SUBORDINATING AND COORDINATING LINKERS

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Declaration

I, Joy Naomi Philip, confirm that the work presented in this thesis is my own, and that where information has been obtained from other sources, this has been indicated in the thesis.

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Abstract

This thesis is concerned with syntactic mechanisms for the marking of grammatical relationships. It is argued that there is a class of semantically vacuous functional heads serving only as a syntactic means of marking such relationships – either subordination or coordination. These heads are known as linkers. Through studying restrictions on the structural and linear distribution of linkers cross-linguistically, the thesis sheds light on varied areas of syntax: the nature of projection in morphology and syntax; word order principles; and the place of coordinate structures within phrase-structure principles.

The morphosyntax provides two possible mechanisms for marking a grammatical relationship. Firstly, an affix marking the relationship can attach directly to any member of the relationship. This member of the relationship then enters the syntactic derivation, but the affix has no syntactic status in its own right. Alternatively, the relationship can be marked by a syntactic object in its own right – a semantically vacuous projecting functional head (a linker). In this latter case, the relationship is marked by the linker structurally intervening between the members of the relationship: its projection must dominate one member, and cannot dominate the others. When combined with principles of extended projection, this leads to the restriction that, in marking a subordination, or Head-Dependent, relationship, such linkers can only appear as the highest head in the extended projection of the Dependent. This prediction is tested empirically by determining the possible distribution and constituency of linkers predominantly in the complex noun phrase.

We next consider how the structural distribution of linkers is mapped onto linear order. It is proposed that there are two types of word order constraints available in natural language: those relating to harmony, which are universal and obey a fixed ranking; and those referring to specific features of a head – either lexical category or features referring to semantics. Given their status as semantically vacuous functional heads, only the first type of word order constraint, relating to harmony, applies to linkers. It is shown using Optimality Theory that this theory successfully accounts for the absence of certain disharmonic word orders cross-linguistically.

Finally, we consider the implications of the restrictions on the structural and linear distribution of linkers for linkers marking the coordination relationship (that is, syntactically independent coordinators). It is argued that coordination is a symmetric structure, headed by a potentially infinite number of coordinands. It is shown that any difference in the distribution of coordinating and subordinating linkers should be attributed to the unique syntax of the coordinate structure.

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Abbreviations in Glosses

1	1st person
2	2nd person
3	3rd person
1, 2, 3…	noun class markers
ABL	ablative
ACC	accusative
ADESS	adessive
ANTIPASS	antipassive
AOR	aorist
ASP	aspect
CERT	certitive
CL	classifier
COMPL	completive
CONTR	contrastive
COP	copula
DAT	dative
DECL	declarative
DEM	demonstrative
DEP	dependent
DET	determiner
DU	dual
EMPH	emphatic
ERG	ergative
EXP	experiential
F	feminine
FACT	factive
FUT	future
FV	final vowel
GEN	genitive
HAB	habitual
IMMED	immediate
IMP	imperative
IMPF	imperfective
INDIC	indicative
LNK	linker
LOC	locative
M	masculine
N	nominal
n-	n-word
NEG	negative
NT	neuter
NOM	nominative
NONPST	non-past
OBJ	object
OBL	oblique
OM	object marker
PART	partitive
PERF	perfective
PL	plural
POSS	possessive
PRED	predicate marker
PRES	present
PROG	progressive
PRT	particle
PST	past
PSTPRT	past participle
Q	interrogative
REC	reciprocal
REL	relative clause
SG	singular
SOC	sociative
SRESS	superessive
T	tense
TODPST	today's past
TOP	topic
VOL	volitional

Chapter 1: Introduction

This thesis presents evidence for a class of semantically vacuous functional heads serving as a syntactic means of marking an independently existing grammatical relationship. This class of heads includes subordinating complementisers (italicised in (1)); syntactically independent structural case markers (as in (2)); linkers, or syntactically independent markers of subordination, in the complex noun phrase, including the associative marker in Bantu (see (3)) and the ezafe/izafe(t) in Indo-Iranian (see (4)); purely functional adpositions (as in (5)); syntactically independent relativisers (as in (6)); and syntactically independent coordinators (as in (7)).

(1) I thought (*that*) John had seen Mary. *English*

(2) John=*ga* Mary(=*o*) mi=ta. *Japanese*
John=LNK.NOM Mary=LNK.ACC see=PST
'John saw Mary.'

(3) anyaní *á* mísala *Chichewa*
2baboons 2LNK 4madness
'the mad baboons' (Morimoto & Mchombo 2004:355, ex 16)

(4) lebâs=*e* arusi=*e* sefid=*e* bi âstin=*e* maryam *Persian*
dress=LNK wedding=LNK white=LNK without sleeve=LNK Maryam
'Maryam's white wedding dress without sleeves' (Samvelian 2006:3, ex 1d)

(5) a book *of* poetry *English*

(6) dopisu *co* Vám poslali *Czech*
letter LNK you.PL.DAT sent
'the letter (*that*) they sent you' (Fried 2010:20, ex 5a)

(7) a) John (*and*) Mary *and* Bill *English*

b) John (*or*) Mary *or* Bill

The aim of this thesis is to show that this apparently diverse set of heads forms a unified class, which we will term 'linkers'. The heads are unified by their status as functional heads that project in the syntax but do not contribute any features to the compositional semantics. Their sole purpose is to mark an independently existing syntactic relationship. For this reason, a

linker only appears where the relevant relationship is present: for example, subordinating complementisers and relativisers, such as those in (1) and (6), do not appear in matrix clauses; linkers used in the complex noun phrase, such as those in (3)-(6), do not appear where either the Head noun is unmodified or where the Dependent constituent is not used attributively; while coordinators, as in (7), only appear where there are two or more constituents sharing equivalent syntactic status. Similarly, since the relationship marked is established independently of the linker, the same syntactic relationship in another language may occur without any linker. (Compare for instance the examples in (2)-(4), which use linkers, with their English translations, which do not.) For the same reason, the use of a linker may be optional, as in (1), (2) and (7), and the English translation of (6). In addition, the thesis proposes that linkers are united by a further characteristic: in order to mark the relevant relationship, the linker must intervene structurally between the members of the relationship. Putting these properties together, the behaviour of a particular linker will therefore be determined by its defining characteristics of syntactic projection, lack of features referring to semantics, and structural intervention, when combined with any independent properties either of the syntax in general, the syntax of the particular relationship being marked, or (in the case where the linker is a clitic, as in (2) and (4) above,) of the phonology.

The thesis is organised as follows. Chapter 2 introduces the notion of syntactically independent heads – that is, linkers – serving as markers of grammatical dependencies. While this is not a new notion (see Nichols 1986, 1992), it is one that has not previously been studied as an empirical phenomenon in its own right. Nichols (1986) introduces the notion of morphemes serving purely as markers of grammatical dependencies, but does not make a distinction between affixes and independent syntactic words in her results. At the opposite extreme, Chomsky (2000, following 1995b) argues on theoretical grounds that projecting heads lacking in interpretable features are by definition ruled out as syntactic objects. The chapter provides empirical evidence that the syntax does allow for semantically vacuous functional heads, but their status as independent syntactic objects marking a relationship places restrictions on their distribution.

It is proposed that affixes are distinguished from independent syntactic words in that the latter, but not the former, project in their own right in the syntax. An affix marking a grammatical relationship therefore does so by attaching directly to any member of the relationship. This member of the relationship then enters the syntactic derivation, but the affix has no syntactic status in its own right. Where a grammatical relationship is marked by a syntactic object in its own right, distinct from either member of the relationship, – a linker – the situation is necessarily different. In this case, the relationship is marked by the linker structurally intervening between the members of the relationship: its projection must dominate one member,

and cannot dominate the others. When combined with the principles of extended projection (Grimshaw 1991/2005, 2000), this leads to the restriction that, in marking a subordination, or Head-Dependent, relationship, linkers can only appear as the highest head in the extended projection of the Dependent, while the relationship between heads within a single extended projection cannot be so marked. These predictions are tested, and borne out, empirically by determining the possible distribution and constituency of linkers predominantly in the complex noun phrase. It is shown that alternative theories of linkers are not able to capture the full range of data, either because they make incorrect predictions regarding constituency (Simpson 2001, 2002; Den Dikken and Singhapreecha 2004), or because they account for only a subset of the relationships marked by linkers (Rubin 1997 *et seq*; Simpson 2001, 2002; Rebuschi 2002, 2005; Den Dikken and Singhapreecha 2004).

Having determined the structural distribution of linkers marking the Head-Dependent, or subordination, relationship, chapter 3 is concerned with how this distribution is mapped onto linear order. It is posited that there are two types of word order constraints available in natural language: those relating to harmony, which are universal and obey a fixed ranking; and those referring to specific features of a head – either lexical category or features referring to semantics. Harmony is defined by the interaction of three independently motivated word order constraints operating over the base-generated structure: linear proximity between a superordinate Head in one extended projection and the head of its Dependent extended projection; uniformity in direction of headedness within the extended projection; and the preference for clausal Dependents to follow their superordinate Head. It is proposed that disharmony occurs where either a lexical head or a head bearing syntactic features encoding semantics has an ordering rule of its own. Given their status as semantically vacuous functional heads, only the first type of word order constraint, relating to harmony, applies to linkers. It is shown using Optimality Theory that irrespective of any possible interaction between the two types of constraints, this leads to the restriction that linkers invariably intervene linearly between Head and Dependent. In this way the theory successfully accounts for the absence of certain disharmonic word orders cross-linguistically. These proposals are shown to be superior, in terms of both what is permitted and what is disallowed, to the alternative generalisation over absent disharmonic word orders offered by the Final-Over-Final Constraint (Holmberg 2000; Biberauer *et al* 2007 *et seq*).

Chapter 4 explores the possibility that syntactically independent coordinators likewise belong to the class of linkers – that is, they are also semantically vacuous functional heads serving to mark a grammatical relationship (coordination) by means of structural intervention. It is shown that any differences in the behaviour of subordinating and coordinating linkers can be attributed not to any inherent difference in the linkers themselves, but rather to the differing syntax of the

subordination and coordination relationships: the former is an asymmetric relationship motivated by s-selectional properties of either Head or Dependent, while the latter is a symmetric relationship of mutual adjunction (Neeleman 2006), headed by a potentially infinite number of Coordinands and occurring independently of s-selection. It is shown that the structure of mutual adjunction makes more accurate predictions than the popular Boolean phrase theory (Munn 1987; Woolford 1987:169; Larson 1990; Kolb and Thiersch 1991:277, fn 60, following Thiersch 1985; Rothstein 1991:§2.1; Grootveld 1992; Johannessen 1993, 1998; Kayne 1994; Zoerner 1995, 1999) concerning the Head of the coordinate structure as a whole, c-command between Coordinands, the coordination of non-maximal projections, and the semantics of conjunction and disjunction. Bearing in mind the differences in the syntax of subordination and coordination, coordinating linkers are subject to the same restrictions as their subordinating counterparts: the structural intervention requirement of chapter 2 and the linear intervention requirement of chapter 3.

The empirical findings of this thesis and the consequent generalisations concerning obligatory structural and linear intervention for linkers bear a number of similarities to the relator principle of Functional Grammar introduced by Dik (1983, 1997) (whereby relators encompass adpositions, case markers, subordinating devices and coordinators):

(8) *The Relator Principle*

Principle I: The preferred position of a Relator is at the periphery of its immediate relatum.

Principle II: The preferred position of a Relator is in between its two relata.

(Dik 1983:274)

However, there are two important differences to be observed. Firstly, the definition of the linker is more restrictive than that of the relator, both syntactically and semantically. Unlike linkers, the class of relators encompasses relationship-marking affixes, as well as independent syntactic words, and also the full set of adpositions, including those that are semantically contentful. This thesis shows that the more restrictive definition of the linker, as opposed to the relator, allows us to make more precise generalisations. The relator principle states only preferences, whereas the structural and linear intervention requirements over linkers are (at the base-generated level) without exception. Secondly, the two parts of the relator principle are simply descriptive observations, or stipulations. In this thesis, however, the generalisations made concerning the structural and linear positioning of linkers are not only verified empirically, but also motivated theoretically.

Chapter 2: Locus and Linkers

2.1 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 chapter 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.

Before considering the theoretical argument and empirical evidence supporting this generalisation, which will occupy the major part of this chapter, a certain background to the concepts it addresses will need to be given. Section 2.2 of this chapter 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 2.3 will then elaborate a theory of morphosyntactic marking, focusing on the role of relational functional heads. The predictions made by this theory will be tested in section 2.4 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 2.5.

The main empirical contribution of the chapter will be to show 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 can only be employed where it marks a Dependent. Specifically, the important issue of determining the distribution and constituency of linkers in the complex noun phrase will be addressed (section 2.4), an aspect that has been overlooked in previous studies of such linkers (such as Rubin 1997 *et seq*; Den Dikken and Singhapreecha 2004; Rebuschi 2002, 2005:§4; Den Dikken 2006).

The main theoretical contribution of the chapter will be to motivate the empirical distinction between independent syntactic words and affixes by proposing firstly that the two are distinguished in that former, but not the latter, head their own projection in the syntax, and secondly that syntactic heads serving uniquely as dependency-markers are subject to a structural intervention requirement (section 2.3). Moreover, it will be argued *contra* Chomsky (1995b, 2000) that, given the principles of extended projection (Grimshaw 1991/2005, 2000), the presence of semantically vacuous functional heads in the syntax and their subsequent deletion at LF does not raise any theoretical problems (section 2.5.2).

2.2 Morphosyntactic Marking of Dependencies

2.2.1 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. (We will also consider marking of the symmetric coordination relationship in chapter 4.) 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
'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'

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 morphological 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 chapter: 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 head-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 latter 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, that projects) and the notion of the syntactic Head of a subordination relationship. Throughout this thesis I distinguish between the two by using a capital H for the latter. Working definitions of Head and Dependent in the Head-Dependent relationship are given below:[1]

[1] These definitions, in their broad outlines, should not I think be controversial. Nichols (1986; 1992) and Bickel and Nichols (2008a,b,c) 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. subcategorisation]) within the constituent, it is the Head that governs the Dependent' (Nichols 1992:46; see also Nichols 1986:57). In practice, this ideology is perhaps – and necessarily – a little confused by ease of methodology. Nichols maintains what Corbett *et al* (1993:5) term the 'Head of construction constancy principle', whereby the grammatical category of the Head of a given relationship remains uniform across languages. The choice of Head/Dependent is therefore semantically motivated.

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 (1991/2005, 2000) notion of the extended

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

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

c) *Head-Dependent relationship:* A relationship mediated by s-selection between a (projection of a) head in extended projection α and a Dependent extended projection β.

It is important to recognise that the Head-Dependent, and the head-head, relationships encompass only a subset of syntactic relationships.[2] 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 chapter. Similarly there is the symmetric relationship of coordination, which we reserve for more detailed study in chapter 4.

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, 2008a, 2008b, 2008c):

(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

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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).

[2] The Head-Dependent relationship itself is made up of other meaningful syntactic relationships, such as sisterhood, the spec/head relationship, and adjunction, while the head-head relationship is concerned with domination.

[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 Ā-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.

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 chapter 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.

2.2.2 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

[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 thesis.

attaches to (cf. 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, and 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.

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 [wat̪ayi-*ɣamṛa-ma* pat^{r}a-*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 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 (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.' (Corbett 2006:97, ex 64)

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 *pat^{r}a* ('canoe') and its possessor *wat̲ayi* ('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

[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.

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 the 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. 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 (22) and (48) 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 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]

[6] While a complementiser such as *that* is marked for finiteness, it is not the complementiser, but rather the

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.

2.3 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 2.2.2 above); secondly, a structural intervention requirement on the syntactic marking of relationships; and thirdly, the principles of projection in building an extended projection (Grimshaw 1991/2005, 2000).

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

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lower head T, that introduces the finite feature; the complementiser does not introduce any semantics.

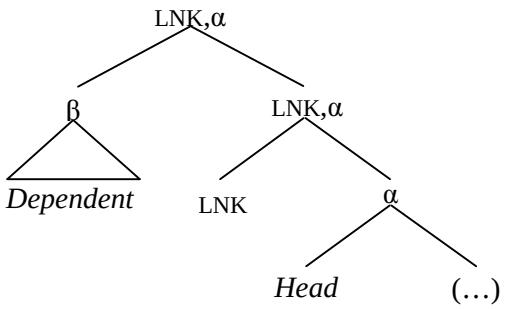
(which we will term LNK, for 'linker') should structurally intervene between these two. The notion of structural intervention can be defined as follows: every projection of LNK must dominate one member of the relationship, and no projection of LNK can dominate the other member of the relationship. The 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 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 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 (1991/2005, 2000), 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

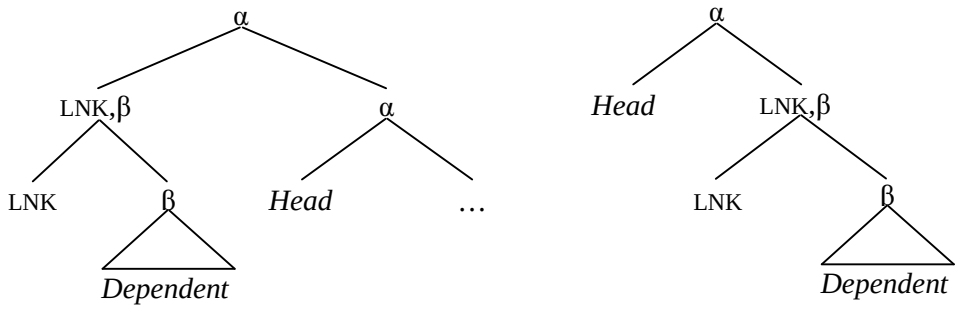
projection prevents further percolation, and the cessation of percolation closes off the extended projection. There is no option for a head internal to the extended projection not to percolate, or to percolate only partially.

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. When this sub-tree is merged with the Dependent (a distinct extended projection), 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 (17)a). (Note that the trees in this chapter represent purely hierarchical structure, and do not make any claims about linearisation. How the structural relationships studied in this chapter are mapped onto linear order is a matter we will explore in detail in the next chapter.) 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. The same problem arises where the functional head LNK is used to mark the relationship between two heads, shown in (17)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 (17)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.

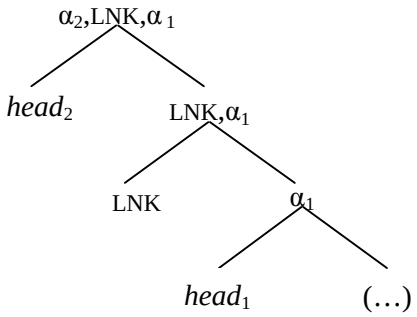
(17) a) ** Head-marking by means of an independent syntactic word:*



b) *Dependent-marking by means of an independent syntactic word:*



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

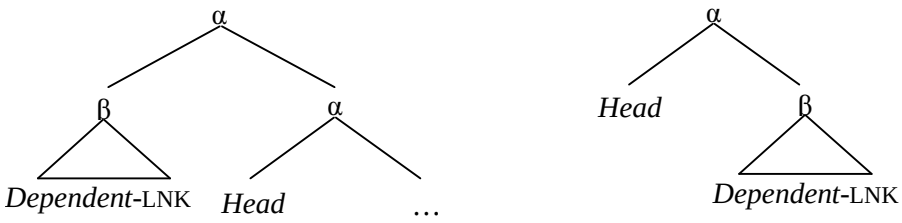


Therefore, combining the proposed structural intervention requirement with independently motivated principles of extended projection leads to the prediction that a syntactic relationship between a head and some other element can only be marked by means of a semantically vacuous functional head – that is, an independent syntactic word – if this head marks a Dependent.

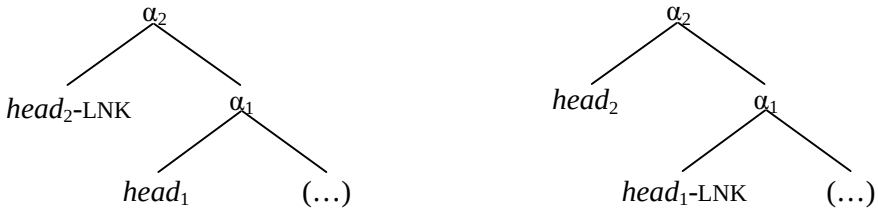
However, this restriction does not apply where the semantically vacuous marker of a relationship is an affix, rather than a syntactic word in its own right. The non-projecting affix does not mark the relevant relationship by its hierarchical position in the syntax, because it doesn't have one. Instead,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

(18) a) *Affixal Head-marking:*

b) *Affixal Dependent-marking:*



c) *Affixal marking between heads:*



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).

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 (19) 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 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: a 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 (17)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).

(19) *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 a 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 will consider examples of specific lexical entries in (93) below.

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 (19). We have already seen some evidence that this is the case in section 2.2.2. 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 in the complex noun phrase both of the existence of purely relational functional heads, and of the restriction to Dependent-marking (cf. Limburg 1985).

2.4 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 (cf. Rubin 2002: chapter 2; Den Dikken and Singhapreecha 2004; Samvelian 2006:26). 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)).[7]

In this section we will be concerned primarily 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 and with prenominal Dependents. (See the Appendix for the sample used in this thesis.) In the

[7] Here I concentrate on the use of linkers in the complex noun phrase, where their usage is best documented, and their constituency least obvious. As well as nouns, relevant heads may be adjectives and possibly prepositions, as in Western Iranian languages (Samiian 1994:23-26; Ghomeshi 1997:730; Kahnemuyipour 2000:173; Samvelian 2007:609, 2008:§2.2 and references cited there). Rubin (2002: chapters 2 & 3) provides evidence of linkers within the clause, some of which are phonologically identical to the linker used in the complex noun phrase. At least in Tagalog this is unlikely to be due to simple homophony, as in both instances of its usage the linker/complementiser has the same fairly idiosyncratic allomorphy (cf. Schachter and Otanes 1972). See this section for examples from Mandarin Chinese and §3.5.3 for further examples.

vast majority of cases, the linker intervenes linearly between the Head noun (phrase) and its Dependent, giving the linear orders in (20)a) and b) below (see section 3.2.1.):[8]

(20) 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.

2.4.1 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 (21)), complements (as in (22)-(23)), and attributive modifiers, both in predicate modification (as in (24)-(26)) and where the Dependent is demonstrative (as in (27)) or quantificational (as in (28)).[9] Not every relationship will be marked in every language.

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

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

[8] In a minority of languages the surface order N(P)-Dependent-LNK is also found, often in free variation with the order in (20)b). We will propose in §3.5.2 in the next chapter that this order is derived from that in (20)b) by movement. See also discussion of examples from Pashto in (40)-(41) below.

[9] Which Head-Dependent relationships are marked by overt linkers is subject to cross-linguistic variation. The most common usages of linkers occur where Head and Dependent are of the same category: whether both verbal, in which case we use the term complementiser for the linker, or both nominal. In such cases morphological marking is more likely to be required to disambiguate which is the Head and which is the Dependent. I know of no language that uses linkers in the complex noun phrase but does not use them where a Head noun takes another nominal as its Dependent.

(23) səmy-a *cə* Habi *Zina*[10]
listen.to-N.F LNK.F Habi
'listening to Habi' (Oprina 2002:124, ex 64d)

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

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

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

(27) chi *ve* qhaʔ-šɛ nî gâ *Lahu*[11]
this LNK headman two CL
'these two headmen' (Den Dikken & Singhapreecha 2004:36, fn 23, ex iii)

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

Crucially, however, my research into linkers in a wide variety of genetically and geographically diverse languages (see Appendix for a comprehensive list) 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. 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. However, the relationship between a noun and a determiner head is never marked by a linker, even though in some cases the form of the determiner head – which does not co-occur with a linker – is identical to a demonstrative – which must co-occur with a linker (as in the Afade examples in (30)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 (29)b)-c) and (30)c). (See Bernstein 1997; Giusti 1995 *et seq*;

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

[11] Lahu is Tibeto-Burman.

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 the Kotoko languages is exemplified below:

(29) 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)

(30) a) gɨlew do *Afade*[12]
dog(M) the.M
'the dog'

b) gɨlew *an* do
dog(M) LNK.M the.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 (20) should invariably result from the following constituency:

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

(31) 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; Simpson 2001, 2002 on Mandarin Chinese; Holmberg and Odden 2004 on the West Iranian language Hawrami), and while these theories necessarily make predictions concerning the constituency of linkers, whether these predictions are borne out empirically has remained an unanswered question.

Here I will argue that data from fronting (subsection 2.4.2), coordination (2.4.3) and deletion (2.4.4) 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 2.4.5).

2.4.2 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).[13,14] These examples show pied-piping of the linker with the *wh*-moved Dependent:

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[13] 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].

(32) 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] est -elle l-a [femme]?
LNK which husband(M) is she the-F woman(F)
'Of which husband is she the wife?'

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

In French, pied-piping of the linker is obligatory, while in English it is optional. For our purposes, however, this contrast is irrelevant; in order to show that the linker, whether *de* or *of*, forms a constituent with the Dependent possessor, it is sufficient to show that pied-piping of the linker is possible.

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 (34)c), it is accompanied by the linker.[15] 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

(34) 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.'

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[14] 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.

[15] Morimoto and Mchombo (2004) and Mchombo (2006) do not state whether fronting of the associative marker with the possessor in Chichewa in examples such as (34)b) is obligatory, though this seems probable. However, it is sufficient for our argument to show that pied-piping of the linker is *possible*, which Morimoto and Mchombo's example certainly demonstrates.

Topicalisation of a constituent internal to the complex noun phrase in Chichewa is dependent on the presence of an object marker co-referential to the complex noun phrase with which this fronted constituent is associated (Mchombo 2001, 2004:§4.9, 2006; Morimoto and Mchombo 2004).

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 (2005a) 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 *et seq*). 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 (35)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 (35)d) and e) show that *de* cannot be stranded by fronting of the adjective.

(35) 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 also Paul (2005:§2) show

that there are certain adjectives that can appear with *de* as noun phrase modifiers, but cannot be used predicatively,[16] with co-occurrence of either the intensifier *hen* ('very') or the negator *bu* constituting evidence of predicatehood. Compare the behaviour of *zhongyao* ('important') in (36), which can be predicative, with *zhuyao* ('main') in (37), which cannot be:

(36) 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'

(37) 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:

(38) 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)

[16] Sproat and Shih (1991:574) justify their relative clause analysis by citing Huang's (1987) observation that *qian* ('former') and *wei* ('fake') can occur neither as *de*-modifiers nor as predicates. However, Aoun and Li (2003:251-252, fn 15) provide evidence that these are not adjectives, but prefixes.

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 (39) below: the example in (39)b) shows fronting of the Dependent, *kexue* ('science'), with pied-piping of *de*, confirming that the two form a constituent, while (39)c) shows that, just as in the noun phrase examples in (35)d)-e), movement of the Dependent cannot strand *de*:

(39) 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*], women [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 has the word order LNK-dependent-noun, where the linker *de* marks the relationship between a Head noun (phrase) and its possessor:

(40) [*de* Asad] [moţar] *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 (41) below. Compositional semantics suggests that in such cases the possessor must have moved out of the nominal complement of the preposition.

(41) a) [*de* Asad]$_i$ [pə chāqú t_i] *Pashto*
LNK Asad with knife
'with Asad's knife' (Larson 2009, ex 58a)

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

2.4.3 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*:

(42) 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:

(43) [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

(44) 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.'

(45) 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

(46) 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 (42) and (43) and in (46). The intended interpretation in the marked construction in (46) is only possible with 'comma' intonation after each conjunct. This, together with the fact that its usage is limited to literary contexts, indicates that (46) is in fact an example of Left Node Raising. The examples in (42) and (43), 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.[17]

[17] 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

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), Simpson (2001) and Simpson and Wu (1999) point out the significance of its similarity to Mandarin *de*. Like Mandarin, Japanese has prenominal Dependents and therefore the word order in (20)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 (47), but may be where a single Head noun has two possessors, as in (48):

(47) [John=*no*] [tumasosite(*=*no*) kodomo] *Japanese*
John=LNK wife and=LNK child
'John's wife and child'

(48) 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'

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).[18]

(49) [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'

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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.

[18] It is debatable whether this marking of the Head noun's case is true agreement with the Head noun, or whether case is rather assigned to the extended nominal projection as a whole, and therefore marked on all its members that are capable of expressing it morphologically. See discussion of this issue in general terms in Corbett (2006:133-137). Neither analysis has any bearing on the conclusions of this thesis.

(50) 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 (51)-(52) 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:

(51) the [[branches (**of*)[19] and leaves] [*of* [the tree]]] *English*

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

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

Evidence from coordination data can also be found in two further languages with postnominal Dependents, Persian (or Farsi) and Lagwan (or Logone), a Central Chadic language of the Kotoko group. The phonological properties of the linker in these two languages, however, are such that the argumentation for constituency must be more subtle.

The linker *-(y)e* in Persian, known as the ezafe or izafe(t), is a phonological enclitic that attaches to the right-edge of a noun phrase where this noun phrase has a postnominal Dependent.[20] The ezafe in Persian has received considerable attention, both as a phenomenon in itself (Samiian 1983, 1994; Ghomeshi 1997; Kahnemuyipour 2000; Ortmann 2002, 2003; Samvelian 2006 *et seq*; Larson and Yamakido 2008 and references cited in these works) and in its capacity as a linker (Den Dikken and Singhapreecha 2004:§6.4). However, while the analyses in these works generally make predictions regarding the ezafe's constituency, any empirical evidence for the constituency of this independent syntactic word, has not, as far as I am aware, been discussed. Fronting cannot be used as a test, since movement out of the ezafe domain is impossible

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

[20] The ezafe also occurs within the AP and arguably within the PP (Samiian 1994; Ghomeshi 1997; Samvelian 2007, 2008 and references cited there).

(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 (53) and (54):

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

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

In (53), which is analogous to the Chinese, Japanese, Hindi-Urdu and English examples in (43), (47), (49) and (51), two coordinated NPs are under the scope of a single Dependent, the possessor *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 Persian data differ from the languages we looked at earlier in this section lies in (54), 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 (53), 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 (55)) and the partitive marker[21] (in (56)), 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:

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

[21] See discussion of this particle in footnote 23.

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

(56) 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 (53) and (54) 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 Persian the phonological environment also comes into play.[22,23]

[22] 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 (53) and (54). See discussion in section 2.5.1.

[23] It is worth briefly mentioning another particle in Persian, that has been described by some researchers as an allomorph of the ezafe (Ortmann 2002, 2003; Rebuschi 2005), although not by those specialising in Persian. This particle has the form *-i* and appears as an enclitic on the Head noun (phrase) when it is followed by a restrictive relative clause. It differs from the ezafe in a number of ways: it is only used with restrictive relative clauses, whereas the ezafe is used with both restrictive and non-restrictive attributes; the presence of the demonstrative renders *-i* optional, whereas the ezafe remains obligatory; unlike Dependents introduced by the ezafe, the restrictive relative clause can be extraposed (leaving *-i* behind). The most serious difference however concerns constituency; coordination data indicates that *-i* forms a constituent with the Head noun (phrase):

iii) a) [[doxtar=i] va [zan=i]] [*ke* diruz âmad-and] *Persian*
girl=PART and woman=PART that yesterday came-PL

b) [[doxtar va zan]=i] [*ke* diruz âmad-and]
girl and woman=PART that yesterday came-PL

'the [girl and woman] that came yesterday'

The evidence that *-i* forms a constituent with the Head noun (phrase) is only problematic if it meets the criteria for linkerhood, namely that it is syntactically independent, appears only where the Head noun has a Dependent and does not contribute to the compositional semantics of either the Head's or the Dependent's extended projection. My research into this independent syntactic word reveals that it fails to meet the latter two criteria. Various scholars of Persian, including Hincha (1961), Lazard (1966) and Jahani (2000, 2008) consider the restrictive relative clause particle *-i* to be the same morpheme as the so-called 'indefinite' *-i*, both having a partitive reading, and therefore making some semantic contribution to the head. This particle can also be used, giving the partitive reading, in the absence of a restrictive relative clause, as exemplified in (56) above. Comparing this example with iii) above demonstrates their identical distribution. Similarly, both may optionally co-occur with the demonstrative, moreover confirming that there is no indefinite reading, even in the absence of a restrictive relative clause. Further historical and comparative arguments can be made: Lazard (1966:264) and Jahani (2000) point to the same historical source for both instantiations of *-i*; while Jahani (2008) shows that fellow West Iranian language Balochi also uses the same particle for both functions.

