   and coat=LNK   Alık=OBL.MSG see-1SG
      'I see Alık's hat and coat.'
                                                      (Toosarvandani & Van Urk 2014:212, ex 7b)

(63) [kolâh(* =*e*) va   lebâs][=*e*   Maryam]   *Persian*
      hat=LNK   and dress=LNK Maryam
      'Maryam's hat and dress.'

---

[15] Repetition of *of* on each conjunct may be possible with Right Node Raising intonation.

(64) ahâli[=*e*   [Gilân va(*=*ye*) Mâzandarân]]
      population=LNK Gilân and=LNK Mâzandarân
      'the population of Gilân and Mâzandarân'

    In (62) and (63), which are analogous to the Chinese, Japanese, Hindi-Urdu and English examples in (52), (56), (58) and (60), two coordinated NPs are under the scope of a single Dependent, the possessors *Alık* and *Maryam*. As in the previous equivalent examples, the linker may only appear once, adjacent to the Dependent. This can be readily explained if, as hypothesised, the ezafe forms a constituent with this Dependent.
    Where the West Iranian data differ from the languages we looked at earlier in this section lies in (64), where it is two Dependents that are coordinated; it is not possible to repeat the ezafe on each conjunct. However, the ungrammaticality here can be accounted for by the phonological properties of the ezafe, which is known to cliticise to the material to its left; it is quite conceivable that the ezafe cannot be cliticised to a coordinating conjunction.
    On the other hand, there does not seem to be any independent reason why repetition of the ezafe on each conjunct in (63), where the site of attachment is the right edge of a noun phrase, is ungrammatical. The ungrammaticality of the ezafe cliticised to the first conjunct is particularly striking when contrasted with the behaviour of other phonological enclitics attaching to noun phrases. The data below show that, in analogous examples, a pronominal clitic (in (65)) and the partitive marker (in (66)), both of which we would expect to form a constituent with the noun phrase to which they attach, may optionally be repeated on each NP:

(65) a) [kolâh=aš]va [lebâs=aš]   *Persian*
        hat=3SG and dress=3SG
        'her/his hat and his/her dress'

     b) [kolâh va   lebâs]=aš
        hat   and dress=3SG
        'her/his hat and dress'

(66) a) [kolâh=i] va [lebâs=i]
        hat=PART and dress=PART
        'a hat and a dress'

     b) [kolâh va   lebâs]=i
        hat   and dress=PART
        'a hat and dress'

    The simplest explanation for the coordination data in (62)-(64) therefore seems to be the same as for the Chinese, Japanese, Hindi-Urdu and English data we have previously looked at – that the linker/ezafe forms a constituent with the Dependent –, the only difference being that in West Iranian the phonological environment also comes into play.[16]
    Before leaving West Iranian for the time being, it is worth pointing out that the coordination data in (63) and (64), where the ezafe must have scope over both conjuncts, constitutes strong evidence that the ezafe is indeed an independent syntactic word – that is, a clitic, as opposed to an affix (see section 2.2) – and therefore a linker. The conclusion that the ezafe is an independent syntactic word is also reached by Bögel *et al* (2008). They show that certain restrictions on the occurrence of the ezafe highlighted by Samvelian (2007), leading the latter to a phrasal-affix analysis at the word-level, are not incompatible with the properties of clitics. Under the phrasal-affix analysis, on the other hand, and as acknowledged by Samvelian (2007:631), (63) remains mysterious.

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[16] That is to say that this is the simplest explanation that maintains the assumption that the ezafe has some status as a morphosyntactic object. Samiian (1994, following 1983) and Ghomeshi (1997) consider the ezafe to be purely phonological, inserted at PF. This explanation of course could also account for the data in (63) and (64). Shortcomings of this analysis in terms of wider implications both in Western Iranian specifically and cross-linguistically are discussed in section 5.1.

I am therefore analysing the West Iranian ezafe here as a form of Dependent-marking by the definition in (8)b, on the grounds that the data suggest that the ezafe forms a constituent with the Dependent. In Nichols' (1986, 1992), work, however, the Persian ezafe is consistently cited as an example of Head-marking. It is clear however that Nichols uses the term with reference to the morpheme's phonological site of attachment.[17] Therefore my analysis is not in any direct conflict with Nichols': as pointed out by Zwart (2006:§2.1), if a morpheme is phonologically expressed on the Head, syntactically it may still serve as a Dependent-marker.

The conclusion that the West Iranian coordination data naturally result when a language has postnominal Dependents and enclitic linkers is supported by finding the same data in a genetically and geographically distinct language with these same properties. This can be seen by considering the following coordination data from the Kotoko language Lagwan (Central Chadic), spoken predominantly in Cameroon. Here the linker in question, like the Bantu associative marker, is used to mark a possessive relationship, and again like the associative marker agrees with the Head noun: *na* if the Head noun is feminine singular; *a* elsewhere. [18]

(67) [[Ufu (* =*na*)   ka   dughumi] [=*a*   mghe]] i   bbi.   *Lagwan*
       goat(F) =LNK.F.POSS and   ox(M)   =LNK.POSS chief 3PL.IMPF be.good
      'The chief's goat and ox are good.'

(68) nsla [=*na*   [meni   ka (*=*na*)   gɨnɨm]]
      cow(F)=LNK.F.POSS   man(M)   and =LNK.F.POSS   woman(F)
      'the [man and woman]'s cow'

In example (67), a single possessor, *mghe* ('chief'), has scope over two coordinated possessums. The linker can only appear once, adjacent to the possessor *mghe*, as is predicted by the hypothesis that the linker forms a constituent with the Dependent, here the possessor. Where two possessors of a single Head noun, *nsla* ('cow'), are coordinated, as in (68), the linker again can only appear once. However, as in Persian, the ungrammaticality of repetition of the linker in example (68) can be accounted for by the enclitic status of the linker, which presumably cannot attach to a coordinating conjunction.

The above analysis is of course dependent on the claim that linkers in Lagwan are phonological enclitics; if linkers in Lagwan were not phonologically dependent on the material to their left, the ungrammaticality of the second linker in (68) would remain a problem. Indeed, we would expect precisely the results found in (67) and (68) if linkers in Lagwan were phonological *pro*clitics and formed a syntactic constituent with the Head noun to their left. It is therefore crucial to show that there is a phonological dependency between linkers in Lagwan and the material on their left, and none between these linkers and the material on their right. There is evidence from both syllabification and tone for the enclitic status of linkers in Lagwan.