Before leaving Persian for the time being, it is worth pointing out that the coordination data in (53) and (54), 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 (cf. section 2.2.2) – 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), (53) remains mysterious.

I am therefore analysing the Persian 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 though that Nichols uses the term with reference to the morpheme's phonological site of attachment.[24] 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 Persian 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 Central Chadic language Lagwan, 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.[25]

(57) [[Ufu (* =*na*) ka dughumi] [=*a* mghe]] i bbi. *Lagwan*
goat(F) =LNK.F.POSS and ox(M) =LNK.POSS chief 3PL[26] be.good
'The chief's goat and ox are good.'

[24] 'As in Nichols (1986), constructions are described as [H]ead-marking if the morphological marker of the syntactic relation or constituent type is affixed, *cliticized*, or otherwise attached to the [H]ead of the constituent' (Nichols 1992:68-69, my italics).

In later work, however, Bickel and Nichols use constituency to define whether Head-marking or Dependent-marking is involved where the marker of the relevant relationship is an independent syntactic word (Bickel and Nichols 2008b).

[25] Except where otherwise indicated, Lagwan examples here and elsewhere are based on my fieldnotes, 2004-2005.

[26] Here and elsewhere in Lagwan, morphemes such as this are not syntactically independent agreement markers (hence syntactic Head-markers and counterexamples to the predictions of the theory proposed here), but heads expressing tense or aspect which agree with the subject (morphologically Head-marked tense/aspect markers). Imperfective aspect, as in (57), is morphologically unmarked.

(58) 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 (57), 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 (58), the linker again can only appear once. However, as in Persian, the ungrammaticality of repetition of the linker in example (58) 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 (58) would remain a problem. Indeed, we would expect precisely the results found in (57) and (58) 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:

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

(60) /s̀xè/ + /=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:

(61) /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:

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

(63) /àsɨ/ + /=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 (62) and vowel deletion in (63) take place in order to provide an onset for the linker. Where the possessor, *Adam* in (62) and *Aysha* in (63), 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:

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

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

(66) /gɨm/ + /=na/ + /ẃ/ → [gɨm.nà.ʷú]
millet.cane(F) =LNK.F.POSS my 'my millet cane'

(67) /sà/ + /=na/ + /ẃ/ → [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:

(68) /m̀s'àl/ + /=a/ + /ẃ/ → [m̩.s'à.lá.^{w}ú] *Lagwan*
hair(M) =LNK.POSS my 'my hair'

(69) /m̀bìy/ + / =a/ + /ẃ/ → [m̩.bì.já.^{w}ú]
clothes(PL) =LNK.POSS my 'my clothes'

(70) / ǹgùn/ + /=na/ + /ẃ/ → [ŋ̩.gùn.ná.^{w}ú]
stomach(F) =LNK.F.POSS my 'my stomach'

(71) / m̀tì/ + /=na/ + /ní/ → [m̩.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 (64)-(67) and high tone in (68)-(71).

2.4.4 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 be 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 (72) and (73) below, the linker *de* is also deleted, indicating that it must form a constituent with the Dependent possessor:

(72) Ni you mei you hai ø 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?'

(73) 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 (72) and (73) 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:

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

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

Regarding the example in (73), 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 (73) 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.[27] The sentence contrasts with the example in (76) below where *Zhangsan* is not a dislocated topic co-refential with a *pro*-dropped possessor, but is the possessor itself. In this case there cannot be a break following *Zhangsan*, and, as in (75), where there is also no dislocation, *de* is obligatory:

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

[27] 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*.

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:

(77) [[Ta *de*] shu] hen pianyi, keshi [[wo *(*de*)] *ø*] hen gui.[28] *Mandarin Chinese*
he LNK book very cheap but I LNK very expensive
'His/Her book is very cheap, but mine is very expensive.'

(78) 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, like other case-markers, the linker *no* is deleted as part of the *pro*-dropped pronoun (in (79)), while in the ellipsis case, *no* must remain overt (in (80)):[29]

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

[28] This sentence is possible without the second *de*, but the intended reading is impossible, since there is no NP ellipsis; *wo* ('I') can only be interpreted as the Head:

iv) [[Ta*de*] shu] hen pianyu, keshi wo hen gui. *Mandarin Chinese*
he LNK book very cheap but I very expensive
*'His/Her book is very cheap, but mine is very expensive.'
'His/Her book is very cheap, but I am very expensive.'

[29] 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 (cf. Kitagawa and Ross 1982). Under the two-morpheme analysis, there is an alternative explanation available for example (80), 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):

v) 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 (79), the coordination data in (47)-(48), and general morphological inconsistencies (see 2.4.5) remain a mystery.

(80) [[Kare=*no*] hon]=wa yasui ga [[boku*(=*no*)] *ø*]=wa totemo takai.[30]
he=LNK book=TOP cheap but I=LNK=TOP very expensive
'His book is cheap, but mine is very expensive.'

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[31], Swahili and 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, lead 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.)

Hindi-Urdu

(81) [[Jaldī *k-ā*] kām] to [[shaitān *(*k-ā*)] *ø*] hotā hai.[32]
speed(F) LNK-MSG.NOM work(M) indeed devil(M) LNK-MSG.NOM be.HAB is
'The work of haste is really (the work) of the devil.'

(82) 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's his grandmother's.'[33]

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[30] Like the Chinese example in (77), this sentence is in fact possible without the second *no*, but in this case the intended reading is impossible, since there is no NP ellipsis; *boku* ('I') can only be interpreted as the Head:

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

[31] 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-*.

[32] Like the Japanese and Mandarin ellipsis examples, this will also be grammatical without the second linker, but the intended reading is impossible:

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

[33] In some varieties of Swahili, *bibi* is translated as 'wife'.

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

English

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

(85) 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, 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.

2.4.5 General Morphosyntactic Properties

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:

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

(87) 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 (86). 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 (86) and (87).

Applying these generalisations to Chinese, Japanese, Hindi-Urdu, Persian 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 (86), 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 nor Japanese 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 uses only Dependent-marking, while Hindi-Urdu, Persian and English also have Dependent-marking at the clause level.[34] 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;[35] therefore considering the ezafe as a form of Dependent-marking, as we have good reason to do, allows us to maintain the generalisation in (87) as universal.[36]

Concerning Japanese and Hindi-Urdu, 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

[34] Lagwan also has some, though limited, Dependent-marking at the clause level: weak pronouns are marked for case by tone. Strong pronouns and nouns are invariable.

Chinese languages also have some Dependent-marking at the clause level: adverbs are introduced by a linker. In Mandarin Chinese this linker has the same phonological form as the linker used in the complex noun phrase, *de*.

[35] Unlike many other West Iranian languages, adjectives and demonstratives in Persian are invariant.

[36] 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 (87). 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 (87).

predicted of any linker. Secondly, the morphosyntax of Japanese is not only consistently Dependent-marking, but also uniformly head-final (the only exception being certain coordinators, discussed in section 4.6.2.1). If, as both predicted, and implied by the coordination, *pro*-drop and ellipsis 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 a morphologically otherwise 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 (*modulo* certain loans from Persian,[37] and again coordinators, discussed in chapter 4). 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.

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 is 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.[38]

Indeed, the agreement itself in both Bantu and Hindi-Urdu can be used as a supporting argument for constituency. Where the sole purpose of a morpheme is to mark a syntactic relationship between two distinct extended projections – that is, a Head-Dependent relationship, we would expect the primary agreement on this morpheme to cross-reference features not of the

[37] The complementiser *ki*, and in Urdu the ezafe (see Bögel *et al* 2008)

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

projection of which it is a part, but of the projection with which it serves to establish a relationship.[39] Therefore the primary agreement in Head-marking should cross-reference features of the Dependent, while conversely the primary agreement in Dependent-marking should cross-reference features of the Head (cf. Nichols 1986:58, also Zwart 2006:56-57). By this reasoning, the fact that the agreement on the linker in Bantu and Hindi-Urdu cross-references not features of the Dependent, but features of the Head noun, is suggestive 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 other West Iranian languages such as the Kurdish languages it cross-references the gender or number feature of the Head noun,[40] demonstrated by the examples below:[41]

(88) a) kur[=*ê* ganç] *Kurmanji*
boy(M)=LNK.M young
'young boy'

b) kur[=*ên* ganç]
boy(M)=LNK.PL young
'young boys'

(89) a) kaç[=*â* ganc]
girl(F)=LNK.F young
'young girl'

b) kaç[=*ên* ganc]
girl(F)=LNK.PL young
'young girls' (Samvelian 2008, ex 33)

We have seen that the linker in Lagwan also marks the number or gender feature of the Head noun. However, in Lagwan the linker also marks properties of the Dependent. There are in fact

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

[40] In these languages the form of the ezafe also marks definiteness. As with any instance of definiteness-marking on Dependents in the extended nominal projection, however, it is debatable as to whether this is true agreement with the definiteness feature of the Head noun, or whether definiteness is a feature of the extended projection as a whole, and therefore marked on all its members that are capable of expressing it morphologically. See discussion of this issue in Corbett (2006:133-137).

[41] Zwart applies this argument to another West Iranian language, Zazaki (or Dimli). However, like Lagwan, this language marks not only the number or gender feature of the Head noun, but also varies according to the type of Dependent, distinguishing genitival and adjectival Dependents (see Larson and Yamakido 2006, 2008:66-67 and references given there). Cf. discussion of Lagwan below.

three types of linker found in the Lagwan complex noun phrase: one set is used if the Dependent is a possessor (as in (90)); another is used for any other Dependent that is nominal (as in (91)); and a final set is used for any other Dependent (AP, PP, relative clause, demonstrative or quantifier, as in (92)). 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:

(90) 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'

(91) a) luxt**ɨ** [=*e* sama]
season(M)=LNK.M.N rain(F)
'rainy season'

b) nk'**ɨ**na [=*l* as**ɨ**]
finger(F) =LNK.F.N foot(M)
'toe' (lit. fingers of foot)[42]

c) mand**ɨ**gy-en [=*i* g**ɨ**mi]
cat-PL =LNK.PL bush(M)
'wild cats'

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

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

viii)nk'**ɨ**na [=*l* as**ɨ** [=*a* u]] *Lagwan*
finger(F) =LNK.F.N foot(M) =LNK.POSS my
'my toe' (lit. fingers of my foot)

b) g**ɨ**n**ɨ**m [=*ɨn* [ghuye i[43] a mti ya]]
woman(F)=LNK.F husband her 3SGM.PERF die CERT
'woman whose husband has died'

c) g**ɨ**nam [=*i* [mawi [=*a* t**ɨ**n] y-a mti ya]]
woman.PL =LNK.PL men(PL) =LNK.POSS them 3PL-PERF die CERT
'women whose husbands have died'

The choice of linker in the Lagwan noun phrase in different configurations can be captured by positing different sets of lexical entries, with competition between lexical entries regulated by the Elsewhere Principle (Kiparsky 1973 and subsequent work). We take the set of lexical entries used where the Head noun is feminine by means of illustration:

(93) *Lexical entries for linkers in the feminine noun phrase in Lagwan*

a) INTERNAL SELECTION:

Sister: N[GEN]
Mother: bears the same lexical index as LNK

EXTERNAL SELECTION:
Sister: N[F]
Mother: extends the projection of the sister of LNKP (N[F]);
does not extend the projection headed by LNK

SEMANTICS: λx.x

PHONOLOGY: /na/

b) INTERNAL SELECTION:

Sister: N
Mother: bears the same lexical index as LNK

EXTERNAL SELECTION:
Sister: N[F]
Mother: extends the projection of the sister of LNKP (N[F]);
does not extend the projection headed by LNK

SEMANTICS: λx.x

PHONOLOGY: /ì/

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

c) INTERNAL SELECTION:

Sister: compulsory

Mother: bears the same lexical index as LNK

EXTERNAL SELECTION:

Sister: N[F]

Mother: extends the projection of the sister of LNKP (N[F]);
does not extend the projection headed by LNK

SEMANTICS: λx.x

PHONOLOGY: /ń/

There is a choice of three possible linkers to be used to mark the Head-Dependent relationship where the Head noun is feminine in Lagwan, given in the lexical entries in (93) above. While each of these lexical entries adheres to the general lexical entry for subordinating linkers given in (19) above, each one is more specific in terms of its c-selectional requirements and phonological form inserted at Spell-Out. Each of the lexical entries specifies that the sister and mother of LNKP should be a projection of a feminine noun; that is, in each case the linker marks the relationship between a feminine Head noun and its Dependent. The lexical items in (93)a) and b) also select for Dependents with specific syntactic properties: in both cases the linker selects exclusively for a nominal complement, while in (93)a) this nominal complement must also bear genitive Case. In an example such as (90)b), therefore, where a feminine Head noun has a possessive Dependent bearing genitive Case, in principle any one of the three linkers in (93) is able to mark the relationship. Applying the Elsewhere Principle, however, which favours the application of a more specific rule over a more general one, the linker in (93)a), *na*, will be chosen. In the case of (91)b), where the Dependent is a non-genitive, attributive noun, the most specific linker in (93)a) is unavailable, since the Dependent does not bear the feature genitive and hence does not meet the internal selectional requirement for the sister of the linker. Of the remaining two linkers, in (93)b) and c), it is the linker in (93)b), *l*, that is chosen, since it requires a more specific context to apply. Finally, in (92)b), where the Dependent is clausal, the only applicable form for the linker is that given by the lexical entry in (93)c), *n*.

Since the linker in Lagwan can in some sense be regarded as marking properties of both Head and Dependent, this marking cannot be taken as evidence for either Head-marking or Dependent-marking. Nevertheless, it is certainly worth noting that in other Afro-Asiatic languages, including the closely related Kotoko language Zina, agreement on the linker cross-references only features of the Head noun (cf. also (23), (28), (29)):

(94) 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)

This comparative evidence then suggests that in the related language Lagwan the agreement with the Head should also be regarded as the primary agreement. Like Bantu, Hindi-Urdu, Kurmanji and Zina, therefore, the agreement on the linker in Lagwan suggests that it serves as a Dependent-marker.[44]

2.5 Theoretical Implications

The empirical evidence from linkers presented in the previous section bears out the predictions made by the theoretical reasoning given in section 2.3. Having established 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 2.5.2). Before taking this step, however, we must be sure that no previous 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.

2.5.1 Theories of linkers

The data presented and discussed in section 2.4 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.

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

[44] I am aware of only one language where the linker appears to agree exclusively with the Dependent. This is the Central Sudanic language Lendu, where the linker marking a possessive relationship agrees with the possessor in number (see Tucker 1940:396-399; Tucker & Bryan 1966:56-57; Kutsch Lojenga 2005:4-5; and example in §3.5.2).

Ross (1982) for Mandarin Chinese and Japanese, by Watanabe (2006) for Japanese and by Samiian (1994, following 1983) and Ghomeshi (1997) for the Persian ezafe. However, the constituency tests conducted in sections 2.4.2-2.4.4 showed the linker to have a syntactic site of attachment, indicating that it is present in the syntax.[45] 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 (cf. examples (88)-(89)). Agreement with the Head noun is also a property of linkers in Atlantic-Congo, Afro-Asiatic 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:

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

His 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 (cf. (21) and (23) respectively). Concerning this problem in Mandarin Chinese, Rubin (2002:chapter 2, §3.3) suggests the possibility that *de* when used in modification and *de* used to mark the possessive relationship are distinct, homophonous, morphemes. This seems very unlikely, given that a number of genetically and areally diverse languages also use an identical morpheme for both modifier Dependents and possessor Dependents. Even in Bantu languages and in Hindi-Urdu, which only use a linker 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-

[45] To be fair to Samiian and Ghomeshi, as I mentioned in footnote 22, the Persian data we have seen would actually also be compatible with the PF analysis. This analysis is not possible for the other languages we have looked at though, or even for the ezafe that shows agreement in fellow West Iranian languages (see below). Given that we want our theory of grammar to be as economical as possible, and that we require the linker-as-syntactic-object analysis for other, including quite closely related, languages, it is preferable in the absence of further, conclusive, data to apply this analysis to the Persian ezafe as well.

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:

(96) $[_{\text{Conj.NP}}\,[_{\text{ConjP}}\,\text{NP}\,[_{\text{Conj'}}\,\text{Conj}^{\circ}\,[\text{Dependent}]]]]$

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 (23)), demonstratives ((27) and (94)) and quantifiers (28), as well as non-intersective adjectives (below; see Ortmann 2003:24 for further examples):[46]

(97) [weilai *de*] laoshi *Mandarin Chinese*
future LNK teacher
'future teacher' (Ortmann 2003:24, ex 61b)

(98) moallem[=*e* qabli] *Persian*
teacher=LNK former
'former teacher' (ex 60a)

Moreover, we have seen that, if the phonological properties of the linker permit it, the linker can be used in combination with a regular coordinating conjunction (cf. examples (42), (48), (50), and (52)).

[46] I do not mention possessors here or in the discussion of Den Dikken and Singhapreecha (2004) and Den Dikken (2006), as it is not entirely clear whether the possessive relationship can involve the intersection of two sets, or whether the possessor can be predicative.

Den Dikken and Singhapreecha (2004) and Den Dikken (2006), by studying a variety 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:

(99) $[_{FP}$ 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);[47] 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)[48]:

(100) $[_{ClfP}$ $[_{SC}$ 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[49] unaccounted-for.

More seriously, Den Dikken and Singhapreecha's theory makes incorrect predictions regarding constituency. The representations in (99) and (100) 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 2.4 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 –

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

[48] Clf does not seem to have this need in languages with prenominal modification (cf. (35), (38)).

[49] Den Dikken and Singhapreecha (2004:13, fn 9) acknowledge that the fact that non-predicative adjectives can be used with the linker *de* in Mandarin Chinese and the Persian ezafe is problematic for their analysis. They suggest that the ban on the predicative use of these adjectives is 'not a deep but a surface one'. Even if this speculation is correct, the use of linkers with complements of verbal nouns, demonstratives and quantifiers remains unexplained.

Mandarin Chinese, Japanese and Hindi-Urdu – the linker forms a constituent with the Dependent. (See also Paul 2007 for a more detailed critique, and consequent rejection, of Den Dikken and Singhapreecha's analysis for Mandarin Chinese.)

The same problems are faced by Simpson's (2001, 2002) analysis of Mandarin Chinese *de*. Simpson proposes an antisymmetric analysis of *de* in Chinese, based on Kayne's (1994: chapter 8) model of relativisation and possession, whereby a determiner in D takes a CP complement containing the NP to be relativised or possessed. This NP then raises to [Spec, CP]. In Mandarin Chinese, Simpson considers *de* to be the determiner. Since *de* does not contribute any definiteness, or indeed any semantics at all, Simpson considers it to be a semantically empty determiner. The word order in Mandarin Chinese is attributed to the phonological properties of *de*. Under this analysis, since *de* is a phonological enclitic, it attracts Dependents[50] to its specifier for phonological support, with the result that *de* forms a surface constituent with the noun (in [Spec, CP]). The resulting structure is as follows:

(101) $[_{DP}\,[_{IP}$ Dependent $t_{NP}]\,[_{D'}$ *de* $[_{CP}$ NP $t_{IP}]]]$

Besides making incorrect predictions regarding constituency, this analysis again predicts that *de* should only occur with predicative categories, and therefore cannot account for its use with purely attributive adjectives, as in (37).

At the conclusion of our analysis of previous theories of linkers, we have found that none of them encompasses the full range of data for linkers in the noun phrase captured by the alternative proposal presented in this chapter. Moreover, unlike the analysis of linkers in the noun phrase as Dependent-markers, none of the previous proposals is able to generalise over all occurrences of syntactically independent, semantically vacuous, relationship-marking heads. Therefore, it now seems meaningful to consider what broader implications the more empirically attractive proposal presented here has regarding theories of morphosyntax.

2.5.2 Theories of Morphosyntax

Firstly, the findings of this chapter 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

[50] Simpson (2001:147, fn 14; 2002:21, fn 14) suggests that the enclitic *de* selects exclusively for IP as phonological support, explaining why the Head noun does not instead raise to [Spec, DP].

Of course, *de* is only present when the noun is modified in some way. Simpson (2002:§4.1) argues that determiners frequently may appear only when there is some modification present, as below:

ix) the sweater of John's *(that you showed me last night) *English*
(Simpson 2002:20, ex 58-59)

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 1995b, following Pollock 1989[51]), Chomsky (1995b:§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 2.4 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 2.5.1).

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 (17): 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 2.3, 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, 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

[51] 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).

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.[52]

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 2.3. 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.

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[52] Bickel and Nichols (2008b) 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:

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

'crocodile's tail' (Bickel & Nichols 2008b, exx 6, 8, citing Osborne 1974:74-75)

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.

Similarly, Ansaldo and Matthews (2000) attempt a study of Head- and Dependent-marking in isolating languages, using data from comparatives in Sinitic languages. They conclude by means of constituency tests that both Head-marking and Dependent-marking can and do occur by means of an independent syntactic word. However, in all their examples the alleged Head-marking independent syntactic words are actually the comparative morphology. By the criteria used in this chapter these comparative independent syntactic words do not constitute markers of a relationship. Firstly, the comparative morphology is present irrespective of whether there is a standard of comparison. Secondly, the comparative morphology serves to introduce a relationship (Cresswell 1976, Heim 2001, Kennedy 2005, 2009, among others), rather than to mark the presence of an existing relationship.

2.6 Conclusion

In this chapter 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 some 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.

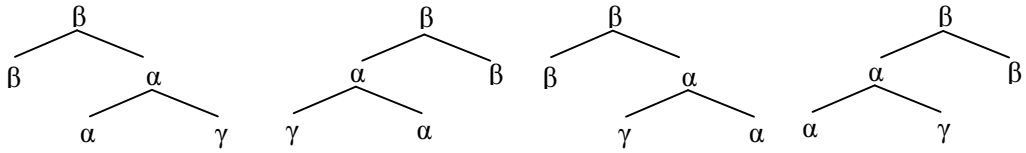
Chapter 3: Linearisation and Linkers

3.1 Introduction

The presence of harmonic, or optimal, word order constraints (*inter alia* Greenberg 1963; W. Lehmann 1973; Hawkins 1983; Dryer 1992) presents a point of interest to both generative grammarians and typologists. One feature that has almost invariably been common to such constraints is that they constitute preferences, rather than universal, absolute principles; that is, orders termed disharmonic earn this title generally not because they do not exist, but because they are cross-linguistically dispreferred. In particular, much attention has been paid to directionality of headedness, with the consistently head-initial and consistently head-final orders – shown here in (1)a) and b) respectively – considered harmonic, while those displaying mixed headedness, as in (1)c) and d), are regarded as disharmonic:

(1) *Harmonic orders* *Disharmonic orders*

a) Initial-over-initial b) Final-over-final c) Initial-over-final d) Final-over-initial



Latterly attention has turned to a subset of these disharmonic orders, which, more than being simply cross-linguistically dispreferred, appear not to surface at all (Holmberg 2000; Biberauer, Holmberg and Roberts 2007 *et seq*). Research in this area is concerned with two questions: firstly, which are the disharmonic orders that do not exist? Secondly, why are such orders absent?

This chapter attempts to answer both questions by motivating the following empirical generalisations:

(2) a) Where α is a linker, the disharmonic orders in (1)c) and d) are ungrammatical as base-generated structures.

b) Where α is any other head, the disharmonic orders in (1)c) and d) are simply cross-linguistically dispreferred as base-generated structures (as long as any requirement over linkers can otherwise be satisfied).

It will be shown that the difference between the two classes, and hence the difference in the two generalisations, is determined by semantics.

An alternative generalisation over absent disharmonic orders is provided by the Final-Over-Final Constraint (henceforth FOFC, Holmberg 2000; Biberauer, Holmberg and Roberts 2007 *et seq*):

(3) *The Final-Over-Final Constraint (FOFC)*

If α is a head-initial phrase and β is a phrase immediately dominating α, then β must be head-initial. If α is a head-final phrase, and β is a phrase immediately dominating α, then β can be head-initial or head-final, where:

(i) α and β are in the same Extended Projection [categorially non-distinct, and αP is a complement to β][1]

(ii) αP has not been A'-moved to SpecβP.

(Biberauer, Holmberg & Roberts 2010:53, ex 1'''')

FOFC makes a very different prediction to the generalisations in (2). The prediction made by FOFC can be paraphrased as follows (leaving aside the question of A'-movement):

(4) Wherever αP is a categorially non-distinct complement of β, the final-over-initial order in (1)d) is ungrammatical.

If, as I shall propose here, the generalisations in (2) are correct, the Final-Over-Final Constraint fails empirically as a universal by being both too weak and too strong (cf. Hawkins 2010, 2011): too weak, because it fails to predict the ungrammaticality of (1)c) (the initial-over-final order) where α is a linker (see (2)a)); too strong, because it incorrectly predicts the ungrammaticality of (1)d) (the final-over-initial order) where α is any other head, αP being a categorially non-distinct complement of β (see (2)b)).

The main empirical contribution of this chapter will therefore be to provide evidence for a new generalisation over the presence or absence of disharmony cross-linguistically, showing that for linkers (as defined in chapter 2), disharmony is ungrammatical, while for any other head disharmony is simply dispreferred. In particular it will be shown that linkers in their base-generated position invariably intervene linearly between the Head and Dependent of the relationship that they mark.

In terms of theoretical contributions, this chapter proposes that ordering occurs at two levels of the grammar (assuming Chomsky's 1995b *et seq* Y-model of the grammar). Firstly, the linear order may be fixed between a relevant lexical head and its nominal complement within the narrow syntax due to a parameter determining direction of structural Case assignment

[1] Note that Biberauer *et al*'s definition of extended projection differs from Grimshaw's (1991/2005), a matter we return to in section 3.6.1.

(following Travis 1983, 1984; Y.-H. Li 1990; cf. Koopman 1984:§4.4). Linearisation of the remaining material takes place at PF, determined by the Optimality Theoretic (Prince and Smolensky 1993/2004) ranking of violable word order constraints. Assuming the copy theory of movement (Chomsky 1993, 1995b), it is shown that these constraints apply (i.e. linearisation takes place) prior to deletion of any lower copies of constituents. These violable linearisation constraints are of two types, with the generalisations in (2) obtaining as a result of their interactions. Firstly, there are general ordering constraints relating to harmony – these are universal, and always interact in the same way, in a Harmonic Word Order Ranking. Secondly, there are alignment constraints referring to specific syntactic features: either relevant lexical features or features encoding semantics. Constraints of this kind require heads bearing specific syntactic features to appear either initially or finally to their (partial) projection, which may result in disharmony. The set of constraints of this latter kind that is active within a given language is subject to cross-linguistic variation. It is possible for these specific constraints to override the general rules of harmony, giving rise to disharmony; however, we will see that, given any possible interaction between the two, the generalisation in (2)a) will always hold.

Crucially, I will propose, following the findings of chapter 2, that there is a class of functional heads – 'linkers' – which are entirely lacking in syntactic features encoding semantics; that is, they do not add to the compositional semantics of their extended projection, but serve only as a syntactic means of marking a relationship. Given their status as semantically vacuous functional heads, there is only one kind of linearisation constraint that is applicable – the universal violable constraints determining harmonic word order. Constraints referring to either lexical heads or syntactic features encoding semantics cannot apply, since there are no such features available in linkers. It is this contrast between the type of constraint that can apply to linkers and the wider set of constraints that can apply to any other head that leads to the generalisations in (2).

As we established in the previous chapter, a linker is a syntactically independent, semantically vacuous word serving only to mark the presence of an independently existing relationship – modification or θ-role assignment – between a Head in one extended projection[2] and a distinct Dependent extended projection, the Dependent being sister to (a projection of) the Head. As such, the linker makes no contribution to the compositional semantics of its extended projection and so only appears where the relevant relationship exists. Examples of linkers include subordinating complementisers, such as *that* in English, specialised relative clause markers, or relativisers, such as *co* in Czech[3] ((5) below), purely functional, as opposed to lexical,

[2] Throughout this thesis, I use the term extended projection in the conventional sense, as first defined by Grimshaw (1991/2005), as opposed to Biberauer, Holmberg and Roberts' (2010) redefinition.

[3] Relative operators, on the other hand, will not be included, since these make a semantic contribution.

adpositions, such as *of* in English, general linkers or syntactically independent markers of subordination in the complex noun phrase, such as the ezafe/izafe(t) in Indo-Iranian and *de* in Mandarin Chinese ((6) and (7) below; see also chapter 2; Rubin 2002; Den Dikken and Singhapreecha 2004)[4], and purely structural syntactically independent case-markers. All of these occur only in the context of marking a Head-Dependent relationship. For example, subordinating complementisers and relative clause markers do not appear in matrix clauses; the linkers in (6) and (7) do not occur where the adjective or PP is predicative.

(5) dopisu [*co* Vám poslali] *Czech*
letter LNK you.PL.DAT sent
'the letter that they sent you' (Fried 2010:20, ex 5a)

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

(7) [guanyu Chomsky *de*] shu
about Chomsky LNK book
'book about Chomsky' (Paul 2007:9, ex 22a)

Similarly, the linker does not initiate the relationship between Head and Dependent; it simply marks its presence. For example, consider a Head such as the verb *know*. This assigns a θ-role to its complement, which may be either clausal or nominal in category, as shown in (8) below. In the former case, (8)a), the finite clausal complement is optionally marked by the overt linker *that*. Although in (8)b) the relationship between the verb and its complement – this time nominal – is identical in terms of θ-assignment, here there is no linker. The fact that the relationship remains the same whether or not there is a linker indicates that the linker has no role in initiating the relationship; it is simply used to mark the presence of the relationship where the complement is both clausal and finite.[5] More generally, the statement that linkers do not initiate the relationship they mark is confirmed by the fact that the subordination relationships marked by linkers such as subordinating complementisers, syntactically

[4] In some languages, such as Tagalog (Malayo-Polynesian), a single morpheme (*na/-ng* in Tagalog) is used as subordinating complementiser, relative clause marker and linker in the complex noun phrase, confirming that they form a natural class.

[5] Note that while in this case finiteness is marked on the linker, it is not the linker itself, but rather the lower head T, that introduces the finite feature; the linker does not introduce any semantics.

Similarly, it may be that the head *if*, which appears in complementary distribution with *that*, does not introduce, but simply marks the presence of a *wh*-feature introduced lower in the clause. (Note that in many languages subordination and interrogation are expressed by separate heads; see for example Biberauer, Holmberg and Roberts 2010:34-35 and example (57) below.)

independent relativisers, other linkers in the noun phrase and syntactically independent case-markers occur with no marking at all in many languages. (Compare for example (6) and (7) with their English translations.)

(8) a) I know [(*that*) it's Rupert]. *English*

b) I know [(**that*) your middle name].

It is important to note that this definition of linkers, while it encompasses purely subordinating complementisers, excludes semantically contentful adverbial conjunctions such as *because*. Although *because*, like *that*, only appears in the presence of a relationship, unlike *that*, it does not mark an independently existing relationship, but *initiates* the relationship; a causal relationship cannot occur in the relevant structure without it.

The remainder of this chapter is organised as follows. The next section provides a broad typological overview of harmonic and disharmonic word orders, and their comparative frequency of occurrence. It will be seen that the general picture supports the generalisations in (2). Section 3.3 introduces the notion of harmony as a universal phenomenon, operating on any basic order determined in the syntax. Section 3.4 shows how disharmony may come about for certain heads, due to the language-specific ranking of constraints referring to specific syntactic features. Section 3.5 presents the results where harmony and disharmony interact. In section 3.6 the results are compared with the predictions of FOFC, arguing that the latter are both too weak and too strong.

3.2 Word Order and Typology

3.2.1 Linkers and Harmony

Part a) of the generalisations in (2) states that linkers are always harmonic, displaying only the orders in (1)a) and (1)b), such that the linker intervenes linearly between the Head and Dependent of the relationship it marks. We see direct support for this in the cross-linguistic distribution of subordinating complementisers (henceforth simply 'complementiser(s)'), where a complementiser C heads a clausal complement to a verb. This is shown in (9) below: the orders in (1)a) and b) are both attested, while (1)c) and d) are ungrammatical (see also Hawkins 1988:346, 1994:§5.6.1; Kayne 2000:320, ex 36, p324, fn 12; Bayer 1996 *et seq*; Cinque 2005b:53-54):

(9) α = C

a) Initial-over-initial: [V [C TP]] = 157 languages (93%)

b) Final-over-final: [[TP C] V] = 12 languages (7%)

c) *Initial-over-final: [V [TP C]] = 0 languages (0%)

d) *Final-over-initial: [[C TP] V] = 0 languages (0%)

(Data taken from Dryer 2009a:199-200[6])

Precisely the same distribution is found where a relative clause is marked by an independent syntactic word of some kind (REL), whether a complementiser (such as *that* in English), a general marker of subordination in the noun phrase (such as *de* in Mandarin Chinese, see (96) below), or a specialised relative clause marker (or relativiser, such as *co* in Czech, see (5) above): syntactically independent relative clause markers are initial in postnominal relative clauses, and final in prenominal relative clauses. This is shown by data in (10) below from C. Lehmann's (1984) seminal work on relative clauses, and confirmed as a universal by De Vries (2005:148, see also Andrews 1975/1985:26; Downing 1978; Keenan 1985:160; Hawkins 1988 *et seq*; De Vries 2002:37[7]; Cinque 2005b:53-54):

(10) α = REL

a) Initial-over-initial: [N [REL TP]] = 21 languages (88%)

b) Final-over-final: [[TP REL] N] = 3 languages (14%)

c) *Initial-over-final: [N [TP REL]] = 0 languages (0%)

d) *Final-over-initial: [[REL TP] N] = 0 languages (0%)

(Data taken from C. Lehmann 1984[8])

To these two better-known sets of data, I would like to add a third set showing precisely the same restriction. This concerns the distribution of linkers in the noun phrase of the type we studied in some detail in the previous chapter (which also encompasses syntactically

[6] I have removed from Dryer's data the languages Supyire (North Volta-Congo), Khoekhoe (Kwadi-Khoe), and Harar Oromo (East Cushitic) since these are not true instances of C-headed complements to verbs. In Dryer's Supyire example, the C-headed clause is an adjunct doubled by a pronominal argument in complement position. In Khoekhoe and Harar Oromo, the alleged 'complementiser' is in fact a noun. See fn 25 and section 3.4 respectively.

[7] De Vries (2002) shows the same absence of disharmony using a larger data set. However, he specifies that statistical tendencies in the data should not be taken as representative, as the data is biased towards Indo-European (where postnominal relative clauses are the norm) (p366):

i) α = REL

a) Initial-over-initial: [N [REL TP]] = 56 languages (95%)

b) Final-over-final: [[TP REL] N] = 3 languages (5%)

c) *Initial-over-final: [N [TP REL]] = 0 languages (0%)

d) *Final-over-initial: [[REL TP] N]] = 0 languages (0%)

(Data taken from De Vries 2002:376-384, table 2)

[8] I have not included languages where the relative marker is an affix on the verb, since the affix is part of the verbal head, rather than being a functional head in its own right. See chapter 2 and section 3.5.1 below.

independent relative clause markers). There we determined that, in terms of constituency, linkers in the noun phrase always form a constituent with the Dependent they introduce. In terms of their distribution, the data in (11) below shows that linkers in the noun phrase, like subordinating complementisers and relative clause markers, conform to the generalisation in (2)a). (The languages used in this sample and their classification are given in the Appendix.)

(11) α = LNK

a) Initial-over-initial:	[N [LNK XP]]	= 50 languages	(59-60%)
b) Final-over-final:	[[XP LNK] N]	= 34 languages	(40%)
c) *Initial-over-final:	[N [XP LNK]]	= potentially 1 language[9]	(0-1%)
d) *Final-over-initial:	[[LNK XP] N]	= 0 languages	(0%)

We have therefore now seen three types of linker for which the generalisation in (2)a) holds (with some intersection between the sets): complementisers (marking the relationship between a verb and its clausal Dependent), relative clause markers (marking the relationship between a noun and its clausal Dependent), and linkers in the noun phrase (marking the relationship between a noun and any kind of Dependent). Crucially in each case the linker does not make any contribution to the compositional semantics, but simply marks an independently existing relationship.

3.2.2 Disharmony

Where we are not dealing with linkers, however, the situation is different. Part b) of the generalisations in (2) predicts that for any other head, any of the word orders in (1) will be possible, but the disharmonic orders in c) and d) will be cross-linguistically dispreferred. The findings of broad typological studies provide an initial indication that this is indeed the case. This can be seen in the data below, dealing with the extended projection of the verb. The data in (12) is concerned with the relative ordering of the verb and an auxiliary (independent tense, aspect or mood marker), and that in (13) with the verb and an interrogative particle:

(12) α = V

a) Initial-over-initial:	[Aux [V O]]	= 79 languages	(55%)	
b) Final-over-final:	[[O V] Aux]	= 30 languages	(21%)	
c) Initial-over-final:	[Aux [O V]]	= 19 languages	(13%)	(39% of OV languages)

[9] See section 3.5.2 below.

d) Final-over-initial: [[V O] Aux] = 16 languages (11%) (17% of VO languages)

(Data taken from Julien 2002:330-356)

(13) α = V

a) Initial-over-initial: [Q [V O]] = 75 languages (20%)

b) Final-over-final: [[O V] Q] = 127 languages (34%)

c) Initial-over-final: [Q [O V]] = 34 languages (9%) (21% of OV languages)

d) Final-over-initial: [[V O] Q] = 135 languages (36%) (64% of VO languages)[10]

(Data taken from Bailey 2010:29, table 1, using data from Dryer 2008a,b)

Data from the nominal domain shows the same, predicted, distribution:

(14) α = N

a) Initial-over-initial: [P [N PossP]] = 134 languages (40%)

b) Final-over-final: [[PossP N] P] = 177 languages (53%)

c) Initial-over-final: [P [PossP N]] = 14 languages (4%) (7% of N-final lgs)

d) Final-over-initial: [[N PossP] P] = 11 languages (3%) (8% of N-initial lgs)

(Hawkins 2010:1, using data from Hawkins 1983)

This kind of distribution is not limited to examples within a single extended projection. Precisely the same situation holds across extended projections (except where the relationship between extended projections is marked by a linker), as can be seen where the verb takes an adpositional complement, in (15), and a nominal complement, in (16) and (17):

(15) α = P

a) Initial-over-initial: [V [P NP]] = 419 languages (47%)

b) Final-over-final: [[NP P] V] = 427 languages (48%)

c) Initial-over-final: [V [NP P]] = 38 languages (4%) (8% of postpositional lgs)

d) Final-over-initial: [[P NP] V] = 12 languages (1%) (3% of prepositional lgs)

(Data taken from Dryer 2008c; Sheehan 2008:§4, to appear: table 2)

[10] The high proportion of languages displaying the disharmonic order in (13)d) is unexplained by the theory put forward here, at least as far as the grammar alone is concerned (but see fn 22 below). There appears to be a general cross-linguistic preference for interrogation to be signalled at the end of a question, that is independent of the morphosyntax: even where interrogation is not marked by a specific morpheme, but by intonation, this distinctive intonation is reckoned from the end of the question (Greenberg 1963:80, Universal 8).

(16) α = D

a) Initial-over-initial:	[V [D NP]]	= 37 genera	(44%)	
b) Final-over-final:	[[NP D] V]	= 19 genera	(23%)	
c) Initial-over-final:	[V [NP D]]	= 15 genera	(18%)	(29% of VO genera)
d) Final-over-initial:	[[D NP] V]	= 13 genera	(15%)	(41% of OV genera)

(Data taken from Dryer 1992:104, table 34)

(17) α = N

a) Initial-over-initial:	[V [N PossP]]	= 63 genera	(29%)	
b) Final-over-final:	[[PossP N] V]	= 112 genera	(52%)	
c) Initial-over-final:	[V [PossP N]]	= 30 genera	(14%)	(21% of N-final genera)
d) Final-over-initial:	[[N PossP] V]	= 12 genera	(6%)	(16% of N-initial genera)

(Data taken from Dryer 1992:91, table 5)

Finally, consider what may happen where α is semantically contentful head, c-commanded by a linker (cf. (2)b). An example of this is given below, where a verb in an embedded clause is c-commanded by a subordinating complementiser (see also Hawkins 1990:226, 1994:263, §5.6.1; Dryer 1991:500, 1992:102; Bayer 1996:192):

(18) α = V

a) Initial-over-initial:	[C [V O]]	= 140 languages	(75%)	
b) Final-over-final:	[[O V] C]	= 26 languages	(14%)	
c) Initial-over-final:	[C [O V]]	= 21 languages	(11%)	(45% of OV languages)
d) *Final-over-initial:	[[V O] C]	= 0 languages	(0%)	(0% of VO languages)

(Data taken from Dryer 2009a:199, ex 24[11])

The kind of distribution we see here does not seem to conform either to the linker data in (9)-(11), or to the non-linker data we have just seen, in (12)-(17). In fact, it is the only clear left-right asymmetry among all the data. Concerning the harmonic orders, there is a major preference for the consistently head-initial order [C[VO]], the only order permitted for VO languages. The final-over-initial order *[[VO]C] is completely ungrammatical, whereas, among OV languages, the 'disharmonic' initial-over-final order [C[OV]] is scarcely less common than the 'harmonic' consistently head-final order [[OV]C].

[11] I have removed from Dryer's data the languages Harar Oromo and Khoekhoe, since these languages do not contain true complementisers. See discussion in section 3.4 and fn 25.

According to the generalisations in (2), part b) will not hold where it conflicts with any requirement over linkers: a structure may be ungrammatical even where α is a non-linker, iff this non-linker is dominated by a linker (β) and the structure involving the linker is independently ruled out. In the next sections, we will develop a theory of word order which not only captures the restrictions present in the linker data in (9)-(11) (and hence the generalisation in (2)a)), but also the otherwise anomalous data in (18).

3.3 The Universal Notion of Harmony

We begin by considering the notion of harmonic word order. In the literature, a number of cross-linguistic word order tendencies have been observed. In this section I formulate these tendencies in terms of violable constraints, and propose that the notion of harmony in grammar is defined by the interaction at PF of these independently motivated, violable, constraints in a universal ranking. In addition, I argue that these linearisation constraints apply only to base-generated structures (that is, they apply only to the lowest copy of any moved constituent), these base-generated structures showing a greater diversity, and movement being more restricted, than under certain views of syntax. Empirical evidence for the proposed ranking of constraints, and its application to the base-generated structure only, will then be provided by a more detailed study of the restrictions placed on the cross-linguistic distribution of complementisers.

Before considering the relevant constraints, we begin with the more general question of what level of syntactic representation is relevant to the notion of harmony. This is a matter that depends largely on the view adopted of the mapping of syntactic structure to linear order. One such view is expressed by Kayne's (1994) Linear Correspondence Axiom, which assumes that there is a single base-generated order, and any variant of this order occurs as a result of movement. As has been shown by Abels and Neeleman (2009, 2012), however, a restrictive theory of movement cannot be maintained under this hypothesis if we are to account for the full range of data. Moreover, in many cases movement must be assumed purely on the basis of the surface word order, without any independent evidence. Instead, Abels and Neeleman adopt the more traditional view, whereby there are no universal ordering – merely hierarchical – restrictions on base-generation. This approach has the advantage of being able to maintain a more restrictive theory of movement. Under this view, movement is a much rarer phenomenon, and need only be assumed where there is independent evidence. Given that the unmarked order is determined to a much larger extent by the base-generated structure, it is not unreasonable to assume that word order constraints refer to this same base-generated order. This proposal is of course dependent on the claim that linearisation constraints, generally assumed to operate at PF, apply prior to the deletion of the lower copies of any moved material. That this claim is reasonable is confirmed by independent evidence that certain other PF constraints must apply prior to the deletion of lower copies of moved constituents, such as *wanna*-contraction and

related phenomena in English (Lakoff 1970:732; Chomsky 1986b:162-163), contraction of a quantifier with a following definite article in the Italo-Western language Galician (Fernández-Salgueiro 2001), and cliticisation of pronouns in Dutch (Ackema and Neeleman 2003:712-713). In each of these cases, the (silent) presence of a lower copy of a moved constituent is sufficient to block application of an otherwise productive phonological rule. It is further worth noting that the claim that linearisation constraints do not apply to orders resulting from obvious movement is by no means unprecedented. FOFC does not apply to structures resulting from A'-movement (see (3) above); while Williams' (1982) Head-Final Filter applies only to base-generated structures (see discussion below).

The violable linearisation constraints that we will adopt concerning harmony are formulated below:

(19) HEAD-PROXIMATE FILTER

The highest head in the extended projection of a Dependent must be linearly contiguous with the Head it is subordinate to.

(20) FINAL-CLAUSE

A clausal Dependent must follow the Head it is subordinate to.

(21) HEAD UNIFORMITY

A functional head must match the lexical head of its extended projection in the direction of headedness.

The Head-Proximate Filter has its correlates in Generative Grammar in the Head-Final Filter (Williams 1982; cf. Greenberg 1963:70, Universal 21; Emonds' 1976, 1985 Surface Recursion Restriction), in Functional Grammar in Rijkhoff's (1984 *et seq*) Principle of Head Proximity, and in the principle of Early Immediate Constituents in Hawkins' (1990, 1994) performance theory of grammar (cf. also W. Lehmann 1973). (See footnote 12 below for a discussion of the differences between these constraints and the Head-Proximate Filter.) The Head-Proximate Filter specifies a requirement for the Head of a relationship (as defined previously in section 2.2.1) and the highest head in the extended projection of its Dependent to be linearly as close to each other as possible. We have already seen evidence of this as a cross-linguistic preference in the data in (9)-(11) and (15)-(17). The same concept can be used to explain a number of other observed cross-linguistic word order preferences.

For example, Rijkhoff (2002:261-263) points out that the data from Hawkins' (1983:281-290) expanded sample shows a general tendency for languages to avoid placing adjectives and

possessor NPs between the noun they modify and its selecting verb; in more concrete terms, there is a tendency for a noun to precede its Dependents in VO languages and to follow its Dependents in OV languages, such that the noun is as close as possible to its selecting Head, the verb (cf. (17) above; Greenberg 1963:85-90 and references cited in W. Lehmann 1973). A similar concept is found in the Head-Final Filter, where, in the Germanic and Romance languages in which it applies (see Escribano 2004:1, fn 2 for references), prenominal modification is only possible where the modifier is head-final, and therefore its head is immediately adjacent to the noun phrase it modifies. Escribano (2004:2-3) shows that the effects of the Head-Final Filter in the languages in which it operates extend beyond the nominal domain to other categories. Most importantly, there is evidence that the Head-Final Filter operates exclusively over base-generated structures; structures that conform on the surface, but contain a trace to the right of the head of the modifier, such that the prenominal modifier is head-initial (as in verbal passives), are ungrammatical (Williams 1982), while structures that contain a surface violation as a result of leftwards movement of the head-initial modifier from post-Head to pre-Head position are grammatical (Escribano 2004:4). The Head-Proximate Filter that I am proposing here simply extends the Head-Final Filter to include its mirror image. Like the Head-Final Filter, it is concerned with the base-generated structure; that is, with the lowest copy of any moved constituent.[12] We will see concrete effects of this restriction to the base-generated structure in the discussion of the complementiser data later on in this section, and again in section 3.5.2.

The second constraint, the Final-Clause Requirement, is derived from Dryer's (1980) Sentential NP Position Hierarchy. Looking at the cross-linguistic distribution of clausal arguments, Dryer established the hierarchy in (22). This hierarchy states that if a language allows any argument to appear in a given position on the hierarchy, it will allow clausal arguments in that position; a position further to the left, where available, will be preferred over any position to its right. This is confirmed by the fact that clausal complements to verbs are allowed in final position in both VO and OV languages, but preverbal complement clauses are not found in VO languages, which by definition always allow arguments in final position (Dryer 1980; Hawkins 1994:§5.6.1; see also the typology in (24) below). Of relevance to us here is the fact that the clause-final position is preferred over any other: from this we derive the Final-Clause

[12] Here the Head-Proximate Filter differs (as far as I can see) from both Rijkhoff's Principle of Head Proximity and Hawkins' concept of Early Immediate Constituents. The latter relates purely to ease of processing; therefore it is presumably concerned only with surface word order. Similarly, there is a further fundamental difference between the Head-Proximate Filter and Rijkhoff's Principle of Head Proximity. This principle expresses a preference for *lexical* head of the Dependent to be linearly contiguous with the Head of its superordinate domain. The Head-Proximate Filter requires the *highest* head in the extended projection of the Dependent, which may or may not be the lexical head, to be linearly contiguous with the superordinate lexical Head. We will see in the remainder of this chapter that the restriction to base-generated structures and to the highest head of the Dependent captures a wider range of data.

requirement as a violable constraint, formulated in (20) (cf. Language Independent Preferred Order of Constituents, Dik 1997:411).

(22) *Sentential NP Position Hierarchy*

clause-final position > clause-initial position > clause-internal position (Dryer 1980:126)

The first two constraints we have looked at have been concerned with ordering between a Head in a superordinate extended projection and a Dependent, or subordinate, extended projection. We move now to the final constraint, Head Uniformity, which is concerned rather with the order within the extended projection itself. This constraint is perhaps the best known among harmonic word order constraints. There is a preference for heads in a given language or domain to be consistent in directionality of headedness: either uniformly head-initial or head-final (cf. Natural Serialisation Principle, Bartsch and Vennemann 1972:136; Head Parameter, *inter alia* Chomsky 1981; Branching Direction Theory, Dryer 1992, 2009a).

We will see that the three relevant constraints – the Head-Proximate Filter, the Final-Clause requirement, and Head Uniformity – are not always mutually compatible. Where the three compete it is invariably the Head-Proximate Filter that takes precedence; the constraints are hierarchically ordered *à la* Optimality Theory (OT) in the following, universal, ranking:

(23) *Harmonic Word Order Ranking*

HEAD-PROXIMATE FILTER >> FINAL-CLAUSE, HEAD UNIFORMITY

It is worthwhile at this point saying a word on the proposed universality of the Harmonic Word Order Ranking. While OT generally allows for constraints to be ranked differently in different languages, language-independent, fixed rankings are also found where there are pressures from some grammar-external system – Chomsky's (2005) third factor – (e.g. the sonority hierarchy). In this case research has shown that constraints of the type that make up the Harmonic Word Order Ranking are motivated by ease and efficiency of processing (Hawkins 1990 *et seq*). Given that principles of processing do not vary from language to language, it is to be expected that the ranking of these constraints should remain uniform across languages.

The application of this ranking can be seen most clearly in the cross-linguistic distribution of complementisers heading clausal complements to verbs.[13] In the typological data in the previous section we observed two phenomena relating to the distribution of subordinating

[13] There is a particular reason for this, which we will see later on (§3.5.1): because we are dealing here with a Head and Dependent of the same category, there is no interference from the second kind of word order constraint (which we will look at in section 3.4), which can lead to disharmony.

complementisers: firstly, they always intervene between the complement clause they head and its selecting verb (9);[14] secondly, while OV languages allow both initial and final complementisers, in VO languages only initial complementisers are permitted (18). This leads to a single grammatical order for VO languages, and two possible orders for OV languages:

(24)

VO languages:			*OV languages:*		
V[CVO]	140 languages	(100% of VO)	**V[COV]**	21 languages	(45% of OV)
*[VOC]V	0 languages		**[OVC]V**	26 languages	(55% of OV)
*V[VOC]	0 languages		*V[OVC]	0 languages	
*[CVO]V	0 languages		*[COV]V	0 languages	

The tableaux in (25) and (26) below show that this typological pattern is precisely captured by the Harmonic Word Order Ranking, operating on the basic order of VO or OV. This distinction between VO and OV is established within the narrow syntax due to a parameter determining direction of structural Case assignment, of the type proposed by Travis (1983, 1984) and Y.-H. Li (1990; cf. Koopman 1984:§4.4[15]). In VO languages the parameter is set to check Case to the right of the verb, in OV languages to the left of the verb. If a nominal complement should be merged to the left of a verb in a VO language or to the right in an OV language, the conditions for Case checking will not be met, such that the derivation will not be licensed at LF and will consequently crash. The PF constraints in the Harmonic Word Order Ranking then operate on this partially determined word order to give the tableaux in (25) and (26). It is important to note that, since the parameter is concerned exclusively with direction of Case assignment, it will apply only where the verb or other relevant lexical head has a nominal complement, and not a clausal complement. (The fact that clausal arguments are not, for example, subject to adjacency requirements in languages such as English, in which Case adjacency applies, confirms that they are not subject to the same kind of licensing requirements as their nominal counterparts.) The order between a verb and its clausal complement is therefore free to be determined by the constraints of the Harmonic Word Order Ranking operating at PF, as in the tableaux in (25) and (26). Similarly, since of the lexical categories only V and P assign structural Case (Chomsky 1981, 1986b), the direction of headedness of the lexical heads N and A will likewise be determined at PF, a matter which we return to in the coming sections.

[14] The fact that complementisers like *that* do not intervene between their complement and the matrix verb when they head a clausal subject (e.g. *That John was lazy*, *was common knowledge*) is unproblematic: the clausal 'subject' is generally considered to be a topic associated with a null pronoun – the true subject (see Koster 1978; Alrenga 2005).

[15] The approach taken here is stricter than that of Koopman. Unlike Koopman, I assume that the relevant nominal argument must be in complement position for such Case assignment by a lexical head to take place. Koopman allows such Case assignment to take place following movement out of the complement position.

In VO languages (that is, languages in which the parameter is set to check structural Case to the right of the verb), shown in (25), it is possible to obey all three constraints, resulting in a single optimal order – the consistently head-initial order represented by candidate a). The dominant constraint, the Head-Proximate Filter, requires the highest head in the extended projection of the Dependent – that is the complementiser – to be linearly contiguous with the Head it is in a relationship with – the selecting verb. Candidates a) and b) both obey this constraint. This constraint applies only to the complementiser here, not to either verb, because the Head-Proximate Filter only applies where we are dealing with heads in separate extended projections, and then only to the highest head in the complete extended projection of the Dependent. Of the candidates that obey the Head-Proximate Filter, a) is chosen over b), because a) also obeys Final-Clause and Head Uniformity, both of which are violated by b): the Dependent clause in a) follows the superordinate Head it is in relationship with, the matrix verb (thereby obeying Final-Clause), and the complementiser matches the lexical head of its extended projection – the lower verb – in direction of headedness, both being head-initial (thereby obeying Head Uniformity):

(25)

VO language	HEAD-PROXIMATE	FINAL-CLAUSE	HEAD UNIFORMITY
a. ☞ V[CVO]			
b. [VOC]V		*!	*!
c. V[VOC]	*!		*
d. [CVO]V	*!	*	

In OV languages, on the other hand, (those in which the parameter is set to assign structural Case to the left of the verb), shown in (26), there is no single order that obeys all three constraints. Therefore, in order to obey the dominant constraint, the Head-Proximate Filter, either Final-Clause or Head Uniformity must be violated, resulting in two possible orders: the consistently head-final order (26)b) – where Final-Clause dominates Head Uniformity – and the supposedly 'disharmonic' initial-over-final order (26)a) – where Head Uniformity dominates Final-Clause. In languages in which Final-Clause and Head Uniformity are equally ranked, both orders should be possible. It is important to note that, since the order between the verb and its nominal object has been fixed in the syntax, a candidate of the kind [V[CVO]], which would violate none of the constraints, is not available. As explained above, such a derivation in an OV language, though seemingly well-formed at PF, would crash at LF, since the nominal object of the embedded verb would not be properly licensed. Furthermore, notice that if, as I argue here, harmony is defined by the ranking in (23), we have an explanation for why the supposedly 'harmonic' [[OV]C] and 'disharmonic' [C[OV]] are more-or-less equally common among OV languages (see (24)); according to the ranking in (23), both are equally harmonic:

(26)

OV language	HEAD-PROXIMATE	FINAL-CLAUSE	HEAD UNIFORMITY
a. ☞ V[COV]			*
b. ☞ [OVC]V		*	
c. V[OVC]	*!		
d. [COV]V	*!	*	*

The proposal here, at least in regard to the basic VO/OV parameter, bears some similarity to Gazdar and Pullum's (1981) Exhaustive Constant Partial Ordering (ECPO) property. ECPO requires that the linear order of sister constituents of a particular category, once established, should remain constant throughout the language, irrespective of the category of any dominating nodes. In the same way, once the direction of Case-assignment parameter has been set for a particular lexical head (V or P), the linear order between this Case-assigning head and its nominal object will necessarily remain constant throughout the language, at least at the base-generated level. The difference between the two approaches is that ECPO can in principle apply to any set of sister constituents, regardless of their category or Case-assigning/receiving properties. The approach proposed here, on the other hand, does not extend to all sets of sister constituents. Where either one sister is not a Case-assigning lexical head, or the other is not a structural Case bearer, the order between the two can only be determined at PF, by the application of ranked, violable linearisation constraints. In this sense therefore the present approach, while it adheres to ECPO, is more restrictive. The restriction placed by the direction of Case-assignment parameter is important in its predictions. Under ECPO alone, there is nothing either to prohibit a fixed order between the verb and its clausal complement, or to determine how this order relates to the order of the verb and its nominal complement. In principle, then, a clausal complement could precede the verb in a VO language – a combination which, as we have seen, appears to be unattested (24). On the other hand, if the order between a verb and its clausal complement cannot be independently determined but is dependent entirely on the application of the Harmonic Word Order Ranking at PF, preverbal complement clauses in VO languages are successfully ruled out.

We have seen then that, at least as regards subordinating complementisers, the Harmonic Word Order Ranking, operating on the basic VO/OV distinction, correctly derives both the grammatical and the ungrammatical orders. However, there is a second claim to be considered here: if it is true that the Harmonic Word Order Ranking is concerned with base-generated structures, it is predicted not only that the orders [V[CVO]], [V[COV]] and [[OVC]V] should be attested, but that these orders should occur as base-generated structures.

That the order [V[CVO]] is base-generated I take to be uncontroversial. This leaves the two orders attested in OV languages: [[OVC]V] and [V[COV]]. Given that the complement clause

can appear on either side of the verb, one might suppose that one order is derived from the other through movement. However, data from a number of languages suggests that this is not the case. In both cases, the complement clause, whether pre- or postverbal, is not an island for extraction; that is, we do not find freezing effects associated with moved constituents (the Freezing Principle, Wexler and Culicover 1980; cf. J. Ross 1967/1986). The validity of this criterion is confirmed by data which follows later, where extraction is impossible from a complement clause which has undergone movement (see (34)-(35)). The lack of island effects for the orders [[OVC]V] and [V[COV]] is demonstrated below by examples from the Southern Dravidian language Malayalam, displaying the order [[OVC]V], and Persian (or Farsi), which has [V[COV]]. (Note that the complementiser, as a linker, is simply glossed LNK.) In the Malayalam example an adjunct PP, and in the Persian example the direct object, is extracted from the complement clause to sentence-initial position. Analogous evidence from Japanese, Afrikaans, Dutch, German, Hindi-Urdu, and Turkish can be found in Bennis (1987), Bayer (1999:256), Karimi (2001), Aghaei (2006), Biberauer, Newton and Sheehan (2009), Biberauer and Sheehan (2012:§9.4.2) and references cited in these works.

(27) [aa kuLaT^{h}-il]$_{i}$ ayaaL [valiya miinə-kaL t_{i} uNTə *ennə*] paṟaññu. *Malayalam*
that pond-LOC he big fish-PL have LNK said
'In that pond, he said that there are big fish.'
(Bayer 1999:256, ex 35, citing p.c. from Hany Babu)

(28) [Un ketâb-â=ro]$_{i}$ man mi-dun-am [*ke* Kimiyâ t_{i} xar-id-e]. *Persian*
that book-PL=LNK.ACC I IMPF-know-1SG LNK Kimea buy-PERF-3SG
'As for those books, I know that Kimea has bought (them).' (Karimi 2001:84, ex 69)

In all the above languages, data of this kind contrasts with examples where the postverbal clause is coreferential with a preverbal nominal. In such cases, extraction from the postverbal clause is impossible (see Karimi 2001; Aghaei 2006; Biberauer, Newton and Sheehan 2009 and references cited in these works). This is expected, since it is the preverbal nominal that is the complement of the verb, while the clause associated with it is an adjunct, and hence an island. This is shown below in an example from Persian:

(29) * Tehran$_{i}$ pesar-e ' in=*o* ne-mi-don-e [*ke* bâbâ=š raft-e t_{i}] *Persian*
Tehran boy-DEF this=LNK.ACC NEG-IMPF-know-3SG LNK father=his gone-3SG
(Aghaei 2006:40, ex 9)

The fact that the complement clause may be base-generated on either side of the verb in OV languages – as long as the complementiser is adjacent to the verb – is particularly striking in certain OV languages that allow both head-initial and head-final complementisers. This phenomenon is found mainly in Indo-Aryan languages with close geographical or historical

contact with Dravidian, such as Assamese, Bengali (or Bangla), Oriya, Marathi, Gujarati and Nepali, and also the Turkic language Uzbek and the Volta-Congo language Vata (or Dida)[16] (Bayer 1996 *et seq*; Cinque 2005b:55; Davison 2007). In such languages, as predicted by the Harmonic Word Order Ranking and the consequent tableau in (26), all complementiser-initial clauses obligatorily follow their selecting verb, while complementiser-final clauses are uniformly preverbal.

Bengali is a head-final language allowing both scrambling/topicalisation to the left and rightwards extraposition of arguments, the latter being marked. Where it is the finite embedded clause that follows the verb, however, no marked reading results. Bengali has two optional complementisers, *bole*, which is clause-final, and *je*, which is clause-initial. (See Bayer 1996:§7.3.1 for evidence that *je* in Bengali and related Indo-Aryan languages of the eastern zone is a genuine complementiser.) The complementiser *bole* is only possible where the embedded clause is preverbal, while *je* only appears where the embedded clause is postverbal. In other words, the complementiser always intervenes between the verb and the Dependent it introduces:

(30) a) chele-ta [or baba aS-be (*bole*)] Sune-che. *Bengali*
boy-CL his father come-FUT.3 LNK hear-PERF.3

b) [or baba aS-be (*bole*)] chele-ta Sune-che.
his father come-FUT.3 LNK boy-CF hear-PERF.3

c) chele-ta Sune-che [or baba aS-be (*?*bole*)].
boy-CL hear-PERF.3 his father come-FUT.3 LNK

'The boy has heard that his father will come.' (Bayer 1996:255, ex 9)

(31) a) chele-ta [(**je*) or baba aS-be] Sune-che
boy-CL LNK his father come-FUT.3 hear-PERF.3

b) [(**je*) or baba aS-be] chele-ta Sune-che.[17]
LNK his father come-FUT.3 boy-CF hear-PERF.3

[16] It is debatable whether Vata genuinely has an initial complementiser. Koopman (1984) argues that only the final subordinator *kā* is a true complementiser.

[17] The ungrammaticality of this example does not receive a direct explanation under my account. Bayer (1999:259) and Bayer *et al* (2005:32, fn 10) state that overt movement of the postverbal clause is impossible throughout Indo-Aryan, as well as in Persian and Turkish. A possible explanation is that the fronting operation is only available for preverbal material, as the trace of postverbal material will not be properly governed.

c) chele-ta Sune-che [(*je*) or baba aS-be].
boy-CL hear-PERF.3 LNK his father come-FUT.3
'The boy has heard that his father will come.' (ex 11)

Again, there is evidence that both the preverbal clause, headed by *bole*, and the postverbal clause, headed by *je*, are base-generated; neither is an island for extraction:

Bengali

(32) [bas theke]$_i$ amar didi [Otogulo duronto bacca t_i laphi-ye
from bus my sister so.many uncontrollable children jump-PSTPRT
nam-be *bole*] bhabe ni.
descend-FUT.3 LNK think.3NEG.PST
'From the bus, my sister didn't think that so many uncontrollable children would jump off.' (Bayer 1999:255-256, ex 34b)

(33) kriSno mEleria-te$_i$ bhab-che [*je* ram t_i mara gE-che].
Krishna malaria-LOC think-PERF.3LNK Ram die go-PERF.3
'Krishna thinks that Ram died of malaria.'
(Simpson & Bhattacharya 2000:587, ex 13, 2003:130, ex 8)

We have seen then that not only does the Harmonic Word Order Ranking successfully capture the attested cross-linguistic distribution of complementisers, but also the prediction that the three optimal candidates in (25) and (26) should be base-generated as such is borne out. One final consequence remains to be explored: while the unsuccessful candidates are predicted not to occur as base-generated structures, the possibility is left open that they may occur as surface structures following movement. If we do therefore come across any of the orders found among the unsuccessful candidates, we expect to find evidence of movement.