Like many languages, Lagwan prohibits onsetless syllables (Ruff 2005:46). Where a morpheme is vowel-initial, the preferred repair strategy is to resyllabify the coda of the preceding syllable as this morpheme's onset; if the preceding morpheme is vowel-final, this final vowel deletes (Ruff 2005:49). This is demonstrated with the masculine/plural definite article *ale*, a phonological enclitic:

(69) / làymún/ + /=álé/ →   [lèj.mú.ná.lé]   *Lagwan*
      lemon(M)   =the   'the lemon'

---

(70) / ʂxè/ + / =álé/ →   [ˈsχá.lé]
      field(M) =the   'the field'

This resyllabification/deletion strategy is however only available where the morpheme in question forms a single prosodic word with the morpheme that precedes it; elsewhere, an onset is provided by the insertion of a glottal stop (Ruff 2005:41), shown by the following example:

(71) / àm/ + / =álé/ →   [ʔà.má.lé]   *Lagwan*
      water(PL) =the   'the water'

Consider now the following examples, where the possessive linker *a* introduces a vowel-initial possessor:

(72) / bùskwàn/ + /=a/ + /Ádám/ + /=álé/ →   [bùs.kʷà.ná.ʔá.dá.má.lé]   *Lagwan*
      horse(M)   =LNK.POSS Adam(M) =the   'Adam's horse'

(73) / àsì/ + /=a/ + /Áyshà/ + / =álé/ →   [ʔà.sá.ʔáj.ʃà.lé]
      foot(M) =LNK.POSS Aïcha(F)   =the   'Aïcha's foot'

Since the possessum and the enclitic linker *a* form a single phonological word, resyllabification in (72) and vowel deletion in (73) take place in order to provide an onset for the linker. Where the possessor, *Adam* in (72) and *Aysha* in (73), is vowel-initial, on the other hand, this strategy is not available, since there is no phonological dependency between the linker in Lagwan and the material that follows it; an onset can only be provided by last-resort insertion of a glottal stop.

Besides the above evidence from syllabification, the tone of the possessive linker in Lagwan is determined by the Head noun to which it attaches. It seems that if the possessive linker forms a disyllabic foot with this noun, the tone of this noun spreads onto it; if not, the possessive linker is realised with high tone (Ruff 2005:45-46, 2007:115). This is illustrated in the examples below:

(74) / dàr/ + / =a/ + /w̄/ →   [dà.ɾà.ʷú]   *Lagwan*
      gun(M) =LNK.POSS my   'my gun'

(75) / tày/ + / =a/ + /w̄/ →   [tà.jà.ʷú]
      pestle(M) =LNK.POSS my   'my pestle'

(76) /gìm/ + /=na/ + /w̄/ →   [gìm.nà.ʷú]
      millet.cane(F) =LNK.F.POSS my   'my millet cane'

(77) /sà/ + /=na/ + /w̄/ →   [sà.nà.ʷú]
      beer(F) =LNK.F.POSS my   'my beer'

In the above examples, the possessum is always a monosyllabic noun with low tone. Therefore the linker forms a disyllabic foot with this noun, and the low tone spreads onto the linker. This contrasts with examples where the Head noun is polysyllabic, and so cannot form a foot with the linker:

(78) / m̀s'àl/ + /=a/ + /w̄/ →   [m̀.s'à.lá.ʷú]   *Lagwan*
      hair(M) =LNK.POSS my   'my hair'

(79) / m̀bìy/ + / =a/ + /w̄/ →   [m̀.bì.já.ʷú]
      clothes(PL) =LNK.POSS my   'my clothes'

(80) /ǹgùn/ + /=na/ + /w̄/ →   [ŋ̀.gùn.ná.ʷú]
      stomach(F) =LNK.F.POSS my   'my stomach'

(81) /m̀tì/ + /=na/ + /ní/ → [m̩̀.tì.ná.ní]
      death(F) =LNK.F.POSS his   'his death'

In these examples, therefore, the possessive linker receives high tone. Note that the tone of the possessive linker is sensitive only to the tone of the preceding material, not the following material; in all the above examples, the possessive linker is followed by a monosyllable with high tone, yet receives low tone in (74)-(77) and high tone in (78)-(81).

Given the above evidence showing that the linker in Lagwan is a phonological enclitic, there is only one plausible explanation for the coordination data in (67) and (68): the linker forms a constituent with the Dependent, in exactly the same way as the analogous West Iranian examples in (62)-(64). The same conclusion is therefore reached for the coordination data in all the languages we have looked at, whether the Dependent precedes or follows its Head, irrespective of the phonological site of attachment of the linker.

4.4 Deletion

A further means of testing constituency is provided by deletion. Within the complex noun phrase there are two possibilities for deletion: ellipsis of the Head noun phrase and, where available, *pro*-drop of a Dependent possessor. As with any case of deletion, it is assumed that the deleted material must form a constituent. In the case of NP ellipsis, therefore, ellipsis of the linker with the Head noun phrase should only be possible if the two form a constituent; similarly, if the linker is deleted with a *pro*-dropped possessor, this will be taken as evidence that the linker forms a constituent with this Dependent.

Clear cases are provided by Chinese and Japanese, which allow both *pro*-drop of the possessor and NP-ellipsis. Starting with Mandarin Chinese, where the possessor is *pro*-dropped, as in (82) and (83) below, the linker *de* is also deleted, indicating that it must form a constituent with the Dependent possessor:

(82) Ni you mei you hai   guo fei bing?   *Mandarin Chinese*
     you exist not exist suffer EXP lung disease

     [ø (*de) Tingjue] zenme-yang?
         LNK hearing   how-manner

     'Have you ever had tuberculosis? How is (your) hearing?'

(83) Zhangsan, [ø (*de) che] hen hao.
     Zhangsan   LNK car very nice
     'Zhangsan, (his) car is very nice.'

In Mandarin Chinese, it is sometimes possible to omit *de* with an overt pronominal possessor, although usually only where the possessum is a kinship term (C. Li and Thompson 1981:115-116). Therefore, in order for the *pro*-drop examples in (82) and (83) above to be meaningful as evidence that *de* has been deleted with the possessor, it is important to show that *de* is obligatory where the pronominal possessor is overt. This is demonstrated below:

(84) Wo zhen   xianmu [[ni *(de)] tingjue].   *Mandarin Chinese*
     I   really admire   you LNK hearing
     'I really admire your hearing.'