Certain rigid OV languages, such as Japanese and Malayalam, allow the surface order V[OVC] as a marked variant of the consistently head-final order [[OVC]V].[18] This is exemplified in (34)a) below for Malayalam and in (35)a) for Japanese, the postverbal clause being deaccented. Since this order is ruled out as a base-generated structure by the Harmonic Word Order Ranking (see (26)), it is predicted that the complementiser-final postverbal clause in (34)-(35) has moved from preverbal position, and will consequently be an island for extraction. The b) examples show that this prediction is borne out:

[18] Other languages allowing this order as a marked variant of [[OVC]V] include Telugu (also Southern Dravidian) and the Ge-Kaingang language Canela-Krahô (see Krishnamurti and Gwynn 1985; Popjes and Popjes 1986; Cinque 2005b). While I have no information on the extraction possibilities for these languages, given the marked nature of the postverbal variant, it seems highly likely that, like Malayalam and Japanese, the complement is always base-generated in preverbal position.

(34) a) ayaaL paṟaññu [valiya miinə-kaL aa kuLaT^{h}-il uNTə *ennə*]. *Malayalam*
he said big fish-PL that pond-LOC have LNK
'He said that there are big fish in that pond.'

b) * [aa kuLaT^{h}-il]$_{i}$ ayaaL paṟaññu [valiya miinə-kaL t_{i} uNTə *ennə*]
that pond-LOC he said big fish-PL have LNK

(35) a) % Mary=wa it=ta, [John=ga zibunzisin=o aisiteiru *to*]. *Japanese*
Mary=TOP say=PST John=LNK.NOM self=LNK.ACC love LNK
'Mary said that John loves himself.'

b) * [Zibunzisin=o]$_{i}$ Mary=wa it=ta, [John=ga t_{i} aisiteiru *to*]
self=LNK.ACC Mary=TOP say=PST John=LNK.NOM love LNK

This clearly contrasts firstly with the parallel Malayalam example in (27) and the Bengali example in (32), and secondly with the Persian and Bengali examples in (28) and (33), where extraction from either a complementiser-final clause in *preverbal* position or from a postverbal complement clause with an *initial* complementiser poses no problem – both these structures being permitted by the Harmonic Word Order Ranking and the consequent tableau in (26).

The above complement clause data both provides supporting evidence for the validity of the proposed Harmonic Word Order Ranking and confirms the proposed restriction to base-generated structures. Essentially, we are dealing with a case of opacity (Kiparsky 1973b:§2): we have counter-feeding in that movement cannot lead to the satisfaction of the linearisation constraints (the harmonic orders in (27)-(28) and (32)-(33) must be base-generated as such); and counter-bleeding in that movement cannot undo satisfaction of the constraints (as demonstrated by (34)-(35)).

I have argued here that the ordering properties of complementisers are determined by the Harmonic Word Order Ranking in (23) operating on the basic orders of VO and OV, and the resulting tableaux in (25)-(26). This is not to say however that a complementiser as a lexical item can never have its own ordering statement. Indeed, we have already seen evidence to the contrary for Bengali (as well as the other OV languages with a hybrid complementiser system). Examples (30)-(31) show that in Bengali the complementiser *je* can only appear in initial position, selecting a complement to its right, while *bole* must be final, selecting a complement to its left.[19] What is important is that any specialisation within the lexicon must remain within

[19] Note that *je* and *bole* are not simply different phonological realisations of the same linker. The choice of complementiser is partly determined by both syntactic and semantic environment: *je* is used to mark any finite clausal Dependent, whether complement to a verb, or a relative clause; *bole* is used for both finite and non-finite clauses, but can only be used where its selecting verb is associated with some kind of

the confines of the principles of the grammar. The Harmonic Word Order Ranking defines what is a possible grammar in terms of the position of complementisers. An individual complementiser may therefore have its own ordering statement, as long as the result is congruous with the Harmonic Word Order Ranking. Therefore, by (26), it is possible for a complementiser in an OV language to have either an initial or a final ordering statement. On the other hand, (25) shows us that a complementiser with a final ordering statement will not be allowed in a VO language.

Before leaving this section, it is worth noting that the other linker data in (10)-(11) give at least an initial indication that the scope of the proposed Harmonic Word Order Ranking extends beyond the complementiser data: the typology shows that the dominant constraint, the Head-Proximate Filter, is unviolated; the linker, as head of the Dependent, or subordinate domain, is always adjacent to its superordinate Head. (See section 3.5 for a more detailed discussion of how the Harmonic Word Order Ranking interacts with other factors in such constructions.)

3.4 Disharmony

In the previous section, I suggested that the notion of harmonic word order is determined by the ranking of independently motivated harmonic word order constraints in a universal Harmonic Word Order Ranking (23) operating on any basic order established in the syntax by the direction of structural-Case-assignment parameter. In this section, I will propose that there is a second type of word order constraint made available by the grammar, that is not concerned with harmony. Constraints of this kind refer to specific syntactic features of a head, and require them to appear either initially or finally to any level of the projection of this head; that is, they belong to the class of alignment constraints originally proposed by McCarthy and Prince (1993), and exploited in terms of accounting for the mapping of syntactic structure to linear order in works such as Legendre (1996, 1999) and Grimshaw (2001a,b). There are two types of features that can be mentioned by these ordering constraints: either the categorial features of a relevant lexical head or features encoding semantics. In the case of the lexical head, constraints of this kind will apply at PF only if the direction of headedness for this head has not been predetermined in the syntax – that is, the lexical category does not have the property of checking structural Case. In principle these ordering constraints can therefore refer to any head as long as it is either lexical and non-Case-assigning, or has syntactic features pertaining to semantics. There is however no expectation that the same lexical or semantic features should appear in the same position cross-linguistically. The ranking of constraints referring to specific syntactic features therefore freely varies from language to language both with respect to the

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speech act (Singh 1980; Bayer 2001). Note that the properties of finiteness and of the semantics of speech are not introduced by the linker itself, but by the heads T and V respectively. The semantically vacuous linker simply marks these properties.

constraints of the Harmonic Word Order Ranking (provided it maintains its own internal ranking) and with respect to other constraints of the same kind. Where these constraints conflict with, and override, any constraints of the Harmonic Word Order Ranking in (23), disharmony arises. Since different languages each have their own ranking, we expect cross-linguistic diversity in terms of the extent of disharmony within individual languages.

We take the syntactic feature of negation by way of illustration, though what follows should apply to any relevant lexical head (N or A) or to any functional head with syntactic features referring to semantics. For example, disharmony is relatively common for negative markers. As operators, negative markers certainly have syntactic features referring to semantics. Therefore it is possible for ordering rules of the type described above to refer to the negative semantics of the negation head within a given language and require it to appear in a given position.[20] The cross-linguistic situation confirms this. There is a tendency to place negative markers in one of two prominent positions (see Dryer 1988): initially to their projection, with the result that negation will be expressed as soon as possible, preventing a 'semantic garden path' (Jespersen 1917; Dryer 1988:102); or finally, the position reserved for new or significant information, often the locus of sentence stress (Mazzon 2004:5). Now, if an OV language has a dominant ordering rule such that a head expressing negation must appear initially to its merger with the verb phrase, disharmony of the kind seen in (1)c) will be found: the initial-over-final order [Neg[OV]]. In the same way, a VO language may have a dominant rule requiring the negative head to appear finally to its merger with its complement, resulting in the disharmonic order in (1)d): the final-over-initial order [[VO]Neg].

The following tableaux illustrate this using OT.[21] Suppose that Universal Grammar makes available, in addition to the Harmonic Word Order Ranking, the competing sets of constraints Neg-Initial and Neg-Final. Constraints in the former set require the negation head to appear initially to its (partial) projection, the latter finally. There will be equivalent sets of initial and final constraints for every relevant lexical head and for every head with syntactic features

[20] Some languages (e.g. Formal French) have two negative markers yielding a single negation reading. This suggests that one of them does not contribute to the compositional semantics at LF. This situation is easily explained by Zeijlstra's (2004) theory of negation. The negative head enters the derivation with an uninterpretable [Neg] feature, which is deleted prior to LF by the interpretable [Neg] feature on the negative operator in its specifier. This means both markers have syntactic features referring to negative semantics, and hence it is possible for specific ordering rules to refer to these features. On the other hand, only the features of the negative operator in [Spec, NegP] will be available for interpretation at LF.

[21] While OT provides a useful means of illustrating the proposals put forward here, it is not necessary to adopt all the assumptions of the Theory in order to accept the broader ideas put forward in this thesis. Crucial to my proposals is the concept inherent to OT of competition between violable constraints, with obedience to higher-ranked constraints outweighing any violations of lower-ranked constraints. On the other hand, I am not committed to the relevance of all constraints in all languages. For instance, we might safely conclude that in a language invariably displaying the order [[OV]Neg] the constraint Neg-Initial, though presumably available to the child as part of UG, is absent in the adult grammar.

encoding semantics. Note that these are sets of constraints applying to different levels or domains of projection. For example, there could be one Neg-Initial constraint applying to the domain of Neg and its complement and another applying to the maximal projection. In the case where we are dealing with a VO language, the disharmonic order [[VO]Neg] will arise whenever any Neg-Final constraint dominates both Head-Uniformity and Neg-Initial. This is shown in the tableau below. Head Uniformity (21) requires that a functional head match the lexical head of extended projection in direction of headedness. In a VO language, therefore, Head Uniformity will be satisfied where the relevant projection of Neg is head-initial (as in (36)b)), and violated where it is head-final (as in (36)a). The Head-Proximate Filter does not apply here, since we are dealing with word order within a single extended projection (cf. (19)):

(36)

VO language	HEAD-PROXIMATE	NEG-FINAL	FINAL-CLAUSE	HEAD UNIFORMITY	NEG-INITIAL
a. ☞ [VO]Neg				*	*
b. Neg[VO]		*!			

However, for any ranking whereby Neg-Final is ranked lower than either one of Head Uniformity or Neg-Initial, the optimal output will be the harmonic order [Neg[VO]]. This is illustrated by the tableaux in (37)-(38). In (37), Neg-Final is dominated by Head Uniformity. The candidate displaying the harmonic order in b) violates Neg-Final, but the disharmonic candidate in a), which obeys this constraint, fatally violates the higher ranked Head Uniformity. In (38) we see a similar situation, except that here it is Neg-Initial that dominates Neg-Final, thereby ruling out the disharmonic candidate.

(37)

VO language	HEAD-PROXIMATE	FINAL-CLAUSE	HEAD UNIFORMITY	NEG-FINAL	NEG-INITIAL
a. [VO]Neg			*!		*
b. ☞ Neg[VO]				*	

(38)

VO language	HEAD-PROXIMATE	NEG-INITIAL	NEG-FINAL	FINAL-CLAUSE	HEAD UNIFORMITY
a. [VO]Neg		*!			*
b. ☞ Neg[VO]			*		

Of course, precisely the same results obtain where either Head Uniformity or Neg-Initial is ranked any higher, or Neg-Final is ranked any lower. In OV languages, we will expect the inverse results: the disharmonic order [Neg[OV]] will obtain only where Neg-Initial dominates both Head Uniformity and Neg-Final; for any other ranking, the harmonic order [[OV]Neg] will be optimal. We expect exactly the same results where Neg is replaced by any other head with syntactic features encoding semantics.

Under this theory of constraints relating to specific syntactic features, the following predictions arise: firstly, disharmony is predicted to be possible cross-linguistically for any head, as long as this head is either lexical or has syntactic features encoding semantics (that is, for any head that is not a linker, cf. section 3.1); secondly, for any given such head, disharmony is predicted to be comparatively infrequent, or cross-linguistically dispreferred. The conditions allowing disharmony to arise are such that there are more logically possible rankings resulting in harmony than those resulting in disharmony (cf. the quantitative interpretation of language-internal variation of Kiparsky 1993; Anttila 1997, 2002).[22] (For example, of the six logically possible total rankings of the relevant constraints Head Uniformity, Neg-Initial and Neg-Final, two invariably result in harmony as regards the order of the negative head in relation to the verb; two result in harmony for OV languages and disharmony for VO languages; two result in harmony for VO languages and disharmony for OV languages.) These predictions in fact lead to the generalisation in (2)b). We have already seen in section 3.2.2 that the findings of broad typological studies provide an initial indication that these predictions, and hence the generalisation in (2)b), are borne out: in the c) and d) examples in (12)-(13), Head Uniformity is violated, while in (15)-(17) it is the Head-Proximate Filter that is violated.

Consider now the situation with linkers. As discussed in section 3.1, these are distinguished from other heads by their semantic vacuity. I have proposed here that disharmonic word orders arise as a result of ordering constraints within the grammar requiring a head with specified syntactic features encoding either lexicality or semantics to appear either initially or finally to some level of its projection. As we saw in the previous section, it is possible for a linker to have some kind of ordering statement as part of its lexical properties; however, this lexical ordering statement is strictly constrained by what is permitted in the grammar. What we do not expect to see applying to linkers are ordering constraints within the grammar of the type we have seen above, since these constraints refer exclusively to either lexical heads or features relating to semantics. The linker, however, by its very definition does not have such features. This explains why in the previous section, the position of subordinating complementisers (as a member of the class of linkers), and any possible lexical ordering statement, is always determined purely by the Harmonic Word Order Ranking in (23).

For example, we saw in the previous section that the complementisers *je* and *bole* in Bengali must obey the dominant constraint, the Head-Proximate Filter: complement clauses headed by initial *je* must be postverbal; those headed by final *bole* must be preverbal (cf. (30) and (31)

[22] This explains the tendency we would expect as far as the grammar alone is concerned. The empirical situation tells us there is indeed a general tendency towards harmony, but the extent of this varies considerably for different heads (see §3.2.2 above). Finer variation of this kind need not necessarily be explained by the grammar, but may be the result of functional considerations of the kind proposed by Hawkins (1994 *et seq*).

above). Interestingly, it is possible for a clause headed by *bole* to appear postverbally – so violating the Head-Proximate Filter and hence the Harmonic Word Order Ranking – where it functions not as a subordinating complementiser, but heads a reason adverbial clause; in this case, *bole* does not mark the presence of an existing relationship (i.e. it is not a linker), but rather introduces its own relationship:

(39) ami ekhane eSe-chi [tomar SONge kOtha bol-bo bole]. *Bengali*
I here come-PST.1 you with speech say-FUT.1 because
'I have come here in order to talk with you.' (Bayer 1996:255, ex 10)

This shows that there is no ban on postverbal *bole*-clauses *per se*, but simply those where the subordinating *bole* is semantically vacuous.

Similarly, a brief look at the diachronic development of the subordinating complementiser *kī* in the now extinct East Semitic language Akkadian provides direct support that it is indeed the lack of semantics in linkers that prohibits disharmonic word order. Akkadian was an SOV language spoken in ancient Mesopotamia. The subordinating complementiser *kī* developed over time from the adverbial conjunction *kīma*. This morpheme *kīma* occurred in initial position within the adverbial clause, which itself overwhelmingly appeared in preverbal position (usually, but not always, in sentence-initial position, preceding the subject). An example containing *kīma* from the Old Babylonian period is given below:

(40) [kīma udammiqak-kunūši] dummikā-nim. *Akkadian*
as 1SG.do.favours.PST-to.you.PL do.favours.IMP.PL-to.me
'As I have done you favours, do me favours.' (Deutscher 2007:40, ex 27)

Deutscher (2007:§4) documents in detail a change in this morpheme's semantics of the kind comparative > causal/purpose > factive, leading to an eventual complete semantic bleaching; that is, a semantically contentful conjunction introducing an adverbial clause (*kīma*) eventually became a subordinating complementiser heading a complement clause (*kī*). Crucial to the theory put forward here, however – and its predictions – is the result of this change on word order. Throughout the diachronic change, the morpheme *kī(ma)* remains consistently initial to the clause it introduces. However, the semantic bleaching of the morpheme is accompanied by a shift in position of the clause it heads: by the Middle Babylonian period complement clauses

headed by the subordinating complementiser have shifted to postverbal position, while adverbial clauses remain preverbal:[23]

(41) bēl-ī īde [*kī* ultu ēlâ dilipt-u mahratan-ni]. *Akkadian*
lord-my 3SG.know LNK since1SG.arrive.PST trouble-NOM 3FSG.contront.STATIVE-me
'My lord knows that since I arrived, trouble has befallen me.' (Deutscher 2007:51, ex 57)

In terms of the theory proposed in this chapter, the shift of position for clauses headed by a subordinating complementiser, but not for those introduced by a semantically contentful adverbial conjunction, is easily understood. Where a clause is headed by a semantically vacuous subordinating complementiser, its position is determined uniquely by the Harmonic Word Order Ranking in (23) (since no ordering constraint referring to either lexical features or semantics can apply). The tableau in (26) shows us that the only grammatical option for an OV language with an initial subordinating complementiser involves a postverbal complement clause, giving the order attested in Akkadian, [V[COV]]. The final-over-initial order [[COV]V] that would result if the subordinating complementiser retained the position of its semantically contentful predecessor would be disharmonic, and hence ungrammatical. On the other hand, examples such as (40) are unproblematic for the theory put forward here, since *kīma* in this example is semantically contentful and therefore may have its own ordering constraints such that disharmony is possible.

A similar argument can be used for the East Cushitic language Harar Oromo. Cinque (2005b:54, fn 12), Dryer (2007:100, 2009a:200, ex 27, p203, table 4) and Biberauer and Sheehan (2012:229, fn 31) point out that in examples such as (42) below, it appears to instantiate the disharmonic order *[[COV]V]:

(42) inníi [akka deem-u] good'-ám-é. *Harar Oromo*
he that go-DEP order-PASS-PST
'He was ordered to go.' (Owens 1985:145, ex 49)

As was the case in Akkadian, it seems that the initial element of the preverbal clause, *akka*, is not in fact semantically vacuous, and therefore does not belong to the class of linkers; it is free to have its own (disharmonic) ordering rule. The morpheme is used for a variety of purposes, and is translated by reference grammars as 'according as, just as, like, how, manner, way, (in order) to/that, (the fact) that' (Hodson and Walker 1922; Owens 1985). It is moreover worth noting however that Owens (1985:114) refers to the clause introduced by *akka* as a 'noun

[23] There is an intervening period in which *kīma* is used sometimes as a factive complementiser, sometimes as an adverbial conjunction. In both cases the *kīma*-clause precedes the verb. The diachronic situation therefore leaves a few questions open. See Deutscher (2007:§4) for fuller details.

clause'. It seems that the clause is indeed nominal, since, where it expresses purpose, it can optionally be marked with dative case (Owens 1985:146):[24]

(43) [akka na árk-aníi=*f*] d'uf-an. *Harar Oromo*
that me see-PL=LNK.DAT came-PL
'They came to see me.' (Owens 1985:146, ex 54)

Elsewhere, there is no overt case-marking on the complement clause, but this is entirely expected, as the direct object always appears in the absolutive case, which is unmarked morphologically.[25]

We have seen then both the theoretical motivation for part b) of the generalisations in (2), and some empirical indications supporting the predictions: firstly statistical evidence from broad typological studies (as in section 3.2.2 above), and secondly by comparing semantically vacuous linkers with their semantically contentful synchronic or diachronic counterparts. The rest of this section will be devoted to studying some of the relevant disharmonic structures in greater detail.

We begin by considering markers of verbal properties such as tense, aspect and mood. Cross-linguistic studies such as Cinque (1999, 2009) and Julien (2002) argue firstly that these markers are functional heads in the extended verbal projection, and secondly show that these heads obey a strict, universal, hierarchy, or functional sequence (see also Grimshaw 1991/2005, 2000; Svenonius 2008 and references cited in the above works). These findings, which appear to be without exception, are based on the properties and placement of such markers both in head-initial and head-final languages.

Given then that markers of tense, aspect and mood – both initial and final – bear syntactic features encoding semantics, it is predicted that ordering constraints referring to these features should be able to target these heads, resulting in disharmony. We have already seen typological evidence suggesting this prediction is borne out in (12). Concrete examples given below in (44)-(46) support this evidence. The example in (44) demonstrates the initial-over-final order in the North Volta-Congo language Supyire: the head-final VP is c-commanded by an initial aspect marker, *a*. (See also examples from the Ge-Kaingang language Canela-Krahô in (55) and (94) below, where a head-initial TP dominates a head-final VP.)

[24] Since the dative case marker is syntactically independent, it is in fact a linker (see §3.5.3). As predicted, it obeys the Head-Proximate Filter.

[25] Cinque (2005b) claims that the languages D(h)ivehi (Insular Indo-Aryan), Lak(h)ota (Siouan) and Ngiti (Central Sudanic) instantiate the disharmonic order *[V[OVC]], as does Dryer (2009:14, ex 27, p17, table 4) for the Kwadi-Khoe language Khoekhoe. Like Harar Oromo, the alleged 'complementiser' here is in fact a noun (see Cain and Gair 2000; Rood 1973; Kutsch Lojenga 1994:395 and Güldemann 2006:29 respectively). The disharmonic order therefore poses no problem.

(44) Yi [a [yì-yé kúnúŋɔ́]]. *Supyire*
they PERF they-RFL be.close.by
'They are (too) close to each other.' (Carlson 1991:215, ex 30)

The inverse, final-over-initial, construction, whereby final tense or aspect markers are found in VO constructions, is also relatively common (Biberauer *et al* 2007 *et seq*; Dryer 2009b). This is shown in examples from the Central Sudanic language Bagirmi and the North Volta-Congo language Mumuye: the Bagirmi example in (45) shows a final aspect marker, *ga*, c-commanding a head-initial VP, while the final tense marker, *ni*, in the Mumuye example in (46) c-commands a head-initial AspP:

(45) bɨs [sa ja tebɨre] ga. *Bagirmi*
dog eat meat yesterday COMPL
'The dog ate the meat yesterday.' (Stevenson 1969:85, gloss Dryer 2009b:344, ex 104)

(46) Znàsọ [dé baasé Ranti] ni. *Mumuye*
Znaso PERF mimic Ranti IMMED.FUT
'Znaso is about to mimic Ranti.' (Dryer 2009b:345, ex 106b, citing Shimizu 1983:112)

The same results can be shown for the negation head, though the situation here is less straightforward. Firstly, negative particles are not always heads, but in many languages are adverbs. Secondly, where the negative marker is an adverb in a double negation language, NegP is usually not projected (Zeijlstra 2004). Moreover, where it is present, the position of NegP within the functional sequence varies from language to language (Laka 1990/1994; Ouhalla 1991; Zanuttini 1991, 1997; Cinque 1999; Julien 2002; Svenonius 2007:§3). It therefore does not necessarily follow that any attested sequence of either [Neg[OV]] or [[VO]Neg] exemplifies the predicted disharmonic structure; further investigation is required. Since NegP is generally not projected in double negation languages, we restrict our discussion to negative concord languages, which under most theories of negative concord must project NegP (*inter alia* Zanuttini 1991; Haegeman and Zanuttini 1991, 1996; Haegeman 1995, 1997; Brown 1999; Zeijlstra 2004; Ruff 2007). Our goal will therefore be to find negative concord languages in which the negative marker is a head, and this head differs in direction of headedness from the verb.

An example of the disharmonic initial-over-final order is found in the Northern Tungusic language Evenki, an OV language. This is demonstrated in example (47)b) below. It is clear here that the negative marker *ə-* is a head in the extended verbal projection, since it inflects for subject agreement and tense. Comparing the negative example in (47)b) with its affirmative

counterpart in (47)a), we see that these markings would otherwise appear on the lexical verb; in the negative example this latter has a participial form. This confirms not only that the negative marker is a head, but also that the construction is monoclausal (see Payne 1985:212-214).[26]

(47) a) Bi [dukuwūn-ma duku-cā-w]. *Evenki*
I letter-OBJ write-PST-1SG
'I wrote a letter.'

b) Bi [ə-cə̄-w [dukuwūn-ma duku-ra]].
I NEG-PST-1SG letter-OBJ write-PART
'I didn't write a letter.' (Payne 1985:213, ex 31)

Turning now to the inverse disharmonic order, the order [[VO]Neg] is relatively common in central Africa (Dryer 2009b) and the Pacific region (Biberauer, Holmberg and Roberts 2010:56, citing Reesink 2002). Here again it can be shown that, at least in some cases, this final negative marker is a head, and thus instantiates the disharmonic final-over-initial order. Firstly, like Evenki, the Central Sudanic language Ma'di marks negation by means of a negative auxiliary. This is shown in (48), where the final negation head is marked for tense, while the lexical verb remains unmarked. On the other hand, in the absence of negation, the same past/non-past distinction is marked on the lexical verb, as in (49):

(48) a) [m´-āwí ʤótī] kʊ̄. *Ma'di*
1SG-open door NEG.NONPST
'I won't open/am not opening the door/don't open doors.'
(Blackings & Fabb 2003:14, ex 8)

b) [m´-āwí ʤótī] kʊ̄rʊ̀.
1SG-open door NEG.PST
'I did not open the door.' (ex 7)

(49) ká gbándà `-ŋā.
3SG cassava NONPST-eat
'He is eating/eats cassava.' (p13, ex 1)

[26] It is also possible for the object to precede the negative marker, as in the example below. This is presumably the result of object-shift.

i) Bi dukuwūn-ma ə-cə̄-w duku-ra. *Evenki*
I letter-OBJ NEG-PST-1SG write-PART
'I didn't write a letter.' (Payne 1985:213, ex 31b)

In languages where the negative marker is an uninflected particle, there may still be evidence that this particle heads NegP. An example of such a language is Lagwan (or Logone, Central Chadic), which exhibits the order T[VO]Neg:

(50) [Sà dɨ-gɨr kasku diyasɨn] sá. *Lagwan*
FUT 3FSG-go market tomorrow NEG
'She won't go to the market tomorrow.'

A number of factors indicate that the negation marker here heads the projection NegP (Ruff 2007:§3.1.2), and therefore exemplifies the disharmonic final-over-initial order. Firstly, example (51) below provides evidence that Lagwan is a negative concord language, and therefore projects a NegP: the negative marker *sá* is required to license the negative concord item (or n-word):

(51) Bɨle =*a* shima [[a lo] *(sá)]. *Lagwan*
man LNK.M n-M 3MSG.PERF come NEG
'Nobody came.'

Secondly, it is clear that NegP has a fixed position in the Lagwan clause, dominating head-initial TP. This evidence comes from prohibitives. Lagwan finite indicative clauses, demonstrated in (50) and (51), are marked for tense or aspect and subject agreement. Imperatives, on the other hand, lack any marking for tense, aspect or subject agreement, conforming to Kayne's (1992/2000) conclusion that true imperatives are truncated structures lacking TP and any higher functional projections:

(52) Slà a ! *Lagwan*
push.IMP up
'Get up!'

However, as is the case in many languages (see Zanuttini 1991 *et seq*; Kayne 1992/2000; Rivero and Terzi 1995; Zeijlstra 2004; Van der Auwera *et al* 2008), true negative imperatives are banned in Lagwan: as shown in (53)a), it is not possible to attach the negative marker to an imperative clause. Instead, a surrogate is used, with the future tense head projected and marked for second person, as in (53)b):

(53) a) * Slà a sá ! *Lagwan*
push.IMP up NEG

b) [Sà gɨ-sla a] sá !
FUT 2SG-push up NEG
'Don't get up!'

Zanuttini (1994, 1996) argues that in languages banning true negative imperatives, NegP must dominate TP, thereby rendering a structure in which NegP is present but TP is absent (such as (53)a)) ungrammatical. The fact that in Lagwan the ungrammatical structure is repaired by projecting TP seems to confirm this hypothesis.

Finally, there is evidence not only that NegP is projected, and that this NegP dominates head-initial TP and VP, but also that the final negative marker heads this projection, as opposed to being an adverb in its specifier. This evidence is found by applying the 'why not' test developed by Merchant (2006). The 'why not' construction is analysed as a form of phrasal adjunction, and hence only permitted where the negative marker is a maximal projection. In Lagwan, no such construction is possible:

(54) a) * [Age ghwani] sá ? *Lagwan*
because what NEG

b) * Sá [age ghwani] ?
NEG because what

We have seen then that heads marking tense, aspect and negation can all, as predicted, violate Head Uniformity, resulting in disharmony. The typological data in (13) above indicates that the same is true of interrogative heads. This is exemplified firstly in Canela-Krahô (Ge-Kaingang), an OV language with an initial interrogative marker, *xà*:

(55) xà capi te [po curan]? *Canela-Krahô*
Q Capi PST deer kill
'Did Capi kill a deer?' (Popjes & Popjes 1986:157, ex 186)

The inverse disharmonic order, whereby a VO language has a final interrogative marker, is exhibited, among very many other languages, in Lagwan. Lagwan has a final interrogative head (*ɗa*), c-commanding an initial TP and VP. It occurs in both matrix and subordinate clauses, as shown in (56) and (57) respectively:

(56) [G-a mma ì gha] ɗa ? *Lagwan*
2SG-PERF leave her.ACC house Q
'Did you leave it at home?'

(57) Ndalu ngwa fɨne, *ki* [[bɨle =*a* shi a s-o gha] ɗa].
1SG.PROG look.at outside LNK man LNK.M some 3SGM.PERF enter-VENT house Q
'I'm looking outside, (to see) whether someone has entered the house.'

(Aaron Shryock, p.c.)

As regards interrogative markers and other discourse C-particles, notice that the semantic explanation for disharmony accounts for an otherwise anomalous situation. We have seen in the previous section that for subordinating complementisers, the disharmonic final-over-initial order is ungrammatical (see (18)). However, this order is relatively common for other discourse-related heads assumed to belong to the CP-domain, including, as we have seen, question particles (see Julien 2002:§3.6.1; Biberauer, Holmberg and Roberts 2007 *et seq*; Paul to appear a,b). If the presence or absence of disharmony is related not directly to category, but rather to the presence or absence of syntactic features encoding semantics, the apparent anomaly disappears.

So far we have considered examples within a single extended projection – that is, examples where Head Uniformity is violated due to some higher-ranked, specific, constraint. Before concluding this section we will take a brief look at some more complex examples from the nominal domain, spanning more than one extended projection, where the Head-Proximate Filter also comes into play.

We consider firstly Greek and Russian. In these languages the definite article in D occurs initially to its projection, while the noun follows its adjectival Dependent. Since the definite article has features encoding definiteness semantics, constraints of the type D-Initial/-Final will be relevant here. Since N does not assign structural Case to its complement (Chomsky 1981, 1986b), no parameter determining direction of structural-Case-assignment can apply, and so the noun and its Dependents are linearised at PF, with sets of constraints N-Initial and N-Final applying. The other constraint that may be relevant in determining the direction of headedness of D and N is Head Uniformity (21). This constraint is not concerned with the direction of headedness of D and N as individual projections, but relative to each other. Head Uniformity requires that functional heads and the lexical head of their extended projection match in direction of headedness, but is otherwise not particular as to whether they are both head-initial or both head-final. Since D differs in direction of headedness from the lexical head of its extended projection (the noun), this means that the constraints D-Initial and N-Final (applying to the domain of the noun and its adjectival Dependent) must both dominate Head Uniformity, as shown in the tableau in (58)-(59). In addition, N-Final must dominate the Head-Proximate

Filter.[27] This is shown by the sub-tableau in (59), where the AP modifying the noun is head-initial,[28] so violating the Head-Proximate Filter, since the adjective (the head of the subordinate domain, or Dependent) is not linearly contiguous with its superordinate Head, the noun. (The constraints N-Initial and D-Final, which are assumed to be present, but ranked too low to be active, are not shown for space reasons in the tableaux here and in (60)-(61).)

	Greek/Russian	N-FINAL	D-INITIAL	HEAD-PROXIMATE	FINAL-CLAUSE	HEAD UNIFORMITY
(58)	a. ☞ D[A N]					*
	b. D[N A]	*!				
	c. [A N]D		*!			
(59)	a. ☞ D[[A XP]N]			*		*
	b. D[N[A XP]]	*!				
	c. [[A XP]N]D		*!	*		

This contrasts with Germanic languages, where again the constraints D-Initial and N-Final must both dominate Head Uniformity, but this time N-Final is ranked below the Head-Proximate Filter. Where the noun is modified by a simple adjective, as in (60), (or indeed by any head-final AP) we have the same results as in Greek and Russian: the higher-ranked D-Initial and N-Final require a violation of Head Uniformity. However, where the noun is modified by a head-initial AP, as in (61), the results are different: in order to obey the undominated Head-Proximate Filter, N-Final must be violated, resulting in a fully harmonic, consistently head-initial structure:

	Germanic	HEAD-PROXIMATE	D-INITIAL	N-FINAL	FINAL-CLAUSE	HEAD UNIFORMITY
(60)	a. ☞ D[A N]					*
	b. D[N A]			*!		
	c. [A N]D		*!			
(61)	a. D[[A XP]N]	*!				*
	b. ☞ D[N[A XP]]			*		
	c. [[A XP]N]D	*!	*!			

[27] The ranking of D-Initial with respect to N-Final and the Head-Proximate Filter in both Greek and Russian and Germanic languages is not important. Since however it is never violated in these languages, I have kept it undominated in the tableaux in (58)-(61).

[28] Here and in (61) and (72) below, it is assumed that the AP is head-initial due to the high ranking of some A-Initial constraint applying to the relevant level of projection of the adjective (dominating A-Final). Since our primary concern is to demonstrate how the direction of headedness of the noun is determined (and in (72) of the linker), the A-Initial/-Final constraints are not included in the tableaux, to reduce complexity.

3.5 Harmony meets Disharmony

In the previous two sections we established firstly a theory of harmony, consisting of a universal ranking of harmonic word order constraints (23), and secondly a theory of disharmony, allowing divergence from the order determined by the Harmonic Word Order Ranking by higher-ranked specific ordering constraints within individual languages. We determined that this latter type of constraint cannot apply to linkers, due to their status as semantically vacuous functional heads. We have already seen the effects of this with subordinating complementisers, where the position of the complementiser within a given language is determined purely by the Harmonic Word Order Ranking operating on the basic input provided by the syntax (section 3.3). In this section we return to two further types of linker: syntactically independent relative clause markers and more general linkers in the complex noun phrase. These cases are of particular interest because the Head of the relationship marked by the linker and its Dependent are of different categories, thereby enabling us to consider the outcome where harmonic and disharmonic structures interact. We will see that, even where the Head noun has a specific ordering constraint conflicting with the constraints of the Harmonic Word Order Ranking, irrespective of the ranking of this specific ordering constraint, the linker will always obey the Head-Proximate Filter, hence the generalisation in (2)a). The results of this study will not only add empirical support to the theories put forward in sections 3.3 and 3.4, but also shed some light on the well-observed near parallels between the distribution of relative clauses and complement clauses, and why such parallels fail to be realised completely.

3.5.1 Relative Clause Markers

We have already observed in section 3.2.1 one parallel between subordinating complementisers and relative clause markers (see (9) and (10)): in both cases the linker (C or REL) is required to intervene between the lexical Head (V or N) and its clausal Dependent; moreover, in both cases there is a marked preference for the clausal Dependent to follow the lexical Head.

In the case of complement clauses, we observed a direct link between this CP-Final requirement and the order of object and verb: in VO languages the complement clause *must* appear in postverbal position, while in OV languages complement clauses are found with near equal frequency in both preverbal and postverbal position (see (18), (24), (25), (26)).

As regards the distribution of relative clauses, the order of object and verb in the language again plays a significant role. This is shown below using data from Dryer (2008d, see also Greenberg 1963:90, table 10; Downing 1977:164, 1978; Mallinson and Blake 1981:§5.2.1; Hawkins 1983 *et seq*; C. Lehmann 1984; Keenan 1985:§2.1; Foster and Höfling 1987:486, 494; Dryer 1991 *et seq*; De Vries 2001:235-236, 2005:136-137; Rijkhoff 2002:307; Andrews 2007):

(62) a) Postnominal and VO: [N [$_{RC}$ V O]] = 370 languages (64%)

b) Prenominal and OV: [[$_{RC}$ O V] N] = 111 languages (19%)

c) Postnominal and OV: [N [$_{RC}$ O V]] = 95 languages (16%) (46% of OV languages)

d) Prenominal and VO: [[$_{RC}$ V O] N] = 5 languages (1%) (1% of VO languages)

(Data taken from Dryer 2008d)

We see that in OV languages, relative clauses are distributed relatively evenly between prenominal and postnominal position. This mirrors the distribution of complement clauses in relation to the verb in this same set of languages. In VO languages, on the other hand, there is a marked preference for relative clauses to follow the noun. While this preference again seems to run parallel to the distribution of complement clauses in VO languages, there is an important difference. In the case of complement clauses, we are dealing with a strict requirement: preverbal complement clauses in these languages are ungrammatical. With relative clauses, on the other hand, we are dealing with a simple statistical preference: prenominal relative clauses in VO languages are possible, but very rare. The overall crosslinguistic distribution of relative clauses and their markers is therefore as follows (cf. typology of complementiser distribution in (24) above):

(63)	*VO languages:*	*OV languages:*
	N[REL VO]	**N[REL OV]**
	[VO REL]N (rare)	**[OV REL]N**
	*N[VO REL]	*N[OV REL]
	*[REL VO]N	*[REL OV]N

We saw in section 3.3 that the crosslinguistic distribution of complementisers and the complement clauses they head is exactly captured by the Harmonic Word Order Ranking (23), both in terms of attested distribution and its relative frequency. This section will show that, despite a small, but significant, difference, the attested distribution of relative clause markers and the relative clauses they head is again precisely predicted by theories put forward in this chapter: not by the Harmonic Word Order Ranking alone, but in combination with the theory of disharmony proposed in section 3.4.

We begin by considering the more simple case of OV languages. The relative clause marker, as a linker, cannot have its own ordering constraints and therefore must obey the Harmonic Word Order Ranking. This can be seen in (64) below, where the attested orders for OV languages are precisely those predicted by this ranking. Moreover, the relative frequency of the two orders is predicted: since neither is more marked than the other, both appear with near equal frequency (see (62)):

(64)

OV language	HEAD-PROXIMATE	FINAL-CLAUSE	HEAD UNIFORMITY
a. ☞ N[REL OV]			*
b. ☞ [OV REL]N		*	
c. N[OV REL]	*!		
d. [REL OV]N	*!	*	*

Turning now to VO languages, it may seem initially as if, like complement clauses (cf. (25)), the Harmonic Word Order Ranking allows only one optimal order, the consistently head-initial order:

(65)

VO language	HEAD-PROXIMATE	FINAL-CLAUSE	HEAD UNIFORMITY
a. ☞ N[REL VO]			
b. [VO REL]N		*!	*!
c. N[VO REL]	*!		*
d. [REL VO]N	*!	*	

However, recall that while the only constraints that can apply to linkers are those making up the Harmonic Word Order Ranking, this is not necessarily the case with lexical heads. At least where the lexical head is not a structural-Case-assigner, these may have their own ordering rules, requiring them to appear initially or finally to any level of their projection. In the case of relative clauses, the phrase headed by the linker is immediately dominated by a projection of the noun. We must therefore also consider the results where the constraints N-Initial and N-Final applying to this (partial) projection of the noun are introduced into the ranking.

We find very similar results to those discussed in the previous section for the constraints Neg-Initial and Neg-Final. Due to Final-Clause and Head Uniformity, the optimal order for relative clauses in VO languages determined by the Harmonic Word Order Ranking alone requires the noun to appear in initial position. The constraint N-Initial (applying at least to the level of projection of N encompassing the relative clause) calls for the same result. However, it is possible for the noun to appear in final position if all three constraints Final-Clause, Head Uniformity and N-Initial are dominated by N-Final, as in the tableau in (66). Because of the high ranking of N-Final, the a) and c) candidates are immediately ruled out, and a violation of both Final-Clause and N-Initial is inevitable. The Head-Proximate Filter ensures that the b) candidate, [[VO REL]N], is chosen, also incurring a violation of Head Uniformity. On the other hand, if any one of Final-Clause, Head Uniformity or N-Initial is ranked either equally with, or higher than, N-Final, the a) candidate, [N[REL VO]] will be optimal. This explains firstly why there are two possible orders for relative clauses in VO languages, and secondly gives some

indication why [[VO REL]N] is much rarer: there are fewer possible rankings leading to this as the optimal order.

(66)

VO language	HEAD-PROXIMATE	N-FINAL	FINAL-CLAUSE	HEAD UNIFORMITY	N-INITIAL
a. N[REL VO]		*!			
b. ☞ [VO REL]N			*	*	*
c. N[VO REL]	*!	*!		*	
d. [REL VO]N	*!		*		*

As regards OV languages, the Harmonic Word Order Ranking in any case allows one N-initial order, one N-final order (see (64)). So the former will be chosen wherever N-Initial dominates N-Final, and the latter where N-Final dominates N-Initial. Where both constraints are equally ranked, either order will be possible.

Consider now why a parallel situation does not arise with clausal complements to verbs – that is, why we do not find complement clauses in preverbal position in VO languages. The situation where a clausal Dependent in a VO language precedes its superordinate Head (thereby violating both Head Uniformity and the Final-Clause requirement) will only arise if the superordinate Head has a final ordering constraint applying to the domain of projection encompassing the superordinate Head and its clausal Dependent, this constraint being ranked sufficiently high to be active in determining the winning candidate. As we have already discussed, the direction of headedness of the verb, unlike that of the noun, is established in the narrow syntax, as a result of a parameter determining the direction of assignment of structural Case. As a result of this parameter, the order between the verb and its nominal complement is fixed prior to PF, providing the input for the tableaux in (25), (26) and (64)-(66). The difference between the case of the complement clause to the verb and the relative clause to the noun arises when it comes to linearising the embedded clause with respect to its superordinate Head. In the case of V, the syntactic parameter will determine the order between the verb and its nominal complement, but have no effect on the order of the verb and its clausal complement. As we saw in section 3.3, this leads to the possibility of both preverbal and postverbal complement clauses in OV languages, but excludes the possibility of preverbal complement clauses in VO languages. N, on the other hand, as discussed in the previous section, is not a structural-Case-assigner and so no syntactic parameter applies. In this case, therefore, the direction of headedness of N within its projection is determined exclusively at PF, with constraints of the kind N-Initial and N-Final applicable. Since these constraints are PF constraints, and unconcerned with syntactic properties such as Case, they apply to any and every kind of Dependent within the relevant domain of projection. Therefore the order of the verb and its nominal object will be fixed within the relative clause in the input, but it is possible

for constraints of the type N-Initial/-Final, subject to their ranking, to determine the order of the relative clause and its Head noun (as in the tableau in (63)). The difference in behaviour of complement clauses to verbs and relative clauses to nouns is therefore an indirect consequence of the fact that verbs, but not nouns, assign structural Case.

Returning now to the order [[VO REL]N], the explanation offered above makes a very precise prediction. The languages exhibiting this order should be exactly those VO languages that have an active N-Final constraint applying at least to the level of projection of N encompassing relative clauses. That is to say that in these languages we expect N to be final not only with respect to relative clauses, but also with respect to any other kind of Dependent within the domain of the merger of the noun and the relative clause: we expect any Dependent that sits lower in the noun phrase than the relative clause to precede the noun in its base-generated position. Typological evidence from Hawkins (1994:272, table 5.8) shows that, in languages where an adjective and a relative clause appear on the same side of the noun (either preceding or following), the unmarked order invariably has the adjective intervening between the noun and the relative clause. This strongly suggests that the adjective is universally merged below the relative clause. Another kind of Dependent that may be merged below the relative clause in the noun phrase is the possessor, since it is generally assumed that Universal Grammar has two available positions for possessors: one merged low within NP, and one high, in [Spec, DP]. We therefore expect firstly adjectives to precede the noun in [[VO REL]N] languages, and secondly any low possessor, if present in the language.[29]

The five VO languages listed by Dryer as having postnominal relative clauses are the Chinese languages Mandarin, Cantonese and Hakka, the Tibeto-Burman language Bai and the Central East Formosan language Amis. To this list we can add Pazih (or Pazeh), a North Formosan language (Comrie 2008). In all these languages the prenominal relative clause is marked by an overt linker.

Firstly, the Chinese languages are well known to have a consistently N-final noun phrase, thereby bearing out the prediction (see (6) and (7), as well as numerous examples in chapter 2).

Bai is a more complex case. According to Dryer (2008e:§4), possessors, like relative clauses, precede the noun, while adjectives may appear on either side. While at first sight the Bai data seems problematic, a more detailed study reveals that, like the Chinese languages, Bai perfectly

[29] Note that this is not a two-way implication. Languages with prenominal adjectives will not necessarily have prenominal relative clauses, since the domain of adjectives within the noun phrase is smaller than the domain of relative clauses. Therefore it is possible to have an active constraint N-Final applying only to the smaller projection of N covering the domain of adjectives, leaving the order of relative clauses with respect to N unaffected.

bears out the prediction concerning VO languages with prenominal relative clauses. Recall from section 3.3 that our theories of harmony and disharmony are concerned not with the surface order, but with the base-generated order. Therefore the predicted restriction to prenominal position for Dependents of the noun in languages like Chinese, Bai, Amis and Pazih need apply only at the base-generated level. In the case of Bai, there is good evidence for movement of the noun from final position. The surface order is usually A-N-Dem-Num, with N-Dem-Num-A also attested (Cinque 2005a:319, fn 10, 11; Dryer 2008e:§4), though the latter may exist only in written language as a borrowing from Chinese (Abels and Neeleman 2012:55). Extensive work by Abels and Neeleman (2009, 2012) on the crosslinguistic distribution of these four elements shows that the orders attested in Bai are not possible as base-generated orders; they can be derived only by leftwards movement of (a projection of) the noun from final position. Specifically, the order A-N-Dem-Num is derived by movement of the noun with pied-piping of the adjective, as in (67)a), while the order N-Dem-Num-A would be derived by movement of the noun alone, as in (67)b):

(67) a) $[\text{A N}]_i$ [Dem Num t_i]

b) N_i [Dem Num A t_i]

Turning to the Formosan languages, Amis has prenominal adjectives, while possessors may appear on either side of the noun, the postnominal position being preferred (Joy Wu, p.c.). The appearance of the possessor following the noun however is not necessarily problematic, depending on whether this possessor is the low possessor, merged below the relative clause, or the high possessor, in [Spec, DP]. If the postnominal possessor in Amis is associated with D, and hence outside the domain of the relative clause, its appearance in final position poses no problem.

In the final language, Pazih, possessors and adjectives both precede the noun (see P. Li 2000; P. Li and Tsuchida 2001). Pazih then, like the Chinese languages and Bai, supports the proposal that among VO languages, prenominal relative clauses are available only in those languages that have an active N-Final constraint applying at least within the domain of relative clauses, while, on the basis of the data available, Amis is at least compatible with this prediction.

We have seen then that the theories of word order put forward in this chapter not only successfully derive the attested cross-linguistic distribution of relative clause markers, including the presence of prenominal relative clauses in VO languages, but also place a restriction on exactly which VO languages should allow this option.

Before leaving the relative clause data, it is worth saying something about relative clauses that are marked not by a linker, but by an affix marking subordination. It has sometimes been claimed that, in addition to the orders given in (63), the order [N[OV-REL]] is also attested (Hawkins 1990:244, 1994:§5; Cinque 2005b). However, the languages allegedly exhibiting this order – the Pama-Nyungan languages Dyirbal and Kuku Yalanji,[30] Hurrian (Hurro-Urartian), Lushei (or Mizo, Tibeto-Burman) and Sumerian – mark subordination in the relative clause not by means of an independent syntactic head (that is, a linker), but by a suffix on the verb (see C. Lehmann 1984:76-78; De Vries 2002: Appendix II).[31] This is demonstrated by the Dyirbal example below. Here the verb in the relative clause is marked by a relative suffix, *-ŋu*, which replaces the tense suffix (Dixon 1969:37; C. Lehmann 1984:73). That it is indeed a suffix, rather than a syntactically independent clitic, is evidenced by the fact that the relative marker is followed by the ergative case marker, itself a suffix:

(68) yibi [yaṛa-ŋgu [njalŋga-ŋgu djilwal-ŋa-ŋu-ru]]buṛa-n. *Dyirbal*
woman man-ERG child-ERG kick-ŋaj-REL-ERG see-T
'The man who had kicked the child saw the woman.' (Dixon 1969:38, ex 12)

According to Lexical Integrity, affixes in fact should not fall under the restrictions of the Harmonic Word Order Ranking. We argued in chapter 2 that affixes do not project in the syntax and are therefore inaccessible to the syntax component (see, among others, Di Sciullo and Williams 1987; Spencer 1992; Joseph and Smirniotopoulos 1993; Ackema and Neeleman 2002 *et seq* for further evidence supporting this view). If an affix does not head its own projection within the extended projection, it is subject to neither the Head-Proximate Filter nor Head Uniformity. Greater freedom for semantically vacuous affixes than for semantically vacuous heads (linkers) is therefore predicted.

[30] Cinque (2005b:58, 80) also claims this language exhibits the order [V[OVC]]. The 'complementiser' here is the same subordinating suffix as used in the relative clause. As in Dyirbal, further suffixes can be added to this subordinating suffix. See Patz (2002).

[31] Cinque (2005b) also cites the Na-Dené language Slave(y), the Paya language Pech, and Teribe as examples of languages displaying this order. In the case of Slave the alleged relative clause marker makes a semantic contribution, and hence is not a true linker (see Rice 1989:§47.2). Disharmony is therefore predicted to be possible. In Pech, the marker of subordination is transcribed as an affix and also seems to make a semantic constribution (Cinque 2005b:84). I have not been able to find any information on Teribe.

Cinque (2005b:60-61) further gives the South Semitic language Tigre as an example of the order [[REL TP]N], which is also ruled out for true linkers by the Head-Proximate Filter. In this case the alleged relative clause marker – which is not restricted to initial position in the clause – is in fact a marker of definiteness. See Palmer (1961) and Raz (1983).

3.5.2 Linkers Elsewhere in the Noun Phrase

We have seen then that the Harmonic Word Order Ranking in (23), together with the theory of disharmony presented in section 3.4 and the direction of Case-assignment parameter, successfully accounts for the distribution of two types of linker: complementisers and relative clause markers. We have seen that for both types of linker, the dominant constraint in the Harmonic Word Order Ranking, the Head-Proximate Filter, remains unviolated, irrespective of the ranking of any specific constraint targeting the lexical features of the superordinate Head. At least for these two types of linker then, the generalisation in (2)a) holds true. In section 3.2.1 a third, broader, set of linkers was mentioned: linkers used more generally in the complex noun phrase, the Dependent being of any category. Being likewise semantically vacuous functional heads, this set of linkers is also predicted to conform to the Harmonic Word Order Ranking. The only difference here will be that, where the Dependent is not clausal, the Final-Clause requirement will not come into play.

As with relative clause markers (a subset of linkers in the noun phrase), we are dealing here for the most part with a superordinate Head – always a noun – and a Dependent of differing category. As with relative clauses, therefore, we expect different results depending on the ranking of the constraints N-Initial and N-Final (applying to the domain of the relevant Dependent) with respect to the Harmonic Word Order Ranking. Let us consider firstly the results where either N-initial or N-Final dominates at least part of the Harmonic Word Order Ranking. If the Dependent marked by the linker differs from the noun in direction of headedness, violations of Head Uniformity will be requisite. We saw in the previous subsection that in VO languages with prenominal relative clauses, such as Mandarin Chinese, N-Final must dominate at least Final-Clause and Head Uniformity. Therefore, where the noun takes a head-initial Dependent of any kind within the domain of the N-Final constraint, the linker marking the relationship will necessarily violate Head Uniformity in order to obey the Head-Proximate Filter. We saw an example of this in (7) above from Mandarin Chinese, where the noun was modified by a head-initial PP. This is motivated in (69): as the highest head in the extended projection of the PP Dependent, the Head-Proximate Filter requires the linker to be adjacent to the Head noun; of the two candidates (a) and b)) meeting this requirement, only a) also obeys the undominated N-Final constraint:

(69)

Head-initial Dependent	HEAD-PROXIMATE	N-FINAL	FINAL-CLAUSE	HEAD UNIFORMITY	N-INITIAL
a. ☞ [P NP LNK]N				*	*
b. N[LNK P NP]		*!			
c. [LNK P NP]N	*!				*
d. N[P NP LNK]	*!	*!		*	

On the other hand, in a language where the constraints N-Initial and N-Final are ranked below the Harmonic Word Order Ranking, we expect all three constraints in this ranking to be obeyed wherever applicable. An example of such a language is the Malayo-Polynesian language Batad Ifugao. The linker in this language has two allomorphs: an enclitic *-n*, used where the preceding word ends in a vowel, and the independent word *an*, used immediately following a consonant. Unmodified adjectives precede the noun, with an intervening linker, as in (70)a). Where however the adjective is modified – a head-initial construction – the AP must follow the noun it modifies, the linker again appearing in intervening position. This is shown in (70)b):

(70) a) nan [nappuhi=*n*] tibung *Batad Ifugao*
DET bad=LNK wine.jar
'the bad wine jar'

b) nan tibung [*an* nappūhih pan-nig-a']
DET wine.jar LNK bad MANNER-see-1SG
'the wine jar which is bad with reference to the way I see it' (Dryer 2007:127, ex 175)

The data here can be easily explained if we assume the following ranking for Batad Ifugao:[32]

(71) HEAD-PROXIMATE FILTER >> FINAL-CLAUSE, HEAD UNIFORMITY >> N-FINAL >> N-INITIAL

The linker must always obey the dominant constraint, the Head-Proximate Filter: therefore it will be final if the Dependent is prenominal, and initial if the Dependent is postnominal. We firstly consider the case where the noun is modified by a complex head-initial AP, as in (70)b), and motivated in the sub-tableau in (72). If the head-initial AP precedes the noun, the linker will be final, so violating Head Uniformity, as in candidate b). In order to obey both the Head-Proximate Filter and Head Uniformity, the complex AP follows the noun, the extended projection of which is headed by an initial linker, as in candidate a). The consequent violation of N-Final is irrelevant, since this constraint is ranked below Head Uniformity. We now turn to the case where the adjectival Dependent of the noun is itself unmodified, as in (70)a), and motivated in the sub-tableau in (73). In this case Head Uniformity is no longer relevant, since the adjective is non-branching and hence does not have a direction of headedness. Here then, N-Final does come into play: of the two candidates that obey the Head-Proximate Filter, it is the candidate that obeys N-Final, [[A LNK]N], that is optimal:

[32] See fn 28.

	Batad Ifugao	HEAD-PROXIMATE	FINAL-CLAUSE	HEAD UNIFORMITY	N-FINAL	N-INITIAL
(72)	a. ☞ N[LNK A XP]				*	
	b. [A XP LNK]N			*!		*
	c. [LNK A XP]N	*!				*
	d. N[A XP LNK]	*!		*	*	
(73)	a. ☞ [A LNK]N					*
	b. N[LNK A]				*!	
	c. [LNK A]N	*!				*
	d. N[A LNK]	*!			*	

The above findings therefore confirm those of the previous subsection: where a linker marks the relationship between a superordinate Head and Dependent of differing category, we may find otherwise unexpected violations of the Final-Clause requirement and Head Uniformity. Irrespective of the ordering properties of the superordinate Head, however, it is predicted that the dominant constraint in the Harmonic Word Order Ranking, the Head-Proximate Filter, will always be obeyed by a linker (hence the generalisation in (2)a)). With one potential exception, to be discussed below, the results in (10) confirm that this is indeed the case for linkers in the noun phrase.

As with complementisers, there may be surface violations of the Head-Proximate Filter. The surface violation poses no problem as long as the linker obeys the Head-Proximate Filter in its base-generated position; in other words, this can be regarded as a counter-bleeding effect. I know of three (sets of) languages displaying such a surface violation.

Firstly, such examples can be found in possessive constructions in the languages of the East group of Central Sudanic. In these languages a possessor can generally either precede or follow its Head noun. In the former case, marking by a linker is optional, in the latter case, obligatory. In both cases the linker follows the possessor Dependent.[33] The two options are demonstrated below by examples from Mangbutu: the former option, in (74)a), obeys the Head-Proximate Filter, while the latter option, in (74)b), at least on the surface does not. (See Tucker 1940: chapter 8; Tucker and Bryan 1966:56 for further data.)

(74) a) [kɛ́ní *ɓa*] tibɛnà *Mangbutu*
chief LNK spear

[33] The form of the linker attaching to the pre- or postnominal possessor is in some cases identical (as in the Mangbutu example in (74) above), and in some cases different.

b) tibɛnà [kɛ́ní *ɓa*]
spear chief LNK
'the chief's spear' (Tucker & Bryan 1966:56)

However, examples such as (74)b) will not be problematic if the base-generated order is [[PossP LNK]N], as in (74)a), and the order [N[PossP LNK]] is derived via leftwards movement of the Head noun. That the order [[PossP (LNK)]N] is in some sense more basic than [N[PossP LNK]] can be seen by the fact that, in certain of these languages, including Mangbutu, *[N[PossP LNK]] is ruled out where the possessor is pronominal:[34]

(75) a) mai tibɛ *Mangbutu*
my spear
'my spear'

b) * tibɛ mai *ɓa*
spear my LNK

(76) a) [endà *ɓa*] tibɛ
his LNK spear
'his spear'

b) * tibɛ endà *ɓa*
spear his LNK (Tucker & Bryan 1966:57)

Similarly, Tucker (1940:§265) notes that, with the exception of the Moru languages, the order [[PossP (LNK)]N] is found more commonly in this group of languages than the putatively derived order [N[PossP LNK]]. Indeed, in Lendu this latter order is absent altogether:

(77) a) [pi *dzá*] lì *Lendu*
chief LNK.SG spear
'the chief's spear'

b) * lì pi *dzá*
spear chief LNK.SG (Tucker & Bryan 1966:56)

[34] Moru is exceptional in that it is the order [[PossP (LNK)]N] that is absent where the possessor is pronominal.

On the other hand, only the order [N[PossP LNK]] is productively found in a more distantly related Nilo-Saharan language, Kanuri (Western Saharan).[35] In this language the possessor phrase follows its Head noun, and is marked by a genitive case enclitic, *-ve* (or *-be*). This results in the surface order [N[PossP=*ve*]]:

(78) [fátò [kâm kúrà=*ve*]]=ga rúskəna. *Kanuri*
compound man big=LNK.GEN=LNK.OBJ I.saw
'I saw the big man's compound.' (Dryer 2007:83, ex 51)

The above example demonstrates that *-ve* is indeed a clitic (and hence a syntactically independent head), as opposed to a suffix: where the possessor is modified, *-ve* attaches phonologically not to the possessor noun (*kâm*), but to the final word of the possessor phrase as a whole (*kúrà*). Being a syntactically independent head serving to mark the presence of a relationship, the case clitic is a member of the class of linkers, and therefore predicted to be subject to the Head-Proximate Filter at the base-generated level. In order to maintain exceptionlessly the generalisation in (2)a), it would need to be shown that the order given in (78) can only obtain as the result of movement.

Cyffer (1998:51) reports that the general ordering of components within the Kanuri noun phrase is as in (79). While this order itself is not directly indicative of movement, it is not incompatible with it. It is possible that the genitive-marked possessor in fact underlyingly precedes the noun (conforming to the Head-Proximate Filter), and the noun then moves leftwards around the possessor to initial position, just as we proposed for the East group of the Central Sudanic languages above. Since this potential movement cannot be proven by the data available, however, Kanuri must remain a potential, though not proven, counterexample. (Though see section 4.6 for evidence from the coordinate structure that the Kanuri noun phrase behaves as if it were underlyingly noun-final.)

(79) N - Possessor phrase – Adjectival - Relative Clause - Dem/Det - Additive adjunct

The final language, Pashto, displaying the inverse surface order, provides direct evidence for movement (as we have already discussed in section 2.4.2). This language uses the linker *de* to mark a possessor phrase, exhibiting the surface order [*de* PossP]N, as shown below:

[35] Like the Central Sudanic languages, the order [Poss N] without any linker can be found in Kanuri, but is largely restricted to compound nouns (Tucker and Bryan 1966:192).

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

Larson (2009) provides evidence suggesting that this word order is the result of movement of the possessor phrase headed 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 precede this preposition, as exemplified in (81) below. In order to maintain compositional semantics, the possessor must have moved out of the nominal complement of the preposition. Therefore, if, as the data suggests, the base-generated order is [N[*de* PossP]], Pashto perfectly conforms to the Head-Proximate Filter, and consequently the predicted pattern for linkers.

(81) a) [*de* Asad]$_i$ [pə chāqú t_i] *Pashto*
LNK Asad with knife
'with Asad's knife' (Larson 2009, ex 58a)

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

3.5.3 Linkers Elsewhere

The prediction that linkers should obey the Head-Proximate Filter at the base-generated level is of course not restricted to linkers in the noun phrase. It is predicted to apply to any semantically vacuous syntactic head that serves to mark a relationship between a superordinate Head and its Dependent. We have already seen that this is the case for subordinating complementisers, relative clause markers and other linkers in the noun phrase. Linkers however are not limited to these domains.

Firstly, they may also occur in the form of syntactically independent case markers – that is, realisations of the head K (see Lamontagne and Travis 1987; Bittner and Hale 1996) – at least where the case is purely structural and hence makes no semantic contribution. Syntactically independent case-markers of this kind are found in languages such as Hindi-Urdu, Marathi, Persian, Japanese, Korean, Turkish, Harar Oromo, Kanuri, Khoekhoe (or Nama, Kwadi-Khoe), Miskitu (Misumalpan), Shokleng (or Xokleng, Ge-Kaingang) and Yele (Yele-West New Britain), all of which are OV, and in the VO languages Khasi (Northern Mon-Khmer) and Samoan (Polynesian). In all these languages the case-marker intervenes between the superordinate Head and its nominal Dependent; it is postnominal in OV languages and prenominal in VO languages. We have seen examples of this for the OV languages Persian in (28) and (84), Harar Oromo in (43) and Kanuri in (78). An example from Khasi, a VO language, is given below:

(82) Ka la yo”ii [*ya* ’u khlaa]. *Khasi*
she PST see LNK.ACC the tiger
‘She saw the tiger.’ (Bittner & Hale 1996:4, ex 4a, citing Rabel 1961)

Secondly, a linker may be used to mark the relationship between an adjective and its complement. Where the complement is nominal, in many cases the same linker is used here as that used between a Head noun and its nominal Dependent: for example, many languages use a purely functional adposition, such as *of* in English, to mark the relationship, while the Indo-Iranian languages use the ezafe/izafe(t). An example is given below from Persian:

(83) âšeq[=*e* Hasan] *Persian*
in.love=LNK Hasan
‘in love with Hasan’ (Larson 2009, ex 6a)

Where the complement of the adjective is clausal, the linker used is frequently identical to the subordinating complementiser – that is, the linker used more generally to introduce clausal Dependents. (Note that in this case, precisely the same predictions as those regarding the relative clause marker arise: we expect OV languages to allow freely both pre- and postadjectival complement clauses, as long as the linker intervenes, while VO languages should allow preadjectival complement clauses – with a final linker – only if the adjective has an active final ordering constraint.) An example is given below from Persian:

(84) xošhâl [*ke* šâh kešvar=*râ* tark kard] *Persian*
happy LNK Shah country=LNK.ACC left did
‘happy that the Shah has left the country’ (Larson 2009, ex 27b)

While a thorough study is beyond the scope of this thesis, as far as I am aware, linkers used to mark the relationship between an adjective and its complement, whether clausal or nominal, again, as predicted, always intervene linearly between the two.