(85) Wo xihuan [[ta *(de)] che].
     I   like   he LNK car
     'I like his/her car.'

Regarding the example in (83), it is further important to show that the possessor position is filled by a covert pronoun, and not by the overt *Zhangsan*. This can be shown by considering the intonation: the comma following *Zhangsan* in (83) indicates that there is an intonational break between this dislocated topic and the rest of the sentence – its comment. The topic is associated with its comment by a resumptive possessor pronoun, which is *pro*-dropped.[19] The sentence contrasts with the example in (86) below where *Zhangsan* is not a dislocated topic co-referential with a *pro*-dropped possessor, but is the possessor itself. In this case there cannot be a break following *Zhangsan*, and, as in (85), where there is also no dislocation, *de* is obligatory:

(86) [[Zhangsan *(*de*)] che] hen hao.   *Mandarin Chinese*
     Zhangsan   LNK car   very nice
     'Zhangsan's car is very nice.'

We now consider the other deletion operation, ellipsis of the head NP. In contrast to deletion of the Dependent, where the Head noun phrase is deleted *de* must remain overt:

(87) [[Ta *de*] shu] hen pianyi, keshi [[wo *(*de*)] ø] hen gui.   *Mandarin Chinese*
     he LNK bookvery cheap but   I   LNK   very expensive
     'His/Her book is very cheap, but mine is very expensive.'

(88) Wo juede [[huang *de*] chensan] bi   [[hong *(*de*)] ø] haokan.
     I   think yellow LNK shirt   compared.to red   LNK   pretty
     'I think yellow shirts are prettier than red (ones).'

The *pro*-drop and ellipsis data therefore support the conclusion drawn from the Mandarin fronting and coordination data in the previous subsections – that, as predicted, the linker *de* forms a constituent with the Dependent, not the Head noun (phrase).

We can draw the same conclusion from the equivalent data in Japanese. The examples below show that in the *pro*-drop case, the linker *no*, like other case-markers, is deleted as part of the *pro*-dropped pronoun (in (89)), while in the ellipsis case, *no* must remain overt (in (90)):[20]

(89) [ø(*=*no*)   Mimi]=ga nagai.   *Japanese*
     =LNK   ear=NOM long
     '*pro*'s ears are long.'

(90) [[Kare=*no*] hon]=wa yasui ga [[boku*(=*no*)] ø]=wa totemo takai.
     he=LNK   book=TOP cheap but I=LNK=TOP   very   expensive
     'His book is cheap, but mine is very expensive.'

---

[19] The dislocation operation of course cannot be the result of movement, since the putative extraction site would be internal to the subject. Moreover, if this were movement, we would expect some overt realisation of *de*.

[20] Japanese is often analysed as having two particles with the form *no*, one a genitive-case-marker/linker and the other a dummy nominal used in ellipsis. Other researchers take both usages to be realisations of a single, linker, particle (see Kitagawa and Ross 1982). Under the two-morpheme analysis, there is an alternative explanation available for example (90), whereby the linker *no* is elided with the Head noun, the elided constituent being replaced with the other *no*, the dummy nominal. Note however that in some dialects, two occurrences of *no* are possible in ellipsis contexts, suggesting that in these cases linker *no* is not elided (Simpson & Wu 2001:260, citing Murasugi 1991, citing Yuzawa 1944):

iii) kore=wa   [[watasi=*no*]=no] dewaarimasen.   *Japanese*
    this=TOP   I=LNK=one   not.be
    'This one is not mine.'   (Simpson & Wu 2001:260, ex 48)

More seriously, if linker *no* is analysed as forming a constituent with the Head noun, the *pro*-drop data in (89), the coordination data in (56)-(57), and general morphological inconsistencies (see §4.5) remain a mystery.

In languages that do not allow *pro*-drop of possessors, the evidence can only be taken from ellipsis and is therefore less clear. Below data are given from Hindi-Urdu[21], Zazaki, Swahili, Lagwan, English and French. The evidence we have seen in the preceding subsections from fronting and coordination, suggesting that the linker forms a constituent with the Dependent, rather than the Head noun, leads us to anticipate that it will be impossible for the linker to be elided with the Head noun phrase. This prediction is borne out. (Note that in Lagwan, the elided NP is replaced by a dummy nominal *x(i)-*, presumably required as phonological support for the linkers, all of which are enclitics. Similarly, in English and French a dummy nominal is required, *one* in English and *celui* (masculine singular) / *celle* (feminine singular) / *ceux* (masculine plural) / *celles* (feminine plural) in French.)

(91) [[Jaldī   k-ā]   kām]   to   [[shaitān *(k-ā)] ø]   hotā   hai. *Hindi-Urdu*
       speed(F) LNK-MSG.NOM work(M) indeed devil(M) LNK-MSG.NOM be.HAB is
       'The work of haste is really (that) of the devil.'

(92) a) ju [kutɨk[=o   gɨrs]]   *Zazaki*
          one dog(M)=LNK.M big
          'a big dog'   (Toosarvandani & Van Urk 2014:213, ex 9)

       b) Ez [kutik-an[=ê Alik]]=i-ra   [ju[ø[=o gɨrs]]] vinen-a.
          I   dog-PL=LNK Alik=OBL.MSG-of one=LNK.M big   see-1SG
          'Of Alik's dogs, I see a big one.'   (p4, ex 8)

(93) Hi-ki ni   [ki-tabu [ch-a   mw-alimu].   *Swahili*
       this-7 PRED   7-book   7-LNK 1-teacher

       Ki-ngine ni [ø [*(ch-a) [bibi   [y-a=ke]]]].
       7-other   PRED   7-LNK grandmother 9-LNK=his

       'This is the teacher's book. The other (one) is his grandmother's.'

(94) [nsla [=na   meni] ka [xɨ[*(=na)   ginɨm]]   *Lagwan*
       cow(F) =LNK.F.POSS man   and one=LNK.F.POSS woman
       'the man's cow and the woman's (one).'

                                                                              English
(95) John took a [picture [*of* the Eiffel Tower]], while Mary took [one [*of* an eye-catching passer-by]].

(96) Je préfère la [coiffure   [*de* Jeanne], à [celle [*(*de*) Sophie]].   *French*
       I   prefer the.F hairstyle(F) LNK Jeanne(F) to the.one.F LNK Sophie(F)
       'I prefer Jeanne's hairstyle to Sophie's.'

    However, these examples by themselves cannot be taken as direct evidence that the linker does not form a constituent with the Head noun. If the linker were a functional head in the extended projection of the Head noun, there could be independent reasons why the linker cannot be elided; one could postulate that an overt functional head is required to license the ellipsis site in NP ellipsis as in VP ellipsis (cf. Lobeck 1992, 1995). Nevertheless, if we take the ellipsis data from Hindi-Urdu, Zazaki, Swahili, Lagwan, English and French together with the data from fronting and coordination, the conclusion that the linker forms a constituent with the Dependent remains the simplest explanation.

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[21] Although Hindi-Urdu is a radical *pro*-drop language, the *pro*-drop test does not apply here, as pronominal possessors are generally not accompanied by *k-*.

We have seen then that data from fronting, coordination and deletion, from a variety of languages, support the prediction that linkers, as functional heads serving only to mark a syntactic relationship, being otherwise semantically empty, will always act as Dependent-markers. In addition to this more concrete evidence, it is worth pointing out that in a number of cases implicational evidence from general morphosyntactic properties, either language-internal or cross-linguistic, lends support to this conclusion.

Nichols' (1986) seminal study of locus of marking resulted in the following two implicational generalisations:

(97)   If a language has major, salient, Head-marking morphology anywhere, it will have it at the clause level.   (Nichols 1986:75, ex 52)

(98)   If a language has Dependent-marking morphology at the clause level, it will have it at the phrase level.   (ex 53)

These generalisations are motivated by languages that have split systems of locus. For example, Bantu languages have a split system whereby the clause uses exclusively Head-marking, in the form of agreement on the verb (see (10) above), while internally to the complex noun phrase only Dependent-marking is used. On the other hand, there are no attested languages where the opposite situation holds; that is, there are no languages that use Head-marking in phrases but do not do so at the clausal level. This motivates the generalisation in (97). Similarly, Nichols (1986:75) lists Basque, the Northeast Caucasian language Batsbi, Burushaski, the South Caucasian language Georgian and the Gunwingguan language Mangarayi as examples of languages that employ double-marking in the clause, but only Dependent-marking elsewhere. Such languages serve as examples of both generalisations in (97) and (98).

Applying these generalisations to Chinese, the Tibeto-Burman languages Bai and Lahu, Japanese, Hindi-Urdu, Pashto, West Iranian, the Kotoko languages and English, it is predicted that these languages will use Dependent-marking in the complex noun phrase. The fronting, coordination, *pro*-drop and ellipsis data we have seen from these languages suggest that this prediction is borne out. The first statement, in (97), predicts that a language cannot make use of Head-marking within the complex noun phrase unless it also has Head-marking within the clause. Neither Chinese, Bai, Lahu, Japanese nor the Kotoko language Zina (or Jina, Schmidt *et al* 2002:10) has any Head-marking in the clause or elsewhere; therefore it should be impossible for these languages to use Head-marking within the complex noun phrase. As regards the second generalisation, any language that makes use of Dependent-marking in the clause should also use it in the complex noun phrase. Japanese, Bai (as in example (37)) and Zina (Andreassen 2002) use only Dependent-marking, while Hindi-Urdu, Pashto, English, West Iranian languages and Kotoko Proper languages display Dependent-marking in addition to Head-marking at the clause level. In Persian this second generalisation is particularly significant, since, the ezafe aside, there is no other form of Dependent-marking in the complex noun phrase; therefore considering the ezafe as a form of Dependent-marking, as we have good reason to do, allows us to maintain the generalisation in (98) as universal.[22]

Concerning Japanese, Hindi-Urdu and Bai, there are further, language-internal, reasons for anticipating that the linker should form a constituent with the nominal Dependent it follows. Considering firstly Japanese, as a case-marker, we expect *no* to be the highest functional head in the extended projection of the Dependent – precisely the distribution I am proposing is predicted of any linker. Secondly, the morphosyntax of Japanese is not only consistently Dependent-marking, but also uniformly head-final.[23] If, as both predicted, and implied by the coordination, *pro*-drop and ellipsis

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[22] Since Nichols classes the ezafe as Head-marking, on phonological grounds, she is forced to consider Persian as a counter-example to the otherwise well-supported generalisation in (98). When we take the constituency as the defining characteristic of locus of marking, as in (8), on the other hand, Persian is perfectly compatible with the generalisation in (98).

[23] The only exception being certain coordinators, coordinators having a cross-linguistic tendency to head-initiality (Haspelmath 2004:6; Zwart 2009; Philip 2012:§4)

data, *no* is the highest functional head in the extended projection of the Dependent, it serves as a further example of head-finality and of Dependent-marking. If, on the other hand, it forms a constituent with the Head noun (phrase) – that is, it is a functional head internal to the extended projection of the Head noun – it will stand out as an apparently unmotivated exception to two well-established properties of an otherwise morphologically perfectly consistent language. The result that *no* forms a constituent with the Dependent is therefore both desired and expected.

Similar arguments can be made for Hindi-Urdu, another language that is generally head-final.[24] The coordination and ellipsis data we have seen for this language suggest that the linker *k-* forms a constituent with the Dependent that precedes it, taking this Dependent as its complement. The linker therefore is consistent with the general head-final nature of Hindi-Urdu. Again, if the linker *k-* serves as a case-marker, we would also expect it to be the highest head in the Dependent's extended projection. A further argument can be made with regard to the agreement suffix. The linker *k-* shares precisely the same inflectional paradigm as attributive adjectives, the agreement suffix serving as a form of Dependent-marking.

The linker *no*[33] in Bai, as we have seen in examples (33)-(34) and (36)-(37), can be used at both the nominal and clausal levels, with both adjuncts and complements. Where it marks the nominal complement of a following verb, as in (37), it appears to serve as a case-marker; as such, like the linkers in Japanese and Hindi-Urdu, we would expect it to be the highest head in the extended projection of the Dependent.