A third way in which linkers are used in some languages is to introduce adverbials. This is shown below for Tagalog (Malayo-Polynesian), Bai, Mandarin Chinese and Romanian. The adverbial introduced by the linker may act as a modifier within either the (extended) verb phrase or the adjectival phrase (as in, for example, (91)). The adverbial itself may be either adjectival (as in (85)-(88), (91)) or nominal (as in (89)-(90)) in category:

(85) a) Umalis [*na* bigla] ang bisita. *Tagalog*
left LNK sudden TOP visitor

b) [Bigla=*ng*] umalis ang bisita.
sudden=LNK left TOP visitor
'The visitor left suddenly.' (Rubin 2002:6, ex 10)

(86) si^{55}ɣɯ^{33} lɯ^{31} tsɯ^{31} xɛ̃^{55} [*no*^{33} tuĩ^{55}]. *Bai*
willow this CL grow LNK straight
'This willow has grown straightly.' (Dryer 2008e, ex 40a, citing Xu and Zhao 1984:53)

(87) xɯ^{33}tsi^{33} lɯ^{31} suã^{55} tshɛ̲^{44} [*no*^{33} xɑ̃^{55}tɕɛ̲^{42}].
plum this CL red LNK good-looking
'The plums are red in a beautiful way.' (ex 40b, citing Xu and Zhao 1984:54)

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

(89) Women [kexue *de*] yanjiu nei-ge wenti.
we science LNK research that-CL problem
'We will research that problem scientifically.' (p26, ex 28d)

(90) Se cînta [*de* obicei] acolo. *Romanian*
RFL sings LNK custom there
'One usually sings there.' (p17, ex 18)

(91) Problem=a este [[curios *de*] grea].
Problem=the.F is curious LNK tough.F
'The problem is curiously tough.' (p15, ex 16ai)

In all the above examples, the linker, as predicted, intervenes between the adverbial it introduces and the predicate it modifies. This is particularly interesting in the Tagalog, Bai and Romanian examples. Firstly, Tagalog is interesting since it allows modifiers to appear on either side of the Head they modify (Schachter and Otanes 1972; Kroeger 1993). The linker however remains in intervening position, preceding the adjective in (85)a) and following it in (85)b). Note that the phonological difference in the linker in the two examples is purely due to phonological environment: if the preceding word ends either in a vowel, or in /n/, /h/ or /ʔ/, the linker has the enclitic form *-ng*, becoming the syllable coda of the preceding word; elsewhere, it occurs as an independent word *na* (Schachter and Otanes 1972).

A similar situation occurs in Romanian: the nominal adverbial follows the verb in (90), while in (91) the adverbial precedes the adjective it modifies. The linker, *de*, correspondingly precedes its complement in (90) and follows it in (91).

Finally, in the Bai examples in (86)-(87), the adverbial follows the predicate it modifies, hence the linker, *no*^{33}, precedes its complement. However, the following example shows that this same linker, when marking the relationship between a noun and a relative clause, must follow its complement:

(92) [[vɛ̃^{42} tsɐ^{21}tsɑ^{42} *no*^{33}] sɤ^{55}] xɑ̃^{55} ɣo^{42}. *Bai*
write tidy LNK word read easy
'Words that are written tidily are easy to read.'
(Dryer 2008e, ex 39, citing Xu & Zhao 1984:73)

The different ordering possibilities for the linker in fact acts as confirmation to our analysis of the order [[VO REL]N], at least in Bai. It was argued in subsection 3.5.1 that this order comes about due to the high ranking of an N-Final ordering constraint. The fact that the linker *no*^{33} clearly does not have an ordering rule, while we have seen that the noun in Bai does, confirms that the order [[VO *no*^{33}]N] must be the result of an ordering constraint associated with the semantically contentful noun, as opposed to the semantically vacuous linker.

The Tagalog, Romanian and Bai data therefore directly support the proposal put forward in this paper: the position of the linker, being semantically vacuous, is determined not by its own ordering constraint, but its choice of position is subject to the optimal position in terms of the Harmonic Word Order Ranking, with the dominant constraint, the Head-Proximate Filter, always obeyed at the base-generated level.

We have seen then that the generalisations in (2) are successfully derived by the possible interactions of the Harmonic Word Order Ranking presented in section 3.3 with the feature-specific ordering constraints presented in section 3.4: for linkers (with the possible exception of the gentive-case-marker in Kanuri), the dominant constraint in the Harmonic Word Order Ranking, the Head-Proximate Filter, will always be obeyed at the base-generated level; for any other head, while there is a cross-linguistic preference for harmony, disharmony will always be possible, either through violation of Head Uniformity (as in (12)c),d), (13)c),d), (36), (44)-(46), (47)b)-(50) and (55)-(57)), or through violation of the Head-Proximate Filter (as in (15)c),d), (16)c),d), (17)c),d), (39), (40), (59) and (61)). Moreover, when coupled with the direction of Case-assignment parameter, this approach also accounts for certain left-right asymmetries in the cross-linguistic distribution of clausal Dependents to verbs and nouns in VO and OV languages,

as well as the comparative frequency of distribution. In particular, it makes a very precise prediction about exactly which VO languages should permit prenominal relative clauses.

Before concluding our study, we return to the alternative generalisation over disharmonic word orders mentioned in the introduction: FOFC. I will argue, following Hawkins (2010, 2011), that FOFC is both too weak and too strong, permitting certain unattested orders for linkers, and incorrectly ruling out the final-over-initial order for a number of other heads.

3.6 Harmony, Disharmony, and FOFC

3.6.1 FOFC and Linkers

We begin by considering the predictions of FOFC as regards the distribution of subordinating complementisers, relative clause markers, and linkers in the noun phrase. FOFC, as formulated in (3), predicts that, where the two are categorially non-distinct, a head-final phrase cannot take a head-initial phrase as its complement. This is certainly true of the complementiser data (see (24) above): VO languages cross-linguistically do not have clause-final complementisers, while OV languages allow both clause-initial and clause-final complementisers. This is precisely the prediction made by FOFC, irrespective of the headedness of intervening heads, as has been widely documented in the FOFC literature (Biberauer *et al* 2007 *et seq*): either the head-final CP itself immediately dominates an initial TP, as in (93)a), or a head-final TP (or some other intermediate projection) immediately dominates the initial VP, as in (93)b). Both configurations are ruled out by FOFC: the ungrammatical orders *[V[VOC]] and *[[VOC]V] are therefore ruled out.

(93) a) [[T VP]C]

b) [[VO T]C]

Section 3.3 highlighted a second curiosity in the data: although OV languages allow clause-initial complementisers, a clause headed by such a complementiser must always appear in postverbal position, never in canonical object position. This requirement is also captured by FOFC as it is formulated in (3). According to this formulation, the domain of FOFC extends across both clauses since both allegedly form a single Extended Projection: matrix V and C both bear the feature [+V], such that CP is a categorially non-distinct complement of V. As pointed out by Sheehan (2008:2, 14), Biberauer, Newton and Sheehan (2009:§5.1) and Biberauer and Sheehan (2012), it is therefore predicted that a complementiser-initial CP cannot be dominated by a head-final VP. Therefore complementiser-initial clauses are only possible postverbally, ruling out the ungrammatical orders *[[CVO]V] and *[[COV]V]. Note however that this explanation comes at some theoretical cost. In order to include this data within the explanatory

scope of FOFC, Biberauer, Holmberg and Roberts (2010) are forced to add a stipulation to Grimshaw's (1991/2005, 2000) notion of extended projection, allowing an extended projection to include the complement of its lexical head, as long as the two are categorially non-distinct. This added stipulation has serious consequences. Grimshaw (1991/2005, 2000) provides a wealth of convincing evidence that features within an extended projection cannot contradict each other. This however is not the case between matrix and complement clauses: for example, in the Malayalam and Bengali examples in (27) and (32), the two clauses have different tenses, while in the Persian example in (28) they differ in aspect. If the definition of extended projection is to be extended in the manner Biberauer, Holmberg and Roberts suggest, the claim that features within an extended projection cannot contradict each other will therefore have to be given up, thereby losing much of the explanatory power of the original notion of extended projection.

This leaves one more unattested order: *[V[OVC]]. FOFC does not provide a direct explanation for the ungrammaticality of this order (cf. Hawkins 2011). Biberauer and Sheehan (2012:229) however posit that the absence of this order can be explained indirectly by FOFC: if complement clauses in OV languages appear in postverbal position purely to avoid violating FOFC, there is no reason for a clause that would not otherwise violate FOFC in preverbal position to appear in this postverbal position. This explanation is therefore dependent on the assumption that the process resulting in postverbal complement clauses in OV languages is a more costly operation than that used for preverbal ones. However, we have already seen in section 3.3 that in both cases the complement clause is base-generated; neither operation is more costly than the other. Therefore attributing the grammaticality of [[OVC]V] versus the ungrammaticality of *[V[OVC]] to economy seems dubious.[36]

On the face of it, then, it seems that FOFC, like the Harmonic Word Order Ranking, successfully allows the grammatical orders in (24), and unequivocally rules out at least the majority of the ungrammatical orders. When we look at the data in more detail, however, the situation is not quite so simple. The explanation for the absence of final complementisers in VO languages is based on the assumption that FOFC holds over all heads in the extended verbal projection. The typology in (24) shows that FOFC always holds as a descriptive observation regarding the order of the complementiser relative to the verb it c-commands. However, examples such as the following from Canela-Krahô show that FOFC does not necessarily hold between CP and TP: here a CP with a final complementiser *na* immediately dominates a TP

[36] Indeed, under an LCA-based analysis such as that adopted by Biberauer *et al*, all complement clauses must be base-generated in postverbal position, and can only appear in preverbal position due to movement.

with an initial tense-head, *te*. Canela-Krahô thereby instantiates the order in (93)a), predicted by FOFC to be ungrammatical:

(94) i=te [a=te ihmutri, capi jũrkwa ri, a=kra cahhyr *na*] a=pupun. *Canela-Krahô*
1=PST 2=PST there Capi house at 2=child beat LNK 2=see
'I saw you beat your child there, at Capi's house.' (Popjes & Popjes 1986:138, ex 73)

On the other hand, the theories of word order put forward in this chapter can account for the Canela-Krahô data by assuming that in this language the constraint T-Initial dominates both T-Final and Head Uniformity, and Head Uniformity dominates Final-Clause, as in the tableau in (95). The constraints T-Initial and T-Final are available since the head T has syntactic features referring to semantics. Since we are dealing with an OV language, the optimal candidate must violate both T-Final and Head Uniformity, in order to obey the higher-ranked T-Initial (as in candidates a), b) and d)). In addition, as we have seen is invariably the case in OV languages (section 3.3), either a second violation of Head Uniformity by C or a violation of Final-Clause will be requisite in order to obey the Head-Proximate Filter. This leaves candidates a) and b). Since in this language Head Uniformity dominates Final-Clause, candidate a), in which the C-final complement clause precedes the verb, is optimal:

(95)

Canela-Krahô	HEAD-PROXIMATE	T-INITIAL	T-FINAL	HEAD UNIFORMITY	FINAL-CLAUSE
a. ☞ [TOVC]V			*	*	*
b. V[CTOV]			*	**!	
c. [OVTC]V		*!			*
d. V[TOVC]	*!		*	*	
e. V[OVTC]	*!	*!			

The order in (93)b), on the other hand, does indeed seem to be ungrammatical (see (24)). Here the FOFC violation is incurred not by C, but by T. However, we have already seen evidence in from the typology in (12) and the data in (46) suggesting that, contrary to previous claims, T and other intermediate heads in the extended verbal projection by no means always comply with FOFC; the order [[VO]T] certainly seems to exist. The explanation for the absence of the order *[VOC], where there are intermediate functional heads, therefore cannot lie with FOFC.

Given the empirical facts, then, the grammaticality of the order [[T VP]C] as manifested by Canela-Krahô, and, I would argue, the ungrammaticality of both *[VOC] and *[V[OVC]] all fall outside the explanatory scope of FOFC. Moreover, the presence of the FOFC-violating order [VOC] where C is not a semantically vacuous subordinating complementiser, but a semantically contentful discourse particle, such as an interrogative marker, as in (13)d) and

(56)-(57), remains problematic (see subsection 3.6.2 below for further discussion). On the other hand, the account proposed in this chapter not only successfully derives both the attested and unattested orders for semantically vacuous subordinating complementisers, as well as their frequency of occurrence, but also permits the disharmonic order [VOC] wherever C is semantically contentful.

While FOFC at least partially accounts for the complementiser data, the data for relative clause markers and more general linkers in the noun phrase as studied in the previous section falls outside the scope of FOFC, since both disharmonic orders are absent, and not just the final-over-initial order (cf. Hawkins 2010, 2011). Given the provisos in the most recent formulation of FOFC, as in (3), even the ungrammaticality of the final-over-initial order (*[[REL TP]N] and *[[LNK XP]N]) in (10)d) and (11)d) is not predicted by FOFC, since the relative clause and the majority of other Dependents introduced by linkers in the noun phrase are adjuncts, not complements, and are arguably of different category. More seriously, FOFC appears to rule out certain attested orders: under FOFC instances of the order [[VO REL]N] and [[P NP LNK]N] are counterexamples that require explanation, since a head-final linker phrase dominates an initial VP or PP. See examples in (7) and (92) above and (96) below:

(96) [zuotian chi yurou *de*] ren *Mandarin Chinese*
yesterday eat fish LNK person
'the people who ate fish yesterday' (Paul to appear b: 4, ex 8a)

3.6.2 FOFC Elsewhere

We have seen then that in terms of linkers, FOFC cannot capture the full range of unattested orders, and in a few cases disallows grammatical orders. As regards non-linkers, FOFC again cannot fully capture the data. It is predicted that a head-final phrase cannot take a categorially non-distinct head-initial phrase as its complement. However, the data we studied in sections 3.2.2 and 3.4 (see (12)-(14), (45), (46), (48), (50) and (56)) suggests that this prediction is too strong; the final-over-initial order is cross-linguistically dispreferred, but not ungrammatical. Moreover, in general the FOFC-violating final-over-initial order, where head and complement are categorially non-distinct, does not seem to be any rarer than other disharmonic orders permitted by FOFC: either the initial-over-final order, as in the c) examples in (12)-(17), or the final-over-initial order where head and complement are categorially distinct, as in the d) examples in (15)-(17) (cf. Hawkins 2010, 2011).

In section 3.4 we looked in some detail at the presence of disharmony for tense, aspect, negative and interrogative markers. As predicted by the theory of specific constraints targeting heads with syntactic features encoding semantics, we found evidence for both initial-over-final and

final-over-initial structures. For FOFC, however, these final-over-initial structures are counterexamples that require explanation. Here we will take a brief look the explanation of the counterexamples offered by Biberauer, Holmberg and Roberts (2010), and why, at the very least in the case of the Lagwan data, it appears to be inadequate.

In the case of final tense and aspect markers in VO languages, Biberauer, Holmberg and Roberts (2007 *et seq*) propose that a distinction should be made between uninflected particles and inflected auxiliaries. They claim that, while the order [[VO]T/Asp] is widely attested for the former, it is strikingly absent where the tense/aspect marker is an inflected auxiliary. One seemingly strong piece of evidence for making this distinction is taken from Bwe Karen, a Tibeto-Burman language with VO order. In example (97) below, an uninflected aspect particle, *lɔ*, appears in final position. Example (98) shows that, on the other hand, the tense marker, which appears to be inflected with subject agreement, precedes the verb. Biberauer, Holmberg and Roberts use this to argue that the particle (the aspect marker in (97)) and the auxiliary (the tense marker in (98)) differ in distribution; moreover, it is the auxiliary that avoids a FOFC-violation.

(97) yə=ca dɛyo lɔ. *Bwe Karen*
1SG=see picture ASP
'I'm looking at a picture.' (Dryer 2008e, ex 24, citing Henderson 1997:39)

(98) cə=ɗɔ *mɪ* jə=khɔ́ phɪ má nɔ?
3=say LNK 3=FUT take what
'What did he say he would take?' (ex 29, citing Henderson 1997:187)

However, closer inspection of the language strongly suggests that the alleged 'agreement inflection' attached to the verb in (97) and to the future tense marker in (98) is in fact a proclitic pronoun, since it appears in complementary distribution with full NPs, in canonical subject position. This is shown in example (99), where *ʃɛ̀* ('trap') is the subject, and in (100), where the subject of the embedded clause is the full NP *yəcɛ ɓenu* ('my book'); in both cases the alleged 'agreement' is absent:

(99) ʃɛ ní dòkhí tə-ɗő *Bwe Karen*
trap catch barking.deer one-CL
'The trap catches a barking deer.' (Dryer 2008e, ex 2a, citing Henderson 1997:258)

(100) yə=bɔ̀dá *mɪ* yə=cɛ ɓe-nu lɛ́mɛ̀ thó.
1SG=think LNK 1SG=book CL-that lost PERF
'I thought that my book was lost.' (ex 26, citing Henderson 1997:379)

While the order [[VO]Aux] does largely appear to be absent for inflected auxiliaries (though see Sheehan 2008:8 and Biberauer, Holmberg and Roberts 2010:8-9, fn 4 for some potential counterexamples)[37], this result is actually not so surprising. It should be noted that for many of the VO languages exhibiting final uninflected tense or aspect particles, there is simply no verbal inflection in the language at all (Matthew Dryer, p.c.). This can be seen in (45)-(46) above, where not only are the final tense and aspect markers uninflected, but also the verb itself and the initial aspect marker. In such a case we would hardly expect inflection to turn up on the final markers. Moreover, even in languages that do display some subject agreement, the results are not altogether unexpected, as pointed out by Julien (2002:52-3, fn 32). Julien suggests that uninflected tense particles are T heads to which the verb has not moved, while inflected auxiliaries are often V+T combinations. The latter share the distribution of any other finite verb.

Moreover, in order to legitimately exclude uninflected tense and aspect particles from the predictions of FOFC, it would need to be proven that they are not heads in the extended projection of the verb. For example, many tense or aspect markers may have semantic (near) equivalents in adverbs. If, however, the final tense and aspect particles were phrasal it would need to be shown: for example, we might expect to see, firstly, evidence for internal structure through the possibility of modification; secondly, possible focus-movement of the particle; thirdly, possible coordination of the particle with another phrase, but not with another head. Moreover, in order for FOFC to hold, the final particle would have to be phrasal in *all* the languages exhibiting the order [[VO]T/Asp].

As regards negative and interrogative markers, Biberauer, Holmberg and Roberts (2010:81-85) claim that they are syncategorematic; that is, they neither c-select nor are c-selected, and hence are in some sense outside the verb's extended projection. Such an analysis is incompatible with the examples we looked at from Lagwan in (50)-(54) and (56)-(57). Firstly, the comparison of the imperative and the prohibitive (cf. (52) and (53)) strongly suggested that *sá*, the negative head in Lagwan, must select TP, not VP, and hence is involved in c-selection. Secondly, if an interrogative marker is syncategorematic and cannot be c-selected, it is predicted that it should

[37] Svenonius (2000:21, fn 5), citing Dryer's (1998) database, lists two Central Sudanic languages displaying the order [[VO]Aux], where Aux is inflected – Mbay and Ngambay, both of the Sara group. However, my own research into these two languages (based on Vandame 1963; Fortier 1971; Thayer 1978) has found no evidence for this order. (There are both inflected auxiliaries and final aspectual markers, but not the desired combination of final inflected auxiliary.)

only be able to appear as the highest head in root questions; it should not appear in subordinate clauses (Biberauer, Holmberg and Roberts 2010:83). However, example (57) above shows directly that the final interrogative marker in Lagwan, *ɗa*, can indeed appear in subordinate clauses.

Bailey (2010) and Biberauer, Holmberg and Roberts (2010:81) also offer an alternative explanation for the presence of final interrogative markers in VO languages. Jayaseelan (2008) and Bailey (2010) point out that in many languages the so-called question particle and disjunctive connective are homophonous. Bailey (2010) and Biberauer, Holmberg and Roberts (2010:81) use this to suggest that the apparently final interrogative marker may in fact be an initial disjunctive connective with an elided second conjunct, in a structure of the kind [TP [or ~~TP~~]] (cf. Jespersen 1924:323; Katz 1972: chapter 5; Bencini 2003; Aldridge 2011 on Mandarin Chinese). It should be noted, however, that this is not the conclusion Jayaseelan (2001, 2008) draws. (Note, in particular, that in Malayalam, on which Jayaseelan's studies are largely based, the disjunctive connective *-oo*, although homophonous with the interrogative marker, cannot be used to coordinate tensed clauses, Jayaseelan 2001:65, fn 1.) In any case, this analysis cannot account for the presence of the final interrogative marker *ɗa* in Lagwan. The coordination example in (101) below shows that the disjunctive connective is an entirely different morpheme, *ndi*:

(101) [G~~ɨ~~ g~~ɨ~~r] ndi [g~~ɨ~~ g~~ɨ~~r sá]. *Lagwan*
2SG go or 2SG go NEG
'You leave or you don't leave.' (Aboukar 2003:57, gloss and English translation mine)

That the final interrogative marker in Lagwan is not a disjunctive connective is confirmed by its optional appearance in *wh*-questions. This is exemplified in (102). This result is incongruous with an analysis whereby there is an elided second conjunct;[38] as pointed out by Jayaseelan (2008:5; cf. also Katz 1972: chapter 2), under that analysis we would expect the interrogative/disjunctive marker to appear only with polar questions.

(102) [M~~ɨ~~ gh~~ɨ~~n ɗ~~ɨ~~k~~ɨ~~mi] (ɗa) ? *Lagwan*
1PL do how Q
'What do we do?'

[38] Except perhaps with the reading 'What do we do or what don't we do?' This is clearly not the intended reading in (102).

We have seen then that, at the very least in the case of the Lagwan data, Biberauer, Holmberg and Roberts' rationalisation of the counterexamples to FOFC is inadequate.[39] (See also Paul (to appear b) for arguments that sentence-final particles in Chinese are fully-fledged functional heads, and hence cannot be excluded from the predictions of FOFC.) On the other hand, these same examples pose no problem under the theory of feature-specific word order constraints presented in section 3.4, which allows disharmony where a head is either lexical or a functional head with syntactic features encoding semantics (i.e. any non-linker). Because this theory of disharmony excludes linkers, these being semantically vacuous functional heads, for these we are still able to maintain the stronger predictions of the dominant constraint in the Harmonic Word Order Ranking, the Head-Proximate Filter, leading to the generalisations in (2).

3.7 Conclusion

I have proposed here that the notion of harmonic word order, operating on any basic order required by Case-assigning properties of the syntax, be defined by the ranking of the Head-Proximate Filter, Head Uniformity and the Final-Clause requirement, with the Head-Proximate Filter universally taking precedence. Evidence supporting this ranking has been given by various types of linker, in particular complementisers, relative clause markers, and linkers in the complex noun phrase. I have shown that deviation from the optimal order is possible only where specific ordering constraints target either a relevant lexical head or syntactic features encoding semantics. The possible presence or absence of disharmony is therefore directly related to the presence or absence of certain features on a head. The combination of these theories of harmony and disharmony results in the generalisations in (2). These generalisations have been shown to be empirically superior to FOFC, in terms of both what is permitted and what is disallowed.

Furthermore, our study has shown that harmony is concerned not with the surface linear order, but with the base-generated, or first-merged, order. This suggests that linearisation takes place prior to the deletion of any lower copies of moved material.

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[39] In addition to the orders discussed above, Biberauer, Holmberg and Roberts (2010:21-25) claim somewhat controversially (contra extensive work by Cinque 2005a and Abels and Neeleman 2009, 2012) that there are no true examples of the order [[Num NP]Dem]. In order to rule out apparent counterexamples they are forced to conclude that these contain demonstrative positions both above and below the numeral. In allowing a demonstrative position below the numeral, however, they lose any explanation for the ungrammaticality of the order *Num-Dem-NP (cf. Abels and Neeleman 2009, 2012).

Secondly, they claim that FOFC holds in morphology (Biberauer, Holmberg and Roberts 2010:§1.1.4), ignoring clear counterexamples such as $[_V[_V$ be$[_N$ head]]ed]. While FOFC does hold as a descriptive observation over synthetic compounds, the ungrammatical final-over-initial structures are ruled out on independent grounds (see Ackema and Neeleman 2004:164ff). Moreover, FOFC as formulated in (3) only accounts for a subset of these ungrammatical final-over-initial structures: those where the categories are non-distinct.

Chapter 4: Coordination and Linkers

4.1 Introduction

In the previous chapters, we defined linkers as semantically vacuous, syntactically independent functional heads serving to mark the presence of an independently existing relationship by means of structural intervention, and found that certain cross-linguistic generalisations concerning their structural and linear distribution followed from these properties. So far, we have been concerned only with linkers marking a relationship of subordination, otherwise known as the Head-Dependent relationship. In this chapter we will explore the evidence that syntactically independent coordinators, equivalents of *and* and *or* in English, likewise meet this definition and hence belong to the class of linkers. I will propose that the difference in the behaviour of subordinating and coordinating linkers should be attributed to the difference in the syntax of the subordination and coordination relationships, rather than to any inherent difference in the linkers themselves. (Indeed, since linkers are proposed not to have any inherent properties, it follows that their behaviour must always be attributed to independently motivated syntax-internal, or phonological, pressures, as demonstrated in the previous chapters for their structural and linear positioning.)

Our first objective will therefore be to establish whether or not coordinators share the defining properties of, and hence belong to the class of, linkers (section 4.2). Secondly, we will need to address the true syntactic nature of the coordination relationship, both for binary, and for multitermed, coordination (sections 4.3 and 4.4). These two points established, we will be in a position to consider the structural and linear distribution of coordinators as linkers in the light of the findings of the previous two chapters and our discoveries about the syntax of the coordinate structure (sections 4.5 and 4.6 respectively). If coordinators are genuine linkers, these two properties concerning their distribution should follow from the assumptions made in chapters 2 and 3 applied to the coordinate structure.

The main empirical contribution of this chapter consists in providing a typology of the cross-linguistic distribution of coordinators, both in coordinate structures with two Coordinands and those with multiple Coordinands. It will be shown that there are a number of asymmetries between the distribution of coordinators where Coordinands are head-initial and where they are head-final. More importantly for the central hypothesis of this chapter, we will see that, as for subordinating linkers, there are certain disharmonic patterns that are universally absent.

The principal theoretical contribution provided by this chapter consists in providing evidence that syntactically independent coordinators share the properties of, and hence form a unified class with, the subordinating linkers that we studied in the previous two chapters. It will be argued that any difference in behaviour between the two results purely from the different syntax

of coordinate and subordinate, or Head-Dependent, structures. In making the case for this central hypothesis, evidence will be provided showing that the syntax of coordinate structures is fundamentally different from that of subordination structures.

4.2 Coordinators as Linkers

We begin by considering the initial evidence that (syntactically independent) coordinators are linkers – that is, semantically vacuous functional heads serving to mark an independently existing relationship.

In the first place, there is evidence that coordinators, like subordinating linkers, belong to the class of functional heads. Grootveld (1992:§2), Zoerner (1995:§1.4.1) and Johannessen (1998:§3.3) show that coordinators exhibit the vast majority of Abney's (1987:43-44) criteria for functional heads: they constitute a closed lexical class; they are frequently phonologically dependent; the coordinator cannot be separated from its complement; finally, coordinators lack 'descriptive content'. The second and third of these properties are demonstrated by the examples in (1)-(3) and (4)-(5) respectively. In the Kanuri (Western Saharan), Persian (or Farsi) and Latin examples in (1)-(3), the coordinating conjunction is an enclitic, and therefore phonologically dependent. Extraposition examples, such as those in (4) and (5), are used to demonstrate that the coordinator always forms a constituent with one or other Coordinand, presumed to be its complement (cf. Munn 1992:19; Zoerner 1995:§1.4.2; Haspelmath 2007:8). In the case of English and Hindi-Urdu, the b) examples, contrasted with the ungrammaticality of the c) examples, show that the coordinator forms a constituent with the Conjunct to its right. While the b) examples show that it is possible to extrapose this rightmost Conjunct, stranding of the coordinator, as in the d) examples, is prohibited, even though the extraposed Conjunct is a constituent in its own right, and even if this constituent is rendered sufficiently heavy to justify Heavy XP-Shift (see section 4.4 below). The only explanation for the ungrammaticality of the d) examples can therefore be that the coordinator, as a functional head, cannot be separated from its complement.

(1) [kâm ád´=*a*] [kámú túdú=*a*] *Kanuri*
man this=and woman that=and
'this man and that woman' (Haspelmath 2007:9, ex 24a, citing Cyffer 1991:70)

(2) ali[=*o* ahmad][=*o* mohammad] *Persian*
Ali=and Ahmad=and Mohammad
'Ali and Ahmad and Mohammad' (Stilo 2004:285, ex 23)

(3) senat-us [popul-us=*que* roman-us] *Latin*
senate-NOM people-NOM=and roman-MSG.NOM
'the senate and the Roman people' (Haspelmath 2004:6, ex 11c)

(4) a) John bought [[a book] [*and* a newspaper]] yesterday. *English*

b) John bought [a book] yesterday, [*and* a newspaper].

c) * John bought [a newspaper] yesterday, [a book] *and* (Munn 1992:18, ex 39)

d) * John bought [a book] *and* yesterday, [a newspaper (with a cricket supplement)][1]

(5) a) John=ne kal [[ek kitaab] [*aur* ek mægziin]] khariid-ii. *Hindi-Urdu*
John=ERG yesterday one book and one magazine buy-PERF.F
'John bought a book and a magazine yesterday.'

b) John=ne kal [ek kitaab] khariid-ii, [*aur* ek mægziin].
John=ERG yesterday one book buy-PERF.F and one magazine
'John bought a book yesterday, and a magazine.'

c) * John=ne kal [ek mægziin] khariid-ii, [ek kitaab] *aur*
John=ERG yesterday one magazine buy-PERF.F one book and
(Benmamoun *et al* 2010:73, ex 17)

d) * John=ne kal [ek kitaab] *aur* khariid-ii, [ek (maheng-ii cricket k-ii)
John=ERG yesterday one book and buy-PERF.F one expensive-F cricket LNK-F
mægziin]
magazine

The coordinator therefore meets four of Abney's five criteria for functional heads. The only property that does not fit in with Abney's criteria is that coordinators in many languages – such as English *and* and *or* – allow complements of a variety of different categories. Note however that this seems to be a general property of linkers as a subclass of functional heads (witness for example the behaviour of *de* in Mandarin Chinese and the ezafe in Persian in chapter 2). Given that the linker does not contribute any features referring to semantics to the extended projection, it is in principle free to combine with a complement of any featural make-up or semantic type. In summary then, we see that not only do coordinators fit the properties of functional heads in general, but also share the specific characteristics of linkers as a subset of this class.

[1] This is ungrammatical under the intended extraposition reading, whereby both Conjuncts are within the scope of *yesterday*.

Secondly, while a linker is by definition an independent syntactic word – a functional head – we have seen in the previous chapters that the relationship-marking function of a linker may also be served by an affix, or alternatively the relationship may simply remain unmarked. The same is true of the coordination relationship. Evidence of marking coordination by means of an affix can be seen below from noun phrase conjunction in the Pama-Nyungan languages Djabugay and Kalkatungu (or Kalkutung):

(6) [yaba-*mba*(-nggu) nyumbu-*mba*(-nggu)] djama du:-ny *Djabugay*
brother-and-ERG father-and-ERG snake kill-PST
'Brother and father (the pair of them) killed a snake.' (Patz 1991:293, ex 86)

(7) ŋata aṛi-li-ɲin [maa-ci-ka ati-ɲci-*jana*-ka] *Kalkatungu*
we eat-ANTIPASS-PART food-DAT-Ø meat-DAT-and-Ø
'We are eating vegetable food and meat.' (Blake 1979:95, ex 5.60)

In Djabugay, coordination is marked on both Conjuncts by the coordinator *-mba*[2], which follows the noun. In Kalkatungu the coordinator, *-jana*, again follows the noun, but here it appears only on the second Conjunct. In both languages, each Conjunct is also marked by a further morpheme: in Djabugay optionally by the ergative case marker *-nggu*, and in Kalkatungu by the morpheme *-ka*[3]. The appearance of *-nggu* and *-ka* on both Conjuncts, rather than following the coordinate structure as a whole, indicates that they are within the scope of the coordination. Where *-nggu* and *-ka* co-occur with the coordinator, however, they invariably follow the coordinator, such that the coordinator occurs internally to the Conjunct. This selective behaviour of the coordinator in both languages is best explained if *-mba* and *-jana* are suffixes; if they were syntactic words in their right, their linear position would need to reflect structural scope over the entire Conjunct, including *-nggu* and *-ka*.[4]

Again, like the Head-Dependent relationship, it is also possible for the coordination relationship to occur without any morphosyntactic marking, a strategy known as asyndeton, juxtaposition or zero-marking. Marking conjunction by asyndeton is widely, perhaps universally, available (Payne 1985:25; Haspelmath 2007:§2.1), being particularly common in Australia and South

[2] According to Patz, *-mba* is a comitative marker. However, this analysis seems incompatible with its appearance on both Conjuncts. Rather, it seems that the relationship in (6) is one of coordination, and that *-mba* is a coordination marker.