Regarding Bantu as well, the linker's forming a constituent with the Dependent – and therefore acting as a form of Dependent-marking – is generally consistent with patterns of locus of marking and agreement in Bantu. While Bantu uses Head-marking at the clausal level, the extended nominal projection consistently uses Dependent-marking. This Dependent-marking is expressed by agreement in noun class with the Head noun, realised as a prefix on the relevant Dependent. Presumably the reason this strategy cannot be employed where the Dependent is nominal is that this nominal is the only category that already is marked with a noun class of its own. Therefore the agreement with the Head noun is hosted by a semantically empty independent syntactic word that heads the extended projection of the Dependent nominal.[25]

Indeed, the agreement itself in both Bantu and Hindi-Urdu can be used as a supporting argument for constituency. Head-marking usually takes the form of some kind of agreement with the Dependent (Nichols 1986). Dependent-marking, on the other hand, can be realised in a number of ways: either an invariant morpheme, agreement with features of the Head, or by cross-referencing features of the Dependent. An example of this latter type is found in English complementisers, where *that* marks the presence of a finite, and *for* an infinitival, Dependent. Therefore, where a morpheme serves to mark the relationship between two distinct extended projections (i.e. the Head-Dependent relationship), it should only cross-reference features of the Head if it is a Dependent-marker.[26] By this reasoning, the fact that the agreement on the linker in Bantu and Hindi-Urdu cross-references features of the Head noun indicates that the linker serves as a form of Dependent-marking.

As pointed out by Zwart (2006:56), this argument carries over to the West Iranian ezafe. While the ezafe in Persian is invariable, in Northwestern Iranian languages the ezafe cross-references the number, or where singular gender, feature of the Head noun, and in some languages the case and/or definiteness feature of the noun phrase as a whole. This agreement is demonstrated by the Zazaki examples below (see also (92) above):

(99) a) pirtok[=o   rind]   *Zazaki*
         book=LNK.M   good
         'good book'   (Todd 2008:92, ex 1)

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[24] *modulo* certain loans from Persian and again coordinators

[25] If this reasoning is correct, the motivation for using the associative marker is similar to the use of *do*-support in English.

[26] Of course, where the relationship marked by agreement remains within a single extended projection, as in marking between heads, agreement necessarily cross-references features of (a head within) its same extended projection.

b) sûk[=a   gırd-ı]
   city=LNK.F big-F
   'large city'   (ex 4)

c) pirtok[=ê   gırd-i]
   book=LNK.PL big-PL
   'big books'   (ex 5)

The same number and gender agreement can be witnessed in Afro-Asiatic languages. The Zina examples below again show the linker agreeing with the number, or where singular gender, feature of the Head noun (see also (24), (31), (38)):

(100) a) [[dar [*y*=awa]] [*yi*   nguna]] [*yi*=nde]   *Zina*
      gun(M) LNK.M=my LNK.M big   LNK.M=this
      'this big gun of mine'   (Demeke 2002:98, ex 80)

b) tusa [*cə*=nde]
   foot(F) LNK.F=this
   'this foot'   (p89, ex 47b)

c) [[aw-i [*tə*   Omar]] [*tə*   mangwani]] [*t*=ade]
    goat-PL LNK.PL Omar   LNK.PL big.PL   LNK.PL=that
    'those big goats of Omar's'   (p95, ex 68)

The situation in the closely related Kotoko Proper languages is more complex, but follows the same general pattern. We have seen that the linker in the Kotoko languages Lagwan and Afade, like Zina, Northwestern Iranian, Bantu and Hindi-Urdu, also marks the number or gender feature of the Head noun. However, in at least Lagwan, Afade and Mpade (also known as Mpadɨ or Makary; see Allison 2012:59-61, §§4.2.9, 6), the linker also varies according to the nature of the Dependent. In Lagwan, the Kotoko language we have focused on more particularly in this study, there are in fact three types of linker found in the complex noun phrase: one set is used if the Dependent is a possessor (as in (101)); another is used for any other Dependent that is nominal (as in (102)); and a final set is used for any other Dependent (AP, PP, relative clause, demonstrative or quantifier, as in (103)) (see also Shryock and Brahim 2011:17-20, 2014:184-187). For each type, the form of the linker of course varies according to the number or gender of the Head noun, with some syncretism. This is exemplified below:

(101) a) dar   [=*a*   u]   *Lagwan*
    gun(M) =LNK.POSS my
    'my gun'

b) beke   [=*na*   u]
   mistake(F) =LNK.F.POSS my
   'my mistake'

c) al   [=*a*   u]
   eyes(PL) =LNK.POSS   my
   'my eyes'

(102) a) luxtɨ   [=*e*   sama]
    season(M) =LNK.M.N rain(F)
    'rainy season'

b) nk'ɨna [=l   asɨ]
   finger(F) =LNK.F.N foot(M)
   'toe' (lit. fingers of foot)[27]

c) mandɨgy-en [=i   gɨmi]
   cat-PL   =LNK.PL bush(M)
   'wild cats'

(103) a) lghwadɨ [=a   [a   gura   zi   ya]]
        ground(M) =LNK.M 3SGM.PERF cultivate RFL CERT
        'ground that has been cultivated'

   b) gɨnɨm   [=ɨn   [ghuye i[28] a   mti ya]]
      woman(F) =LNK.F husband her 3SGM.PERF die CERT
      'woman whose husband has died'

   c) gɨnam   [=i   [mawi   [=a   tɨn] y-a   mti ya]]
      woman.PL =LNK.PL men(PL) =LNK.POSS them 3PL-PERF die CERT
      'women whose husbands have died'

The linker in these Kotoko Proper languages can in some sense be regarded as cross-referencing properties of both Head and Dependent. This additional variation according to properties of the Dependent however in no way detracts from its status as a Dependent-marker. As discussed above, while both Head-markers and Dependent-markers may cross-reference properties of the Dependent, φ-feature agreement with the Head only occurs on Dependent-markers. Like Bantu, Hindi-Urdu, Northwestern Iranian and Zina, therefore, the agreement on the linker in Kotoko Proper provides evidence that it serves as a Dependent-marker.