[3] The precise function of *-ka* is not clear. See Blake (1979:95).

[4] It is difficult to judge exactly how widespread is the affixal strategy for marking coordination. Usually the only means of distinguishing a suffix from an enclitic in a consistently head-final language is through coordination (cf. §2.2.2). This test however cannot be used when the morpheme in question is itself a coordinator. Note however that Haspelmath (2007:8, fn 2) states that coordinators never show suppletion, suggesting the affixal marking strategy is not widespread.

America (Haspelmath 2008), though its use as the only available means of marking conjunction is increasingly rare (Payne 1985:§2.1.2; Mithun 1988; Stassen 2008), a trend that may well be attributed to the spread of literacy (Mithun 1988:353-357). Examples are given in (8)-(9) below from the Chon language Ona-Šelknám, the Daly language Maranungku (or Maranunggu) and Abun (a language isolate of Indonesia). (See section 4.3.1 below for evidence that the coordinate structure in such examples has the identical syntactic characteristics of overtly marked coordination.)

(8) [Kačerán, Kormsčen] viek-án. *Ona-Šelknám*
Kačerán Kormsčen RFL-chase
'Kačerán and Kormsčen chased one another.'
(Stassen 2000:8, ex 14, citing Tonelli 1926:72)

(9) [[mereni kalani] ŋeni]kili-nya awa. *Maranungku*
brother uncle my eat-3PL meat
'My brother and uncle ate the meat.' (Stassen 2000:8, ex 11, citing Tryon 1970:83)

(10) Ye ma [[kagitPef] [kagitBamogwem] [kagitBikar]]. *Abun*
people come fromPef fromBamogwem fromBikar
'They came from Pef, from Bamogwem and from Bikar.'
(Berry & Berry 1999:94, ex 5.164)

While asyndeton is more commonly used to mark conjunction, examples of unmarked disjunction are also attested, as demonstrated below for English, Malayalam (Southern Dravidian), Dutch and Mandarin Chinese (see also Dik 1968:32; Payne 1985:§2.4; Ohori 2004:56-58, and references cited there). (We return to these examples in section 4.3.4 below.)

(11) [Five, six] minutes later the bomb exploded. *English*
(Dik 1968:32, ex 13a)

(12) [aNc-aar̲ə] peer vann-irunnu. *Malayalam*
five-six person come-PERF.PST
'Five (or) six people had come.' (Asher & Kumari 1997:366, ex 1739)

(13) [Morgen, overmorgen,] het maakt mij niet uit. *Dutch*
tomorrow the.day.after.tomorrow it makes me not out
'Tomorrow, the day after tomorrow, I don't care.' (Dik 1968:32, ex 13b)

(14) Welke tekening kies je? [[De zijne,] [de hare,] [de mijne]?]
which drawing prefer you the his the hers the mine
'Which drawing do you prefer? His, hers, mine?' (Bos 1962:47, ex d)

(15) Nii chy fann chy miann? *Mandarin Chinese*
you eat rice eat noodles
'Will you eat rice or (eat) noodles?' (Dik 1968:32, ex 13d, citing Chao 1961:58)

The fact that coordination can remain unmarked is of further significance: it provides evidence that the coordination relationship occurs independently of the coordinator (cf. Ohori 2004). That is, the coordinator does not initiate the relationship, nor contribute to the compositional semantics of either Coordinand, but simply marks the presence of the relationship. In previous chapters we established that the same was true of the linker marking the Head-Dependent relationship.

Similarly, given that the coordinator, as a linker, serves only to mark the presence of a relationship – coordination – it cannot occur unless such a relationship exists; while there are examples of coordinate structures without an overt coordinator, coordinators do not occur in the absence of a coordination relationship.[5]

Finally, we saw in the last chapter that, due to their lack of semantics, linkers form a distinct class from other syntactic heads in terms of ordering restrictions: they must always intervene linearly between the members of the relationship that they mark. For any other head, disharmony is possible. Typological studies show that the harmony requirement is also true of syntactically independent coordinators: the coordinator invariably intervenes between the Coordinands whose relationship it marks (Maxwell 1984:275; Dik 1997:406; Johannessen 1998:109; te Velde 2000:66; Zwart 2005, 2009, *modulo* the additional coordinator in polysyndetic coordination, itself subject to specific restrictions, which we return to in section 4.6). Therefore subordinating linkers and syntactically independent coordinators are the only heads for which disharmony is ruled out, a matter which will be discussed in greater detail in section 4.6.

There is therefore substantial evidence supporting the claim that coordinators belong to the class of linkers, as a subclass of functional heads. It should be noted that the claim that subordinating linkers and coordinators are members of the same class is not a new one. Dik's (1983) Functional Grammar likewise classes subordinating linkers and coordinators together as

[5] Even in the highly restricted examples of Conjunct-drop that we will encounter in section 4.3.1, the dropped Conjunct, and hence the coordination relationship, must be present in the pragmatic context.

'relators'[6]: 'Relators may mark a relation of coordination or a relation of dependency' (Dik 1997:398). Zwart (2009:1599) likewise suggests that coordinators are a type of linker, a morpheme serving to mark a syntactic relationship between two elements.

Likewise, the view that coordinators are semantically vacuous, or lack inherent features referring to semantics, is by no means unprecedented in the literature. Hockett (1958:153) states that coordinators 'serve not directly as carriers of meaning, but only as markers of the structural relationships between other forms'. Similarly, Zoerner (1999:323, 339) describes the coordinator as 'a completely feature-neutral syntactic head' having 'no *a priori* syntactic features'. Blümel (1914:52, cited in Zhang 2007) even declares, 'Strictly speaking, ... such words should be excluded from dictionaries.'

If then the coordinator has no features referring to semantics, we must conclude that it is the syntax of the coordinate structure itself that gives rise to a relationship of coordination or equivalence, this relationship being interpreted as either conjunction or disjunction. This suggests that the syntax of the coordinate structure must be in some way distinct from that of constructions giving rise to a relationship of dependency.

4.3 The Coordination Relationship

In the previous section, I proposed that coordinators, like the subordinating linkers we studied in chapters 2 and 3, are functional heads essentially lacking in features referring to semantics, serving only to mark an independently existing syntactic relationship. This proposal has two consequences: firstly, if coordinators do not contribute any relevant features, the unique relationship of equivalence found in coordination, and the distinctive syntactic properties that accompany it, cannot be attributed to any property of the coordinator, but rather point to something unique in the syntactic structure of coordination; secondly, if coordinators and subordinating linkers have no inherent differences, any differences in their behaviour can only be attributed to a syntactic difference in the subordination and coordination relationships. Before proceeding further, it is therefore crucial to understand correctly the syntax of the coordination relationship.

In this section, I will argue, following Neeleman (2006), that the coordinate structure is formed by mutual adjunction of two or more Coordinands: this structure of mutual adjunction, being essentially adjunction, is perfectly compatible with the principles of phrase-structure, but distinguishes itself from other syntactic structures in that it is syntactically a symmetric relationship of equivalence, rather than an asymmetric relationship of subordination. I will

[6] Linkers are in fact a subclass of Dik's relators, which also includes non-linker adpositions, and does not have any requirement that the relator be syntactically independent.

propose that the coordinator is a semantically vacuous functional head within the structure of mutual adjunction, in the same way that subordinating linkers are semantically vacuous functional heads within the asymmetric subordination structure.

We will then compare the structure of mutual adjunction with two other views of coordination that are prevalent in the literature – the Boolean phrase, headed by the coordinator, and Munn's adjoined variant. Both these alternatives consist of asymmetric structures that, in terms of their syntax, are essentially subordination structures. We will see that the structure of mutual adjunction is able to capture a number of empirical phenomena that either remain inaccessible to, or are incompatible with, the predictions of the asymmetric proposals, while being conceptually no less attractive.

Adjunction is a familiar mechanism in syntax. Chomsky (1986a) defines adjunction in terms of multisegmented categories. Neeleman (2006)[7] proposes a structure for coordination in which the Coordinands are mutually adjoined to each other; or, in other words, the top node of a coordinate structure is a segment shared by two (or, as I shall propose in section 4, more) categories – the Coordinands (cf. Munn 1992, 1993; Progovac 1997 *et seq* where it is argued that the Coordinands have properties of adjuncts). The conditions under which adjacent nodes in a tree can be interpreted as segments of the same category in any adjunction structure are defined as follows:

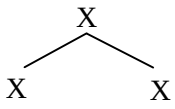
(16) Two structurally adjacent nodes can be interpreted as segments of the same category iff
a) they do not have contradictory categorial features, and
b) they are identical in arity information.

(Neeleman 2006:3, ex 7; cf. Neeleman & Van de Koot 2002)

The restrictions imposed by (16) on the proposed coordinate, or mutual adjunction, structure can be restated as follows. Any unsatisfied selectional requirements introduced by, or within, a Coordinand, such as unassigned θ-roles, movement dependencies, or c-selectional functions must percolate to the top node of the coordinate structure (condition (16)b); see also Neeleman and Van de Koot 2002). Categorial and other syntactic features may project to the top node, but do not necessarily have to (unless the coordinate structure is involved in c-selection or there are θ-roles to be discharged; see subsections 4.3.1 and 4.3.3). Given the condition in (16)a), it will be possible for categorial features to project only where the Coordinands are of like category (cf. Williams 1994:16). This is represented in (17) below, where both Coordinands are of category X:

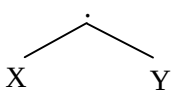
[7] The concept of mutual adjunction as a structure for coordination was originally the result of joint work by Ad Neeleman and Hans van de Koot, which was never written up.

(17)

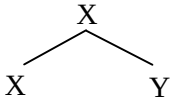


If the Coordinands are of differing category, however, neither can project, as this would result in a violation of condition (16)a) (illustrated by (18)b) and c)). The top node of the coordinate structure is therefore left unspecified, as in (18)a) (cf. Sag *et al* 1985; Pollard and Sag 1994:202-205):

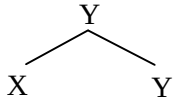
(18) a)



b) *

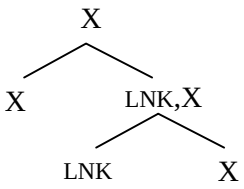


c) *

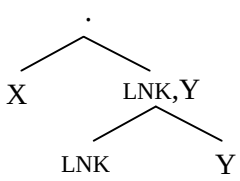


Consider now how the coordinator fits into this structure. We have already seen evidence in (4)-(5) that the coordinator forms a constituent with a single Coordinand. For English and Hindi-Urdu, this gives us structures such as the following (where the coordinator, as a linker, is represented as LNK):

(19) a)



b)



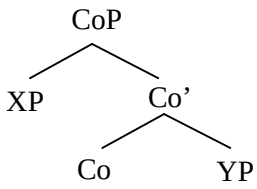
In these examples, the coordinator takes the final Coordinand as its complement. Since the coordinator is a functional head, the features of its complement (here represented by X in (19)a) and by Y in (19)b)) percolate up to head the Coordinand as a whole (cf. section 2.3; Grimshaw 1991/2005, 2000; Williams 1994:16). These features then optionally percolate up to head the coordinate structure as a whole, an option possible only where all Coordinands are marked by the same features, as in (19)a). The coordinator itself does not continue to project, in keeping with the structural intervention requirement of chapter 2 (see discussion in section 4.5 below.)

The trees in (19) represent the situation in English and Hindi-Urdu. This is not to say however that there is any requirement that the coordinator should attach to the final Coordinand. Since we are dealing with a relationship of equivalence, both syntactically and semantically, the coordinator, all else being equal, is in principle free to attach to any or to every Coordinand (cf. Lakoff and Peters 1969; Progovac 1997, 1999a). How this possibility is played out typologically is a matter we will return to in section 4.6; see also subsection 4.3.1 below.

The structure of mutual adjunction provides an (as I will argue, more attractive) alternative to another proposal for the coordinate structure that is prevalent in the literature: the asymmetric

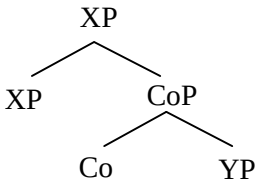
Boolean phrase. It has been proposed in various works that the coordinate structure is Headed by the coordinator, taking the Coordinands as arguments in its complement and specifier[8] (Munn 1987; Woolford 1987:169; Larson 1990; Kolb and Thiersch 1991:277, fn 60, following Thiersch 1985; Rothstein 1991:§2.1; Grootveld 1992; Johannessen 1993, 1998; Kayne 1994 and Zoerner 1995, 1999). According to analyses of this kind, the structure of coordination, termed the Boolean phrase, is therefore as follows, where Co is the coordinator head (with &, B, Conj and K also used variously as labels in different sources), as in (20) below. Note however that this analysis of coordination has not gone unchallenged (see, for example, Munn 1992; Borsley 1994, 2005; Sag 2000:6; Neeleman 2006 and discussion in subsections 4.3.1-4.3.4 below).

(20)



A variant to this structure, shown in (21) below, is suggested by Munn (1992 *et seq*), who proposes that, as in the more standard Boolean phrase theory, the coordinator takes one of the Coordinands as its complement (the second in languages like English and Hindi-Urdu). Unlike the standard Boolean phrase theory, however, the coordinator head does not project further; instead the merger of the coordinator and the second Coordinand is adjoined to the first Coordinand. In this way the Head of the coordinate structure as a whole is the (Head of the) first Coordinand, rather than the coordinator:

(21)



The two variants of the Boolean phrase and the structure of mutual adjunction present very different means of accounting for the coordinate structure within the confines of standard assumptions of phrase-structure. In the same way they have very different consequences for the hypothesis we are exploring in this chapter – that syntactically independent coordinators belong to the class of linkers as defined in the previous chapters. Since both asymmetric structures – the standard Boolean phrase and Munn's adjoined variant – are essentially subordination structures, it will be difficult to uphold the hypothesis essential to the linker theory that the

[8] Since these accounts usually assume that the coordinator is a functional head (as indeed the evidence suggests, see section 4.2 above), this seems rather an odd proposal, as it is a defining characteristic of functional heads that they cannot take arguments as their complement (cf. Abney 1987:38, 44).

coordination relationship and the unique properties of the coordinate structure occur independently of the coordinator. On the other hand, the structure of mutual adjunction, which is unique to the coordinate structure, seemingly provides an elegant means of allowing us to maintain this hypothesis. It is therefore crucial to our central aim here to distinguish empirically between the different accounts. In doing so there are three important issues to be addressed: Firstly, does the coordinator Head the coordinate structure as a whole? Secondly, is the structure symmetric or asymmetric? Thirdly, is the structure dependent in any way on the coordinator to explain properties unique to the coordinate structure? In the following subsections we therefore examine the predictions of the different approaches in terms of the Head of the coordinate structure as a whole (4.3.1), the c-command relation between Coordinands (4.3.2), the coordination of non-maximal projections (4.3.3), and the semantics of conjunction and disjunction (4.3.4). Finally, in section 4 we will see that, by assigning coordination a unique structure within phrase-structure we are able to account for certain unique properties of multi-termed coordination.

4.3.1 The Head of the Coordinate Structure

Firstly, the three accounts make very different predictions about what is the Head of the coordinate structure as a whole. For the Boolean phrase in (20), it is of course the coordinator that projects to Head the structure as a whole. Munn's adjoined Boolean phrase, on the other hand, is Headed by Coordinand with which the coordinator does not form a constituent (the first in languages like English). Finally, in the mutual adjunction account, while the coordinator may appear as a functional head within the internal structure of one or other Coordinand, it does not project further and the Head of the structure as a whole is determined by properties of both Coordinands (see also Gazdar *et al* 1985: chapter 8; Sag *et al* 1985; Pollard and Sag 1994:202-205; Williams 1994:§1.2.3).

Johannessen (1998:§3) conducts a number of different tests to determine what is the Head of the coordinate structure. While the results of many of the tests are inconclusive, she concludes that the overall picture that emerges supports the view that it is the coordinator, rather than either of the Coordinands, that Heads the coordinate structure. However, the tests that Johannessen is using here actually fall into two different categories: tests for syntactic headship – that is, whether or not a given item is an X^0 element that projects within its extended projection; and tests to determine which member of a grammatical relationship is syntactically the Head of this relationship (for example, the Head in a Head-Dependent relationship, also known as 'ruler', Zwicky 1985:14, or 'centre', Dik 1997:397, fn 7). We have already established in the previous section that the coordinator has the properties of a functional head, forming a constituent with one or other Coordinand. What remains to be seen, however, is whether it is the coordinator (as predicted by the standard Boolean phrase), or one (as predicted by Munn) or all (as predicted by

mutual adjunction) Coordinands that serve as the syntactic Head of the coordinate structure as a whole. Once we acknowledge the difference between the two types of head/Head and apply the tests accordingly, a very different picture emerges: when we conduct tests based on projection of features, distributional equivalence, obligatoriness, control of agreement and uniqueness, the evidence points to Headship being shared by the Coordinands, exactly as predicted by the theory of mutual adjunction.

Firstly, if the coordinator were the Head of the coordinate structure as a whole, we would expect it to project some features to the coordination projection as a whole. In turn, we would expect those features to be available for selection. However, contrary to this prediction, it is pointed out by Munn (1992:18, fn 16, 1993:21-22) and Neeleman (2006) that there does not appear to be any head that selects specifically for the coordinate structure.[9]

On the other hand, Borsley (1994:226; 2005:463-465) points out that the selectional requirements of a head can be satisfied by a coordinate structure, as long as all the Coordinands meet these selectional requirements (see also Neeleman 2006). The English and Dutch examples in (22)-(26) below illustrate this:

(22) a) Hobbs turned out [to like Rhodes]. *English*

b) * Hobbs turned out [liking Rhodes]

(23) a) Hobbs ended up [liking Rhodes].

b) * Hobbs ended up [to like Rhodes] (Borsley 2005:464, exx 5-6)

(24) a) Hobbs turned out [[to like Rhodes] [*and* to hate Barnes]].

b) * Hobbs turned out [[to like Rhodes] [*and* hating Barnes]]

c) * Hobbs turned out [[liking Rhodes] [*and* to hate Barnes]] (ex 8)

(25) a) Hobbs ended up [[liking Rhodes] [*and* hating Barnes]].

b) * Hobbs ended up [[liking Rhodes] [*and* to hate Barnes]]

[9] Johannessen (1998:95-96) argues against this view, claiming that the adverb *respectively* can only co-occur with a coordinate structure. This claim however does not concur with the findings of Dalrymple and Kehler (1995), and references cited there: '*respectively* establishes a pairing between elements of two sets having the same cardinality. However, … these elements are semantic entities in the discourse, not syntactic Conjuncts of a coordinated constituent' (p536; see also Munn 1993:§1.2.3). Note in particular the following example, containing no coordinate structure:

i) The first two variations refer to the last two, respectively. *English*
(Munn 1993:9, ex 1.7b)

c) * Hobbs ended up [[to like Rhodes] [*and* hating Barnes]] (ex 7)

(26) a) Jan is te [oud] voor die baan. *Dutch*
Jan is too old for that job
'Jan is too old for that job.' (Neeleman 2006:1, ex 2a)

b) * Jan is te [aan de drank] voor die baan
Jan is too on the drink for that job (ex 2b)

c) * Jan is te [[aan de drank] [*en* oud]] voor die baan
Jan is too on the drink and old for that job (p2, ex 3b)

d) * Jan is te [oud [*en* aan de drank]] voor die baan
Jan is too old and on the drink for that job (ex 3c)

e) Jan is te [oud [*en* alkoholistisch]] voor die baan.
Jan is too old and alcoholic for that job
'Jan is too old and alcoholic for that job.' (p1, ex 2c)

The English examples compare the selectional requirements of the particle verbs *turn out* and *end up*. While sharing semantic selectional requirements, they differ syntactically in that the verbal complement of *turn out* must be infinitival (22), whereas that of *end up* must be participial (23). Where the complement of these verbs is a coordinate structure, these requirements apply to both Coordinands: for *turn out*, both must be infinitival (24); for *end up*, both must be participial (25). The Dutch examples show a similar case. The degree expression *te* ('too') selects for an adjectival complement (Neeleman *et al* 2004): therefore (26)a), which meets these requirements, is grammatical, whereas (26)b), in which *te* is merged with a PP complement, is disallowed. Examples (26)c)-e) show that where *te* takes a coordinate structure as its complement, both Conjuncts must be adjectival. In summary, then, the English and Dutch data show that the distributional equivalent of the coordinate structure as a whole is determined by both Coordinands, in compliance with Wasow's Generalisation (Pullum and Zwicky 1986; see also Sag 2000:6).[10]

[10] Sag *et al* (1985:165) point out that the following examples appear to pose a problem for the claim that all Coordinands must meet the selectional requirements of the head selecting the coordinate structure: in these examples a clause may serve as the second Conjunct of the complement to a preposition, but may not appear alone as sole complement, nor as first Conjunct:

ii) a) We talked about [[Mr Colson] [*and* that he had worked at the White House]]. *English*
(Sag *et al* 1985:165, ex 124a)
b) * We talked about [that he had worked at the White House] (ex 125a)
c) * We talked about [[that Mr Colson had worked at the White House] [*and* his general political experiences]]

iii) a) You can depend on [[my assistant] [*and* that he will be on time]]. (ex 124b)
b) * You can depend on [that he will be on time] (ex 125b)
c) * You can depend on [[that my assistant will be on time] [*and* his general performance]]

These facts directly follow from the theory of mutual adjunction. According to this theory, projection of categorial and other grammatical features from the Coordinands to the coordinate structure is possible, but, all else being equal, not obligatory. What is prohibited, however, is projection of the features of only one Coordinand, whether the first or the second (or at least where this would result in a contradiction of features between mother and daughter) (see earlier discussion of the illustrative trees in (18); also Sag *et al* 1985; Pollard and Sag 1994:202-205). In the English and Dutch examples in (24), (25) and (26)c)-e), the coordinate structure is sister to a head that selects for specific features: infinitival, participial and adjectival features, respectively. In order to satisfy these selectional requirements, the relevant features must be present in the top node of the coordinate structure; that is, they must project from the respective Coordinands to the top node of the coordinate structure. This is what occurs in the grammatical examples in (24)a), (25)a) and (26)e), where both Conjuncts share the relevant features. Examples (24)b)-c), (25)b)-c) and (26)c)-d) are ungrammatical: the relevant features only occur on one Conjunct. As such they cannot percolate without resulting in some illicit contradiction of features. Since the required features cannot be projected to Head the coordinate structure, the selectional requirements of *turn out*, *end up* and *te* remain unsatisfied, resulting in ungrammaticality. Note that the following examples illustrate that the coordination of Coordinands of differing category is not in itself ungrammatical (see also Peterson 1981; Gazdar *et al* 1985:174-175; Sag *et al* 1985):

(27) a) Jan is oud. *Dutch*
Jan is old
'Jan is old.'

b) Jan is [aan de drank].
Jan is on the drink
'Jan is on the drink.'

c) Jan is [oud [*en* aan de drank]].
Jan is old and on the drink
'Jan is old and on the drink.' (Neeleman 2006:1, ex 3a)

In example (27)c), like the ungrammatical examples (26)c) and d), the coordinate structure consists of two Coordinands of differing category – adjectival and prepositional. As explained

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However, Munn (1993:81) points out that, while the CP cannot appear alone as complement to the preposition in its base position, it can in fact be passivised or topicalised from this position:

English

iv) a) [That Mr Colson had worked at the White House]$_i$ was talked about t_i, among other things.
b) [That Mr Colson had worked at the White House]$_i$, everyone was talking about t_i.

v) a) [That Bill would arrive]$_i$ was crucially depended on t_i.
b) [That Bill will arrive]$_i$, we're really depending on t_i. (Munn 1993:81, ex 2.90)

in the initial discussion of mutual adjunction and illustrated by the tree in (18)a), in such cases neither category projects and so the top node of the coordinate structure is left unspecified as to category. This means that the coordinate structure, though well-formed in its own right, will not be able to satisfy any c-selectional requirements of its selecting head. The examples in (27)a)-b) show that the copula *is*, unlike the degree head *te* in (26), is not selective as to the category of its complement, taking an adjectival complement in (27)a) and a prepositional complement in (27)b). Because of this, it is able to take a coordinate structure of unspecified category as its complement (27)c) – that is, where the Conjuncts are of differing category and hence there is no projection of categorial features to the mother.

On the other hand, the fact that the c-selecting head (*turn out*, *end up* or *te* ('too')) is sensitive to the category of both Coordinands poses a problem for Munn's adjoined Boolean phrase theory. According to this theory, the features of the first Coordinand (in languages like English and Dutch[11]) alone should be available for c-selection. Therefore while this analysis successfully accounts for the ungrammaticality of (24)c), (25)c) and (26)c), it cannot exclude the ungrammatical examples in (24)b), (25)b) and (26)d), where it is features of the second Conjunct that do not meet the relevant selectional requirements. As Borsley (2005:465) makes clear, there is no possibility of circumventing these problems by proposing that the Coordinands must share certain features: we have seen in (27)c) that coordination of unlike categories is not in itself problematic. Notably, the kind of subordination structure given by Munn's asymmetric adjunction structure is exactly what is ruled out by principles of mutual adjunction, in that only one Coordinand projects. The fact that such a structure is ungrammatical in examples such as (24)b), (25)b) and (26)d) is suggestive that single-Coordinand projection of this kind is indeed prohibited in a coordinate structure.

Similarly, the coordinator-Headed Boolean phrase theory is unable to handle data of the kind in (24)-(26), or at least without making *ad hoc* stipulations. A common assumption of the Boolean phrase theory is that the coordinate structure as a whole inherits features of its specifier, by spec-head agreement, but not those of its complement (Munn 1987; Johannessen 1998).[12] In

[11] The following extraposition examples provide evidence that the coordinating conjunction *en* forms a constituent with the final Conjunct:

vi) a) Ik zag Marie gisteren [*en* Piet]. *Dutch*
I saw Marie yesterday and Piet
'I saw Marie yesterday, and Piet.'

b) * Ik zag Marie *en* gisteren Piet
I saw Marie and yesterday Piet

c) * Ik zag Piet gisteren Marie *en*
I saw Piet yesterday Marie and (Ad Neeleman, p.c.)

[12] The assumption made by Munn (1987) and Johannessen (1998) is an odd one. Since the coordinator is proposed to be a functional head – and indeed shows every indication of being one – it is difficult to see why the putative CoP should inherit the categorial features of its specifier, rather than its complement.

this case the predictions are exactly the same as in Munn's adjoined theory: the theory with this assumption therefore incorrectly predicts that only the Coordinand proposed to be in the specifier – in the English and Dutch case the first Conjunct – need meet the selectional requirements of the head selecting the coordinate structure as a whole; in other words, there does not appear to be any reason to rule out the ungrammatical examples in (24)b), (25)b) and (26)d). Zoerner (1995), on the hand, proposes that the features of all Coordinands percolate to CoP. While this proposal makes the correct predictions concerning the data in (24)-(26), it does so at the cost of setting a theoretical precedent: as pointed out by Progovac (1998c:3-4) and Camacho (2000:27), it is not usual for a head to inherit properties of both its complement and its specifier.

Further evidence that it is the Coordinands, rather than the coordinator, that act as the distributional equivalent of, and hence Head, the coordinate structure can be taken from the fact that, where there is a coordinate structure, the Coordinands are obligatory (see Grosu's 1981:56 Null Conjunct Constraint). On the other hand, as we have already seen in section 4.2, not every coordinate structure in every language requires an overt coordinator. Examples are given in (28)-(31) below (with examples (8) and (9) repeated here as (28) and (31)):

(28) [Kačerán, Kormsčen] viek-án. *Ona-Šelknám*
Kačerán Kormsčen RFL-chase
'Kačerán and Kormsčen chased one another.'
(Stassen 2000:8, ex 14, citing Tonelli 1926:72)

(29) [Nalpet Kamlakw] yakruk ti-n-iy-m-e. *Awtuw*
Nalpet Kamlakw once DU-REC-shoot-PL-PST
'Nalpet and Kamlakw once had a war (i.e. shot each other).' (Feldman 1986:67, ex 54a)

(30) [Awtiy yaw-re d-iy-e,] [Mimpel komkoran-re ø,] [Yawur kewyæne-re ø].
Awtiy pig-OBJ FACT-shoot-PST Mimpel bat-OBJ Yawur cassowary-OBJ
'Awtiy shot a pig, Mimpel a bat, (and) Yawur a cassowary.' (p169, ex 68)

(31) [[mereni kalani] ŋeni]kili-nya awa. *Maranungku*
brother uncle my eat-3PL meat
'My brother and uncle ate the meat.' (Stassen 2000:8, ex 11, citing Tryon 1970:83)

This proposal seems to run counter to the principles of Extended Projection (cf. Grimshaw 1991/2005, 2000; Williams 1994:16). Supposing the putative CoP were to inherit the properties of its complement rather than its specifier, the wrong predictions are still made: there should be no restrictions on the category of the putative specifier – the first Coordinand in these examples – incorrectly allowing the ungrammatical examples in (24)c), (25)c) and (26)c).

A number of properties in these examples indicate that the coordinate structure without an overt coordinator is syntactically identical to coordination occurring with a coordinator. Firstly, the Ona-Šelknám (Chon) example in (28) and the Awtuw (Ram) example in (29) show that the subject, a conjunction of two singular nouns, can bind a reciprocal. The second Awtuw example, in (30), demonstrates gapping. Finally, in the Maranungku (or Maranunggu, Daly) example in (31), the possessor, *ŋeni* ('my'), has scope over both Conjuncts; furthermore, the conjunction of two singular nouns as subject triggers plural agreement on the verb.

If the structure of coordination is as in (20) – the Boolean phrase – the examples in (8)-(15) in the previous section and (28)-(31) above require explanation, since the coordinator is predicted to be obligatory.[13]

Problems arise likewise with Munn's asymmetric coordination proposal in (21). While initially it may seem as if the coordinator need not be obligatory, a problem arises when it comes to accounting for examples such as (28), (29) and (31) above. As previously mentioned, these examples provide evidence of the coordinatorless coordinate structure binding reciprocals (in (28) and (29)) and triggering plural agreement (in (31)). According to the structure in (21), the features of only one Conjunct project to Head the coordinate structure, but both Conjuncts in the above examples are singular. Munn (1993) deals with this issue by proposing that the coordinator is a type of quantifier, and therefore undergoes quantifier-raising (QR, May 1977) at LF. (There does not appear to be any independent evidence for this movement.) In this way the coordinator, bearing plural semantics, scopes over the entire coordinate structure, thereby permitting reciprocal binding and triggering plural agreement on a relevant target.[14] It seems then that the presence of the coordinator is just as essential in Munn's theory as in the more standard Boolean phrase analysis.

Conversely, in the mutual adjunction structure, as in (17) and (18)a), there is no requirement for coordinators at all and hence these examples are unproblematic.

On the other hand, the coordinator cannot appear alone.[15] Johannessen (1998:§3.2.6.1) points out that occasionally only one Coordinand is present, but acknowledges that this is a 'special

[13] This is by no means to say that explanation is impossible; as Johannessen (1998:§3.2.6.2) points out, it is perfectly conceivable that the coordinator in these examples exists in the syntax, but is phonologically null.

[14] See however the more detailed discussion of examples (42)-(43) below regarding number agreement with the coordinate structure for evidence that the plural feature cannot be introduced by the coordinating conjunction.