5 Theoretical Implications

The empirical evidence from linkers presented in the previous section bears out the predictions made by the theoretical reasoning given in section 3, that linkers, as independent syntactic words serving to mark the presence of a grammatical relationship, only appear as Dependent-markers. The theory and its predictions also carry over to the clause, where, as mentioned in section 2.2, both the presence of syntactically independent Dependent-markers and the absence of independent syntactic words marking the Head/head are well established. Having presented the empirical support for the theory, we are now in a position to consider more far-reaching consequences – that is, the broader implications for theories of morphosyntax (subsection 5.2). Before taking this step, however, we must be sure that no alternative theory of linkers can capture the data equally well. Therefore, we will first briefly discuss some previous theories of linkers and the predictions they make regarding the status, constituency and distribution of linkers.

5.1 Theories of linkers

The data presented and discussed in section 4 provides evidence that linkers have some status as syntactic objects, being functional heads that form a constituent with a (relevant) Dependent of a (relevant) Head (a noun in the majority of cases we have looked at). This Dependent can be anything that meets the definition in (7)b. The brief discussion given here of some previous theories of linkers will show that none of them captures all of the above properties.

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[27] Note that this seems to be a syntactic object, rather than a compound, since the Dependent can be referential:

iv) nk'ɨna [=l   asɨ [=a   u]]   *Lagwan*
    finger(F) =LNK.F.N foot(M) =LNK.POSS my
    'my toe' (lit. fingers of my foot)

[28] Lagwan does not use linkers for kinship terms.

Firstly, linkers have sometimes been analysed as morphemes whose status is purely phonological, not syntactic, being inserted only at PF. This view is espoused by Kitagawa and Ross (1982) for Mandarin Chinese and Japanese, by Watanabe (2006) for Japanese and by Samiian (1994, following 1983), Ghomeshi (1997) and Ghaniabadi (2010) for the Persian ezafe. However, the constituency tests conducted in sections 4.2-4.4 showed the linker to have a syntactic site of attachment, indicating that it is present in the syntax. Another argument in favour of according linkers morphosyntactic status is offered by Samvelian (2006:28) for the West Iranian ezafe, on the grounds that in some languages the linker agrees with features of the Head noun (see Zazaki examples (92) and (99)). As discussed in section 4.5 above, agreement with the Head noun is also a property of linkers in Afro-Asiatic, Atlantic-Congo and Indo-Aryan languages. Given that Head-Dependent agreement serves to mark a syntactic, rather than phonological, relationship, we would expect the selection of the appropriate agreement to apply prior to PF.

Other theories of linkers recognise their status as syntactic objects, but attribute their appearance to different functions. Rubin (1997 *et seq*) proposes that linkers are overt realisations of a functional head Mod, which selects a modifier as its complement, giving the following hierarchical structure:

(104) [[_{ModP} Mod° [Dependent]] N']   (adapted from Rubin 1997:435, ex 11)

Rubin's theoretical motivation is to provide a means for the narrow syntax to determine that the operation pair-merge (adjunction) is required, as opposed to set-merge; by according modifiers a unified syntactic structure, pair-merge will always and only apply to the postulated ModP. Rubin's theory therefore correctly predicts that linkers form a constituent with the modifier they introduce; that is, that they are the highest functional head in the extended projection of the modifier. However, the theory provides an explanation for only a subset of the data: it cannot account for the fact that linkers in the noun phrase may also head the extended projections of possessors and complements of verbal nouns (see (22) and (24) respectively). Note that a number of genetically and areally diverse languages also use an identical morpheme for both modifier Dependents and possessor Dependents, ruling out the possibility that *de* when used in modification and *de* used to mark the possessive relationship are distinct, homophonous, morphemes. Even in Bantu languages and in Hindi-Urdu, which use a linker only where the Dependent is nominal, the same linker is used irrespective of whether the Head-Dependent relationship is possessive or attributive. The theory of linkers as Dependent-markers, on the other hand, accounts for the use of linkers with modifiers, possessors and complements, without requiring any additional stipulations, and further allows us to present all semantically vacuous, syntactically independent, relationship-marking heads, including those also found in the clause, such as case-markers and complementisers, as a unified class of structurally intervening Dependent-markers.

Rebuschi (2002, 2005) argues that the need for the category Mod can be dispensed with if both head and modifier are considered arguments not of the head Mod, but of a coordinating conjunction, linkers in the noun phrase being overt realisations of this conjunction head. This is schematised below:

(105) [_{Conj.NP} [_{ConjP} NP [_{Conj'} Conj° [Dependent]]]]

That an intersective connective is required semantically in predicate modification structures is generally accepted. Under Rebuschi's approach, this intersective connective is not independently and uncompositionally introduced into the semantic component, but can be read directly off the syntactic structure. Whatever its conceptual attractiveness, Rebuschi's theory faces the same problem as Rubin's, in that not all appearances of the linker are accounted for; since the intersective connective is only required semantically in predicate modification, we would expect linkers to surface only where the Head-Dependent relationship involves the intersection of two sets. However, linkers in the noun phrase may also appear with complements of verbal nouns (example (24)), demonstratives ((29) and (100)) and quantifiers (31), as well as non-intersective adjectives ((29) above and (106)-(108) below):

(106) moallem[=*e*   qabli]   *Persian*
        teacher=LNK   former
        'former teacher'

(107) masale[=*ye*   ehtemâli]
     problem=LNK likely
     'likely problem'   (Ortmann 2003:24, ex 60)

(108) [yiqian *de*] laoshi   *Mandarin Chinese*
       past   LNK teacher
     'former teacher'   (ex 61, citing p.c. from Yi-Chun Yang)

Moreover, we have seen that, if the phonological properties of the linker so permit, the linker can be used in combination with a regular coordinating conjunction (see examples (51), (54), (57), (59), and (61)).

 Den Dikken and Singhapreecha (2004) and Den Dikken (2006), by studying a variety of linkers in a broad range of languages, brought to light the cross-linguistic pervasiveness of linkers in the complex noun phrase, recognising a single phenomenon and therefore the need for a uniform analysis. They propose that the linker is a form of nominal copula used in predicate inversion. By their theory, the Dependent has a predication relationship with its NP subject, encoded through a small clause. The Dependent predicate inverts round the NP subject. This is possible only where a functional head F, hosting the linker, merges with the small clause, creating a specifier position for the Dependent predicate to raise to. The linker therefore is analogous to the copula in examples of predicate inversion in the clause. This derives the word order for languages with prenominal modification, such as Chinese, Japanese and Hindi-Urdu:

(109) [FP Dependent [F' LNK [SC NP $t_{Dependent}$]]]

 For languages with postnominal Dependents, further movement takes place, actually restoring the original order of Head NP and Dependent, prior to inversion. This movement is possible where the extended noun phrase includes a classifier projection (ClfP);[29] the remnant of the small clause moves to [Spec, ClfP], while the linker raises to ClfP. This movement is 'arguably' motivated by the need for Clf to check a feature against NP (Den Dikken and Singhapreecha 2004:22)[30]:

(110) [ClfP [SC NP $t_{Dependent}$] [Clf' LNK [FP Dependent [F' t_{LNK} t_{SC}]]]]

 This theory essentially faces the same problem as Rebuschi's (2002, 2005); it only offers an analysis of examples where the Dependent is predicative, leaving examples with complements of verbal nouns, demonstratives, quantifiers and purely attributive adjectives unaccounted-for.

 More seriously, Den Dikken and Singhapreecha's theory makes incorrect predictions regarding constituency. The representations in (109) and (110) predict that in languages with prenominal Dependents, the linker will form a constituent with the Head NP, but in languages with postnominal Dependents, the linker will form a constituent with the Dependent. However, the constituency tests we conducted in section 4 indicated that the linker always forms a constituent with the Dependent, irrespective of linear order; we saw from fronting, coordination, *pro*-drop and ellipsis data that in at least three languages with prenominal Dependents – Mandarin Chinese, Japanese and Hindi-Urdu – the linker forms a constituent with the Dependent.

 The most recent analysis of linkers is provided by Manzini *et al* (2014), Manzini and Savoia (2014, 2018) and Franco *et al* (2015). Concentrating primarily on Albanian and the Northwestern Iranian Kurdish languages, and restricting their analysis to cases of possessors and adjectives as Dependents of a Head noun, the authors argue that the linker is a D head taking the possessor or adjectival Dependent as its complement. This D head serves as an argument(al double) of a lower predicate. Thus the authors share the insight put forward in this article that linkers and agreement belong to the same class of morphemes – those which serve to mark the presence of a syntactic dependency – but differ in that, rather than being a semantically vacuous marker, the linker is considered to be an argument of a predicate. This linker D head is further posited to be a bound

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[29] In examples with multiple Dependents, Clf will have to recur.

[30] Clf does not seem to have this need in languages with prenominal modification (cf. (44), (47)).

variable of the higher D head that closes off the extended nominal projection as a whole. Where the Dependent is an adjective, the linker is argued to satisfy the adjective's θ-role:

(111) [$_{DP}$ D [$_{NP}$ N(P) [$_{DP}$ D$_{LNK}$ AP]]]

In the case of the possessor-possessum relationship, the possessor and possessum are both considered to be arguments of an inclusion predicate, lexicalised in Albanian and Kurmanji Kurdish as an oblique case-ending. The linker in this case is argued to be an argumental double of the possessum, therefore sharing its φ-features and/or definiteness features:

(112) [$_{DP}$ D [$_{NP}$ N(P)$_i$ [$_{DP}$ D$_{LNKi}$ possessor-OBL]]]

Prepositional linkers such as English *of* and French *de* are not considered by Franco *et al* to belong to the class of linkers, but rather to be prepositional instantiations of the inclusion predicate; that is, they are the prepositional equivalent of the oblique case endings in Albanian and Kurdish.

The analysis of the linker as a D head is partly motivated by the fact that in Albanian and Kurdish, articles and linkers/ezafe have a very similar (though not identical) morphological make-up, varying according to number, gender and, in some languages/dialects, definiteness; however, since both heads are marking the same set of features, either the number and gender of the Head noun or the definiteness feature of the extended nominal projection as a whole, it is hardly surprising that they should express these features through similar morphological forms, and need not follow that they are in fact syntactically the same. Moreover, if we look beyond Albanian and Kurdish, there is no morphophonological evidence supporting the claim that linkers and articles belong to the same class. Firstly, as we have seen, linkers are also used in languages with no articles (such as the Bantu languages, Chinese, Bai, Lahu, Japanese, Hindi-Urdu and Persian). Secondly, in the Kotoko languages, which do have articles, there is no morphophonological similarity between the two; indeed, definite articles in Zina (unlike linkers, which as we have seen display φ-feature agreement) are invariant (Demeke 2002:86). Thirdly, linkers in Kotoko and the Arbëresh variety of Albanian are invariant as regards definiteness, despite the existence of definite articles in these languages (on Kotoko see (38); Tourneux and Mahamat 2009; Shryock and Brahim 2011:17-20; Allison 2012:59-61, §§4.2.9, 6; and on Arbëresh see Franco *et al* 2015:288).

Like both Rebuschi's (2002, 2005) and Den Dikken and Singhapreecha's (2004) analyses, the theory espoused by Manzini, Savoia and Franco faces the problem of only accounting for a subset of examples with linkers: those where the Dependent is predicative. Moreover, the analysis is problematic in that, as shown in examples (32)-(37), (48) and (53)-(54), linkers may be present in non-nominal contexts. In many cases, such as Mandarin Chinese, Bai and Persian (the latter of which Manzini, Franco and Savoia claim to account for), these linkers used in APs and the clause are phonologically identical to those used in the complex noun phrase. Recall that for Manzini, Savoia and Franco, the linker is a variable bound by a higher D head. It is not clear what would bind the linker in these non-nominal cases. Finally, proposing that the linker is an argument, and therefore semantically contentful, in itself raises issues: as mentioned previously, Philip (2013) argues that the unique behaviour of linkers (encompassing, as in the proposal put forward in this study, complementisers, linkers in the noun phrase and elsewhere, and relative clause markers) in invariably conforming to harmonic word order principles can be explained by their semantic vacuity. If linkers are not to be regarded as semantically vacuous, we lose a powerful explanation of the presence or absence of disharmony cross-linguistically.

At the conclusion of our analysis of alternative theories of linkers, we have found that none of them encompasses the full range of data for linkers captured by the alternative proposal presented in this article. Moreover, unlike the analysis of linkers as Dependent-markers, none of the previous proposals is able to generalise over all occurrences of syntactically independent, semantically vacuous, relationship-marking heads. Note that there is independent evidence to regard these as forming a class: as mentioned above, Philip (2013) shows that such heads are unique in that they always conform to rules of harmonic word ordering.

Having shown that the analysis of linkers put forward in this study is empirically more attractive than its alternatives, it now seems meaningful to consider its broader implications regarding theories of morphosyntax. Firstly, the findings of this study have implications for theories of functional heads, and more particularly those that are purely relational in nature. Whether or not syntactic theory allows for semantically vacuous functional heads that serve only to mark a relationship is a contentious issue, and one that is generally argued, not on the basis of empirical evidence, but purely from a theoretical standpoint. Thus, while the Minimalist Program in its earliest form made use of such heads with the label Agr (Chomsky 1995, following Pollock 1989[31]), Chomsky (1995:§4.10) later speculates that these heads might, and perhaps should, be dispensed with. Later developments in the theory, such that a head without its own interpretable features will ultimately delete, forced the conclusion that such heads cannot exist, since following deletion the merger of this head with any other syntactic object will be left without a label (Chomsky 2000:138-139). According to this reasoning, a semantically vacuous marker of a relationship can never project in its own right in the syntax, either to dominate a head internal to the extended projection or to dominate the Dependent extended projection as a whole. Chomsky (2000) therefore predicts that marking of a grammatical dependency can never occur by means of an independent syntactic word. We have shown however by the data in section 4 that Chomsky's proposal is too strong; linkers provide evidence that there are indeed independent morphemes lacking features referring to semantics that serve only to mark a relationship. Moreover, we have seen that these morphemes must be syntactic objects; that is, Chomsky's theory cannot be saved by arguing that linkers are introduced into the derivation only at PF (see discussion in subsection 5.1).

On the other hand, when we take into account the principles of extended projection, and continued percolation of the features of the complement of a functional head, deletion of LNK at LF is not in fact problematic. This can be seen by looking at the trees in (18): even if LNK is deleted, every node still has a label, since the features of LNK's complement continue to project. (This deletion must take place after Spell-Out, since LNK can be realised phonologically.)   When we combine this possibility for the presence of semantically vacuous functional heads with the structural intervention requirement of section 3, we arrive at the desired conclusion that such functional heads can only occur as Dependent-markers.

While the conclusions reached by Chomsky's (2000) theory of syntax are too strong to capture the data, approaches to locus of marking as a typological phenomenon are too weak, because they fail to maintain a consistent distinction between locus as it is realised affixally and by syntactically independent words. Typological surveys such as Nichols (1986, 1992) concentrate purely on the affixal expression of locus in terms of data, while yet stating as theoretical background that locus may be realised either affixally or by an independent word. Nichols' contribution regarding the expression of locus by means of independent syntactic words is limited to the following: 'Languages of the isolating type will be left out of the discussion entirely – although their "grammatical words", "function words", "empty words" etc. presumably also exhibit Head-marking and Dependent-marking tendencies' (Nichols 1986:59). According to the evidence we have seen, however, this presumption is overly permissive; independent function words do *not* exhibit Head-marking tendencies.[32]

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[31] While Pollock (1989) does in fact make his argument for AgrP on the basis of empirical evidence, this argument is only for the need of two distinct functional heads within the clause; the empirical evidence does not provide an argument for the presence of a semantically vacuous, relational, functional head. Indeed, even this argument for AgrP has been called into question (Iatridou 1990).

[32] Bickel and Nichols (2013) offer the following, from the Australian language isolate Tiwi, as an example of Head-marking by an independent syntactic word, with the b) example showing that the independent pronoun *ŋara* ('he') forms a constituent with the head:

v)   a)   jərəkəpai   (ŋara)   tuwaɹa   *Tiwi*
          crocodile   he   tail
     b)   ŋara   tuwaɹa   jərəkəpai
          he   tail   crocodile

     'crocodile's tail'   (Bickel & Nichols 2013, exx 6, 8, citing Osborne 1974:74-75)

Given this distinction between marking by affixes and marking by independent syntactic words, there are wider implications for theories of morphosyntax in general, and not just specifically as regards the marking of grammatical dependencies. The theory presented here, for which we have seen the empirical evidence, is based on the assumption that independent syntactic words project in the syntax in their own right, whereas affixes do not. Before concluding, it is worth mentioning that such an assumption is more in the spirit of theories that assign morphology and syntax to separate modules, as proposed for example by theories such as Lexical Functional Grammar and by Di Sciullo and Williams (1987), and argued convincingly on independent grounds for example by Spencer (1992), Joseph and Smirniotopoulos (1993) and Ackema and Neeleman (2002 *et seq*).

Therefore, any theory of syntax will have to allow for purely relational functional heads, whilst restricting their role to that of Dependent-marking. Such a theory was sketched in section 3. Moreover, in order to maintain this restriction to Dependent-marking for independent syntactic words, whilst still permitting both head- and Dependent-marking and marking between heads for affixes, our theory of morphosyntax should find some means of differentiating affixes and independent syntactic words.

6 Conclusion

In this article I have argued that, if we want to understand the place within syntactic theory of semantically empty, relationship-marking functional heads, we need to approach the question not only from a theoretical standpoint, but also consider relevant data where grammatical dependencies are marked by such heads. Conversely, if we wish to further our understanding of how grammatical dependencies are expressed by the grammar, we need to take into account the expression of such relationships by means of both affixes and independent syntactic words. Doing so not only gives us a broader typological basis for any generalisations, but also allows us to explore the factors distinguishing morphology from syntax.

A study of locus of marking as realised by linkers has enabled us to shed light on some of the issues outlined above. Specifically, I provided evidence that linkers serve as independent syntactic words marking Dependents. I argued that this is part of a wider pattern, whereby Dependent-marking is the only option available for independent syntactic words as regards marking a grammatical dependency. Independent syntactic words have such a restriction placed on them due to their syntactic status; I proposed that independent syntactic words, unlike affixes, head their own projection, and are therefore subject to a structural intervention requirement.

The constituency however is immaterial for our purposes here, since *ŋara* is a pronoun, and therefore the Dependent itself, rather than a semantically empty relational marker. The optionality of *ŋara* in a), and the free distribution of *jərəkəpai* ('crocodile') when *ŋara* is present, indicate that the pronoun *ŋara* is the Dependent, which is coreferential with *jərəkəpai*, which is dislocated as an adjunct.

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