[15] This is perhaps not so surprising under either theory. Certainly it is predicted by mutual adjunction. If however the Coordinands in the Boolean phrase are arguments of the coordinator head, we would expect them to be just as obligatory as the coordinator (but not more so). As arguments, we might however expect them to be deletable (for example by *pro*-drop), but this is not the case.

case' (see also Zhang 2010:§2 on what she terms Conjunct-drop). Examples are given below from English and Norwegian:[16]

(32) a) [Observing Ivan playing pretty good ragtime piano] *English*
And he doesn't even have a left hand! (Hankamer & Sag 1976:410, ex 53)

b) * Listening to him, you wouldn't suspect [*and* he doesn't even have a left hand]!

(33) *Og* det ble lys. *Norwegian*
and it became light
'And there was light.' (Johannessen 1998:83, ex 24e)

(34) a) Han har vært i Afrika og.
he has been in Africa and
'He has even been in Africa.' (ex 24c)

b) * Jeg visste [at han hadde vært i Afrika, og][17]
I knew that he had been in Africa and

c) Jeg visste [at han hadde vært i Afrika], og.
I knew that he had been in Africa and
'I even knew that he had been in Africa.' (Janne Bondi Johannessen, p.c.)

(35) a) Har du vært bortreist, eller?
have you.SG been away.gone or
'Say, have you been away?' (Johannessen 1998:83, ex 24a)

b) * Jeg lurer på [om du har vært bortreist, eller?]
I wonder on if you.SG have been away.gone or
(Janne Bondi Johannessen, p.c.)

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[16] Zhang (2008:11) also gives English examples such as the following, which appear to involve ellipsis of an initial VP Conjunct:

vii) Can linguists [study negation]? Not [ø [*and* stay sane]], they can't. *English*
(Lawler 1974:14, ex 59)

The arguments given in Lawler (1974:14-15), Goldsmith (1985:§4) and especially Postal (1998:§§3.3.3-3.3.5) show that such examples, which appear to be unique to English, are irrelevant for our concerns here, since they do not in fact involve coordination, but subordination.

[17] Janne Bondi Johannessen (p.c.) points out that Norwegian has a homographous adverb *og*, meaning 'too'. The discourse particle *og* in (34) is unstressed with a falling intonation, whereas the homographous adverb meaning 'too' is stressed with a rising intonation (according to the intonation patterns of Southeast Norway). The string in (34)b) is ungrammatical under the intended interpretation whereby *og* is an unstressed discourse particle with falling intonation, identical to the conjunctive coordinator, attached to the embedded clause.

In (32) and (33), we have examples of what are termed discourse- or utterance-initial coordinators. As Hankamer and Sag (1976:411) explain, 'such cases involve essentially pragmatic omission of an understood left Conjunct'. In the Norwegian examples in (34)-(35), it is the right Coordinand that appears to be missing. It should be noted that both constructions – whichever Coordinand is missing – are subject to greater restrictions than are imposed elsewhere on the coordinate structure, and the second case, with the sentence-final coordinator, arguably does not involve a coordination relationship at all.

In the first place, although English *and* and Norwegian *og* ('and') and *eller* ('or') can in general coordinate heads or phrases of any category, Conjunct-drop as in (32)-(35) is only possible in examples with clausal Coordinands. Moreover, it is strictly confined to matrix clauses (cf. (32)b), (34)b) and (35)b)). In terms of the examples with final coordinators, as in (34)-(35), both Johannessen (1998:84) and Zhang (2010:§2.4) express doubts that the sentence-final particle has retained its coordinating function. Indeed, German data cited by Zhang (2010:205, citing André Meinunger, p.c.) suggests this cannot be the case: final position *oder* (usually 'or') may serve as an interrogative tag in sentences parallel to that in (35) even in those dialects of German where *oder* does not occur as a disjunctive coordinator. Similarly, as noted in section 3.6.2, in Malayalam questions are marked by a final *-oo*, phonologically identical to the disjunctive coordinator; however, as pointed out by Jayaseelan (2001:65, fn 1), this question-final *-oo* cannot in fact be the disjunctive coordinator, since, unlike interrogative *-oo*, coordinators in Malayalam never attach to a finite verb.

We have seen then that in terms of the projector of features, the distributional equivalent and obligatoriness, it seems to be the Coordinands, rather than the coordinator, or a single Coordinand, that Head the coordinate structure. We now turn to another criterion: which element or elements of the coordinate structure, if any, is able to act as an agreement controller on a target external to the coordinate structure. We will see that the evidence points to either all, or just one, of the Coordinands acting as agreement controller: where the Coordinands differ in φ-features, agreement is established either by resolution rules (term due to Givón 1970; also known as dominance, Sauerland 2008), or by agreement with either the first, or the nearest, Coordinand, irrespective of any putative structural position of this Coordinand. On the other hand, there is no evidence that the coordinator acts as agreement controller, or even that it does so through inheritance of the features of its putative specifier.

We begin by considering the resolution rules for different φ-features. For person and number features, resolution rules are universal, determined by the Elsewhere Principle (Kiparsky 1973a and subsequent work). Following Kerstens (1993), Harley and Ritter (2002), Sauerland (2008) and Zeijlstra (2011), we may assume that first and second person are marked by the feature

[participant], while first person is additionally marked by the feature [speaker]. Third person remains unmarked. Applying the Elsewhere Principle, we expect agreement with the most specific set of features available. That is to say that a third person Conjunct will only control agreement in the absence of any Conjunct with the more specific feature [participant], and a second person Conjunct will only control agreement in the absence of any Conjunct with the more specific feature [speaker] (i.e. first person) (see Corbett 1983 *et seq*). This is illustrated below in examples from Czech:

(36) [já [*a* ty]] zůstaneme doma. *Czech*
I and you will.stay.1PL at.home
'You and I will stay at home.' (Corbett 1983:176, ex 1)

(37) [bratr [*a* já]] se učíme hrát na klavír.
brother and I RFL learn.1PL to.play on piano
'My brother and I are learning to play the piano.' (ex 2)

(38) [[tvůj otec] [*a* ty]] jste si podobni.
your father and you are.2PL to.each.other similar
'Your father and you are similar.' (ex 3)

Examples (36) and (37) contain a first person Conjunct (*já*) within the subject, triggering first person agreement on the verb. Notice that this first person agreement occurs independently of whether the first person pronoun is the left (as in (36)) or the right (as in (37)) Conjunct. In (38) neither Conjunct has the feature [speaker], and so first person agreement is impossible. Instead, agreement is with the most specific feature set available – the feature [participant] provided by the second person pronoun *ty*. Note that the second person agreement is possible in (38) but not in (36), despite both subjects containing a second person pronoun, since it is only in (38) that second person is the most specific feature set available.

Consider how the different theories provided by the two asymmetric Boolean phrase structures and mutual adjunction are able to deal with this data. We have seen clear evidence that the form of person agreement on the target (in the Czech cases the verb) is determined by features of the Coordinands, rather than any inherent feature of the coordinator. Moreover, whether the more specific agreement-controlling feature appears on the first or the second Conjunct is immaterial – in (35) it is the first Conjunct that controls agreement, while in (36) and (37) it is the second. This runs counter to the predictions of Munn's adjoined Boolean phrase theory, as in (21), where only the features of the first Conjunct should be available to control agreement. Similarly, with regard to the more standard Boolean phrase theory in (20), even if we adopt the

assumption that the coordinator inherits the features of its specifier, the appearance of first person agreement in (37) and of second person agreement in (38) cannot be explained, since these features are introduced by the right Conjunct, the putative complement. According to the theory of mutual adjunction, on the other hand, the Coordinands have equal status. Therefore it is perfectly possible, indeed expected, that resolution rules should utilise features from all Conjuncts.

A similar situation arises with resolution of number features. We will see again that agreement in terms of number is determined by features of all the Coordinands, rather than any feature of the coordinator, or just one of the Coordinands. Consider the English examples in (39)-(40) below, where a coordinate structure appears in subject position, and hence controls agreement on the verb:

(39) a) [[The violinist] [*and* the cellist] are going to perform first. *English*

b) [[The violinists] [*and* the cellists] are going to perform first.

(40) a) [[The violinist] [*or* the cellist] is going to perform first.

b) [[The violinists] [*or* the cellists] are going to perform first.

In the conjunction structure in (39), agreement is invariably plural, even where neither Conjunct has a plural feature, as in (39)a). On the basis of this data alone, then, we might be tempted to conclude that the plural feature is contributed by the coordinating conjunction *and*, and hence it is the coordinator that controls number agreement. The disjunction data in (40), however, tells a different story: here agreement is singular where the Coordinands are singular, and plural where the Coordinands are plural. The disjunctive coordinator *or* however remains identical. The coordinator in this case appears to be transparent for the purposes of number agreement, with the form of the verb determined entirely by the Coordinands. Even in the case of conjunction, however, there is evidence supporting the case that it is the Conjuncts, rather than the coordinator, that control agreement.

This evidence comes from languages that distinguish dual agreement from plural agreement, as in Slovenian:

(41) a) [Tonćek [*in* Igor]] sta priźadevna. *Slovenian*
Toncek and Igor are.DU assiduous.DU
'Toncek and Igor are assiduous.' (Corbett 1983:177, ex 5, citing Lenček 1972)

b) [[Tonćek,][Igor] [*in* Marina]] so priźadevni.
Toncek Igor and Marina are.PL assiduous.PL
'Toncek, Igor and Marina are assiduous.' (ex 6, citing Lenček 1972)

(42) [Marta [*in* njegova brata]] bodoprišli.
Marta and his brothers.DU will come.PL
'Marta and his (Igor's) brothers will come. (ex 7, citing Lenček 1972)

In the example in (41)a), the conjunction of two singular noun phrases triggers dual agreement on the copula and predicate. The conjunction of three singular noun phrases in (41)b), however, leads to plural agreement. The form of the coordinating conjunction *in* does not change. Moreover, the example in (42) shows that the form of agreement has nothing to do with the number of Conjuncts; rather it is concerned with the number feature of the Conjuncts taken together. In this example plural agreement is used with a subject consisting of one singular Conjunct and one dual Conjunct. Therefore we cannot argue that the form of agreement is determined somehow by the valency of the coordinating conjunction (supposing that the Coordinands are arguments of the coordinator, as in the Boolean phrase): the examples in (41)a) and (42) have the same number of Coordinands, yet trigger different forms of number agreement, due to the featural make-up of the Coordinands themselves. Moreover, although many languages distinguish dual and plural number, there does not appear to be any language in which this distinction is marked on the coordinator (Gazdar *et al* 1985:170). This again suggests that the number feature of a coordinate structure is not introduced by the coordinator. Additional evidence that the number feature of a coordinate structure cannot be not provided by the coordinator, but by the Coordinands, comes from languages with asyndetic coordination, as in Maranungku. In the example in (31) above, the conjunction of two singular noun phrases triggers plural agreement on the verb, despite the absence of any coordinator.

While the situation regarding resolution of number features is a little more complex than that of person features, both support the view that it is the Coordinands, rather than the coordinator, or a single Coordinand, that control agreement on external targets. This in turn supports the case we have already made for the Coordinands, rather than either the coordinator or a single Coordinand, Heading the coordinate structure.[18]

[18] Munn's (1993) ultimate conclusion is that the semantics of the coordinator are responsible for determining the number feature of the coordinate structure as a whole (see discussion of examples (29) and (31) above). The above discussion shows that such a conclusion is problematic. Earlier in his thesis (p91), however, he postulates that plural agreement with a conjunction structure arises in cases of spec/head agreement due to the head agreeing with the 'maximal projection (i.e. all segments of the [H]ead, including any adjoined material)' in its specifier. While this proposal makes the correct predictions regarding agreement in cases of conjunction, it seems to incorrectly predict that agreement will also be plural where the controlling coordinate structure is disjunctive (as in (40)). Moreover, it is theoretically problematic in that there is no independent evidence that a Head inherits the features of its

A similar situation arises with gender resolution, although the precise rules tend to be language-specific (see Corbett 1983 *et seq* for a detailed overview). In general, where Coordinands differ in gender, the resolved form will be either masculine or neuter, depending on the language.[19] Consider, for example, the situation in Icelandic:

(43) [Drengurinn [*og* telpan]] eru preytt. *Icelandic*
boy(M) and girl(F) are tired.NT.PL
'The boy and the girl are tired.' (Corbett 1983:190, ex 39, citing Jónsson 1927:14)

Here the two Conjuncts, *drengurinn* ('boy'), which is masculine, and *telpan* ('girl'), which is feminine, differ in gender. The agreement marked on the target, the adjective *preutt* ('tired') is neuter. Given that this cannot be agreement with either Coordinand, are we to conclude that it is the coordinator *og* that is neuter and controls agreement? There is evidence suggesting that this is not the case. Firstly, agreement is masculine where all the Conjuncts are masculine, and feminine where they are all feminine (Corbett 1983:190). If agreement were really controlled by a neuter coordinator, we would expect neuter agreement irrespective of the gender of the Conjuncts. Secondly, given that *og* is used to coordinate words or phrases of any category, we would have to assign neuter gender to every coordinate structure regardless of the category of the Conjuncts, even though gender is a property only associated with nominals. Finally, since neuter gender is used as the default form for adjectival agreement even in the absence of any coordinate structure (as in (44) below), there is no reason to attribute the neuter agreement in examples such as (43) to the presence of the coordinator.

(44) Hvítlaukurinn er saxaður nokkuð gróft. *Icelandic*
garlic.MSG.NOM is chopped rather coarse.NT.SG
'The garlic is chopped rather coarsely.' (Whelpton 2007:483, ex 17)

We have seen then that in terms of resolution rules – whether of person, number or gender features – it seems to be the Coordinands, rather than the coordinator, that control agreement, exactly as predicted by the theory of mutual adjunction. Moreover, where a choice must be made as to which Coordinand should control agreement (as in the case of person and gender features), this choice is based on a hierarchy of the relevant φ-features, rather than any putative

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adjunct. If this were really the case, we would expect plural agreement wherever a nominal is adjoined to the specifier of a relevant target. Suppose for example the subject of a sentence is the complex nominal *book of stories*, as in viii) below. If we combine the features of the singular noun phrase *book* with those of its adjunct, *stories*, as suggested by Munn's analysis, we would expect plural agreement; however, agreement in such cases is invariably singular:

viii)The book of stories was/*were very enjoyable. *English*

[19] In languages with more than three genders or noun classes, it is more common to use either semantic resolution or single Conjunct agreement (see below).

structural hierarchy between the Coordinands. We now turn to the second means of dealing with agreement where Conjuncts differ in φ-features: single Conjunct agreement (also known as partial agreement). This occurs where the target agrees with only one Coordinand, either the first or the nearest (depending on the language or the speaker; Corbett 2006:170). Single Conjunct agreement has often been used as an argument in favour of the asymmetric structures, whether Headed by the coordinator, as in (20) (Johannessen 1993, 1998), or by a single Coordinand, as in (21) (Munn 1993). Both theories predict that features of the Coordinand with which the coordinator does not form a constituent should control agreement: in (21) because it is this Coordinand that Heads the coordinate structure as a whole, and in (20) because it is claimed that the Boolean phrase as a whole inherits the features of its specifier. Here, through direct counterexamples to this prediction, we will see evidence that single Conjunct agreement is dependent not on syntactic structure, but rather on linear order (see also Corbett 2006:170; Marušič, Nevins and Saksida 2007; Benmamoun and Bhatia 2010; Benmamoun *et al* 2010).

Firstly, we consider Hindi-Urdu. We have already seen evidence in (5) above that the coordinating conjunction *aur* forms a constituent with the Conjunct to its right. Both asymmetric theories therefore predict that single Conjunct agreement will invariably be with the first Conjunct. However, Benmamoun and Bhatia (2010) and Benmamoun *et al* (2010) have shown that that single Conjunct agreement in Hindi-Urdu is always with the nearest Conjunct, whether the first or last. This is demonstrated in (45) below, showing the canonical SOV order, and in (46), where the coordinated object follows the verb. In the former case the verb *kharidii* ('bought') agrees with the final Conjunct; in the latter it agrees with the first Conjunct:[20]

(45) maiN=ne [[ek chaataa] [*aur* ek saaRii]] khariid-ii. *Hindi-Urdu*
I-ERG one umbrella(M) and one saree(F) buy-PERF.F
'I bought an umbrella and a saree.'

(Benmamoun *et al* 2010:71, ex 12a, citing Kachru 1980:147)

(46) Raam=ne kyaa khariid-aa! us=ne khariid-ii [kursii [*aur* sofa]],
Ram=ERG what(M) buy-PERF.MSG he=ERG buy-PERF.F chair(F) and sofa(M)
jo us=e ham=ne manaa ki-yaa thaa!
which he=DAT we=ERG forbid do-PERF.MSG PST.MSG
'What did Ram buy! He bought the chair and sofa, which we had forbidden him (to buy)!'

(Benmamoun *et al* 2010:77, ex 21b)

[20] Note that this is definitely nearest Conjunct agreement, rather than gender resolution, since the agreement is feminine. Where agreement is established through resolution in Hindi-Urdu, agreement is masculine plural (Benmamoun *et al* 2010:11).

We find a very similar situation in Slovenian: single Conjunct agreement may occur either with the first (as in (47)a), or the nearest (as in (47)b) Conjunct (Marušič, Nevins and Saksida 2007; Marušič, Nevins and Badecker 2010):

(47) a) [Radirke [*in* peresa]] so se prodajal-e najbolje. *Slovenian*
erasers.FPL and pens.NT.PL are.PL REFL sold-FPL the.best

b) [Radirke [*in* peresa]] so se prodajal-a najbolje.
erasers.FPL and pens.NT.PL are.PL REFL sold-NT.PL the.best

'Erasers and pens were the best sold items.' (Marušič, Nevins & Badecker 2010:1, ex 2)

The Hindi-Urdu and Slovenian data run counter to the predictions of both the standard Boolean phrase and Munn's (1992 *et seq*) adjoined variant, whereby only the Coordinand with which the coordinator does not form a constituent (in both cases the first Coordinand) should be available for single Conjunct agreement. On the other hand, these results are perfectly compatible with the theory of mutual adjunction; here the Coordinands are not hierarchically ordered, so either should be available for single Conjunct agreement, providing any linear conditions (precedence or closeness) are satisfied.

So far, all the evidence we have looked at points to Headship of the coordinate structure being shared by the Coordinands, as predicted by mutual adjunction. Neither Headship by the coordinator, as in the standard Boolean phrase, or by only the Coordinand with which the coordinator does not form a constituent, as in Munn's (1992 *et seq*) variant, can account for the full set of data. A final prediction distinguishing mutual adjunction from these asymmetric theories concerns the uniqueness or possible iteration of the coordinator. Since in mutual adjunction, the Coordinands are syntactically as well as semantically in a relationship of equivalence, we have already discussed how in principle the coordinator may attach to any or every Coordinand; that is, all else being equal, iteration of the coordinator on every Coordinand is predicted to be possible. On the other hand, as pointed out by Johannessen (1998:§3.2.7), the Boolean phrase predicts that, at least where we are dealing with binary coordination – that is, coordination with two Coordinands – the coordinator must be unique. Similarly, there does not seem to be any reason for iteration of the coordinator in Munn's adjoined Boolean phrase, where the coordinator is considered to be a type of quantifier.

The presence of polysyndeton (a coordinator for every Coordinand, also known as conjunction doubling)[21], found in a number of unconnected linguistic areas, such as the Caucasus, Northeast

[21] Technically the term polysyndeton refers to multiple coordinators, irrespective of the number of Coordinands (i.e. *John and Mary and Bill* would be considered polysyndeton). Throughout this thesis I

Africa, Australia and New Guinea, South India and Northeast Asia, as well as isolated examples in the Americas, West Africa and Burma (Stassen 2001:1107), therefore presents a problem for both the standard Boolean phrase and Munn's adjoined variant. We have already seen an example of this in Kanuri in the example in (1) above. Further examples are given in (48) for Malayalam. In particular, the Malayalam examples show that the Coordinate Structure Constraint (henceforth CSC, J. Ross 1967/1986) applies, ruling out the possibility that polysyndeton is a different syntactic phenomenon from the more familiar monosyndetic coordination: (48)b) and d) show that extraction out of a single Conjunct is impossible, whereas, for the relevant set of speakers, in (48)e) across-the-board extraction is possible:[22]

(48) mary-kkə [[john-nooTə sneeh=*um*] [tom-nooTə ver̲əp=*um*]] aa. *Malayalam*
Mary-DAT John-SOC love=and Tom-SOC hate=and be.PRES
'Mary loves John and hates Tom.'

a) % illa, illa! mary-kkə [[svayam-ooTə sneeh=*um*] [tom-nooTə ver̲əp=*um*]] aa.
no no Mary-DAT self-SOC love=and Tom-SOC hate=and be.PRES
'No, no! Mary loves herself and hates Tom.'

b) * illa, illa! svayam-ooTə$_i$, mary-kkə [[t_i sneeh=*um*] [tom-nooTə ver̲əp=*um*]] aa.
no no self-SOC Mary-DAT love=and Tom-SOC hate=and be.PRES

c) % illa, illa! mary-kkə [[john-nooTə sneeh=*um*] [svayam-ooTə ver̲əp=*um*]] aa.
no, no Mary-DAT John-SOC love=and self-SOC hate=and be.PRES
'No, no! Mary loves John and hates herself.'

d) * illa, illa! svayam-ooTə$_i$, mary-kkə [[john-nooTə sneeh=*um*] [t_i ver̲əp=*um*]] aa.
no no self-SOC Mary-DAT John-SOC love=and hate=and be.PRES

e) % illa, illa! svayam-ooTə$_i$, mary-kkə [[t_i sneeh=*um*] [t_i ver̲əp=*um*]] aa.
no no self-SOC Mary-DAT love=and hate=and be.PRES
'No, no! Herself, Mary loves and hates.'

Various authors (Johannessen 1998:§4.7, 2005; Hendriks 2001; De Vries 2005; Zhang 2008b) deal with polysyndeton by proposing that, like monosyndetic coordination, there is a single coordinator head, and that the peripheral 'coordinator' is in fact a distributive (or correlative) focus particle, equivalent to English *both*. Under this approach the distributive particle does not

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use the term only where the number of coordinators is equal to the number of Coordinands, as in the Kanuri example in (1) above, and the Malayalam examples in (48) and (50) below.

[22] Not all speakers accept the use of the reflexive *svayam* (a loan from Sanskrit) in the sociative case. The use of the reflexive in this test is important, since Malayalam is a *pro*-drop language and therefore simple doubling of base-generated focused material by a null pronoun can masquerade as movement. Reflexives, however, cannot be *pro*-dropped.

form a constituent uniquely with the immediately adjacent Coordinand, but selects for the coordinate structure CoP as a whole.

The issue here is that proponents of this approach only consider polysyndeton in languages with prepositive coordination – that is, languages in which the coordinator forms a constituent with the Coordinand to its right, giving the pattern co A co B. In such languages the use of polysyndeton is optional, and invariably triggers an emphatic distributive reading (Dik 1968:273; Stassen 2000:15; Haspelmath 2007), as predicted by the distributive focus particle analysis. This is demonstrated by Dutch examples below: in the monosyndetic example in (49)a), either the collective reading, whereby A and B together buy a single car, or the distributive reading, whereby they each buy a car, is possible; in the polysyndetic example in (49)b), the distributive reading is forced (Zhang 2008b:22; see also Zoerner 1999:330):

(49) a) [A *en* B]kochten een auto. *Dutch*
A and B bought a car
'A and B bought a car.'

b) [*En* A *en* B]kochten een auto.
and A and B bought a car
'Both A and B bought a car.' (Zhang 2008b:22)

While the distributive focus particle analysis is therefore compatible with the prepositive polysyndetic coordination data, the analysis cannot extend to at least the vast majority of languages displaying postpositive polysyndeton. Postpositive polysyndetic languages in fact fall into three groups: those where polysyndeton is obligatory, and carries no additional interpretive effects (such as the Dravidian languages); those where it is optional, but carries no additional interpretive effects (such as Japanese and Korean); and, more rarely, those where, like languages with prepositive polysyndeton, the optional presence of the peripheral coordinator triggers an obligatory distributive reading (found in the Northeast Caucasian language Lezgian, or Lezgi, and the Tibeto-Burman language Hakha Lai, or Chin, Haka). Only the latter group meets the predictions of the distributive focus particle analysis. Examples such as the following, from Malayalam (50), where polysyndeton is both obligatory and compatible with a collective reading, or from Japanese (51), where polysyndeton is optional, but still compatible with a collective reading, are predicted not to occur. On the other hand, as we have already discussed, they pose no problem to the theory of mutual adjunction:

(50) [john=*um* mary*(=*um*)] kalyaaNam kaZiccu. *Malayalam*
John=and Mary=and marriage performed
'John and Mary married (each other).'

(51) [Taroo=*to* Akiko(=*to*)]=wa kekkon simasi=ta. *Japanese*
Taroo=and Akiko=and=TOP marry do=PST
'Taro and Akiko married (each other).' (Hinds 1986:97, ex 338)

A second problem with the distributive focus particle analysis of polysyndeton concerns constituency. According to the distributive focus particle analysis required by proponents of the Boolean phrase, the peripheral 'coordinator' in polysyndeton should not form a constituent uniquely with the adjacent Conjunct, but with the coordinate structure as a whole. Lezgian (Northeast Caucasian) is a language displaying optional postpositive polysyndeton, this polysyndeton being accompanied by an obligatory emphatic reading:

(52) [[Zi buba=*ni*], [buba.di-n buba=*ni*]] čuban-ar xˆa-ji-bur ja. *Lezgian*
my father=and father-GEN father=and shepherd-PL become-AOP-SBST.PL COP
'Both my father and my father's father were shepherds.'
(Haspelmath 1993:327, ex 897, citing Rizvanov 1966:19)

Contrary to the predictions of the distributive focus particle approach, it is possible to extrapose the final coordinator (the alleged distributive focus particle) along with the final Conjunct, indicating that the two form a constituent. This data is however unproblematic for the theory of mutual adjunction, whereby in principle coordinators may attach freely to any and every Coordinand:

(53) I dünja.da-l [q^{h}sanwil-er=*ni*] ala, [piswil-er=*ni*]. *Lezgian*
this world-SRESS goodness-PL=and be.on badness-PL=and
'In this world there are both good things and bad things.'
(Haspelmath 1993:328, ex 898a, citing Šixverdiev 1983:50)

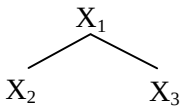
(54) Dax [bürq'ü=*ni*] xˆa-nwa, [biši=*ni*].
dad blind=and become-PERF deaf=and
'Dad has become both blind and deaf.' (ex 898b, citing *Dustwal* 1985, issue 3:79)

In summary then, we have seen that, while the coordinator has properties of a functional head, it does not project to Head the coordinate structure as a whole, *contra* the claims of the Boolean phrase analysis. Likewise, an asymmetric structure such as Munn's in (21), where the structure as a whole is Headed by a single Coordinand, cannot account for the full set of data. Instead, evidence from the projection of features, distributional equivalence, obligatoriness, control of agreement and polysyndeton indicates that Headship is shared by the Coordinands in a symmetric structure, as predicted by the theory of mutual adjunction.

4.3.2 C-Command between Coordinands

A second difference between the Boolean phrase and mutual adjunction concerns the predictions made regarding c-command. As has been widely documented in the Boolean phrase literature, the first of these theories predicts asymmetric c-command between the two Coordinands. If we adopt the structure of mutual adjunction, on the other hand, it is predicted that neither Coordinand c-commands the other. The reasoning behind this is as follows. X c-commands Y iff X does not dominate Y and every Z that dominates X also dominates Y. Consider how this applies to the mutual adjunction structure in (55). Recall that in the mutual adjunction structure, the top node of the coordinate structure (X_1) is a segment shared by two categories ([X_1, X_2] and [X_1, X_3]). Here the terminal X_2 is dominated by the multi-segmented category [X_1, X_2], but not by every segment of the complex category [X_1, X_3], while the terminal X_3 is dominated by the multi-segmented category [X_1, X_3], but not by the multi-segmented category [X_1, X_2] (cf. Chomsky 1986a:9, 1995a:418-419; Kayne 1994:16). Hence not every category that dominates one Coordinand (X_1 or X_2) dominates the other, and so neither Coordinand c-commands the other:

(55)



In this subsection we use data from NPI licensing, anaphor binding, Principle C data and variable binding to compare the predictions of the two different theories. As originally suggested by Progovac (1997 *et seq*), it appears that there is no c-command between Coordinands, exactly as predicted by the theory of mutual adjunction.[23]

Firstly, we consider negative polarity items (NPIs). NPIs are licensed when c-commanded by negation. Therefore, according to Boolean phrase analysis, the presence of negation in the putative specifier (the first Coordinand in English) should be able to license an NPI in the complement of the coordinator (the second Coordinand in English). According to mutual adjunction, on the other hand, NPI licensing within the coordinate structure should be impossible, due to lack of c-command. As pointed out by Progovac (1997 *et seq*), NPI licensing is impossible within coordination, suggesting a lack of c-command ((56)a) below). Note moreover that the presence of negation on both Coordinands in (56)b) does not yield either the

[23] The predictions of Munn's (1992 *et seq*) theory, as in the tree in (21), are debatable. Munn himself certainly considers that the structure involves asymmetric c-command between first and second Coordinands, in the same way as the more standard Boolean phrase. If we adopt the Chomskyan/Kaynean definition of c-command discussed above, however, the first Coordinand in (21) will not c-command the second, since we are dealing with an adjunction structure. However, if we assume that features of the second Coordinand percolate, in accordance with the principles of Extended Projection, to head the adjunct along with the coordinator, it is possible that the second Coordinand c-commands the first.

double negation or the dialectal negative concord reading which would otherwise be obligatory in an NPI licensing environment:

English

(56) a) * He chased [nobody [*and/or* any dogs]] (Progovac 1997, ex 8)

b) He chased [nobody [*and* no dogs]]. (1997, ex 9)

Secondly, we consider the possibility of anaphor binding, where the two Coordinands are coreferential. We use data from Dutch, a language which distinguishes phonologically in the third person between anaphors (*zichzelf*) and logophors – a type of emphatic pronoun (*hemzelf*). According to the predictions of the Boolean phrase, as long as there is no c-commanding licenser higher in the binding domain, we expect the first Coordinand (the putative specifier) to be either an ordinary pronoun or a logophor, depending on the discourse conditions, and the second Coordinand (the complement of the coordinator) to be an anaphor. According to the predictions of mutual adjunction, on the other hand, either Coordinand should be either a pronoun or a logophor, but neither can be an anaphor (unless licensed by a coreferential expression outside the coordinate structure). The data in (57) shows that it is the latter predictions that are borne out. Binding of an anaphor is impossible within the coordinate structure (57)b)-c); coreferential pronominal logophors can occur, however, as in (57)a), since neither c-commands the other and hence they are free:[24]

Dutch

(57) a) de relaties tussen de mens$_i$ *en* God, hem-zelf$_i$ *en* anderen, *en*
the relationships between the human and God, him-self and others, and

[hem-zelf$_i$ [*en* hem-zelf$_i$]]
him-self and him-self

'the relationships between man and God, himself and others, and himself and himself'

b) * de relaties tussen de mens$_i$ *en* God, hem(-zelf)$_i$ *en* anderen, *en*
the relationships between the human and God, him-self and others, and

[hem(-zelf)$_i$ [*en* zichzelf$_i$]]
him-self and himself

c) * de relaties tussen de mens$_i$ *en* God, hem(-zelf)$_i$ *en* anderen, *en*
the relationships between the human and God, him-self and others, and

[zichzelf$_i$ [*en* zichzelf$_i$]]
himself and himself

[24] Note that English *himself* is ambiguous, used for both anaphor and logophor.

While data from NPI licensing and binding of anaphora suggests a lack of c-command between Coordinands, Principle C and variable binding data have both been used to argue that, in languages like English, the first Coordinand asymmetrically c-commands the second (Munn 1993:§2.2.2). I conclude this subsection by suggesting that such data may be independently motivated.

Firstly, Munn (1992:19-20, 1993:16) invokes the following Principle C contrasts to argue in favour of asymmetric c-command between the first and second Coordinand in English:

(58) a) [[John$_i$'s dog] [*and* he$_i$/him$_i$]] went for a walk. *English*

b) * [He$_i$ [*and* John$_i$'s dog]] went for a walk. (Munn 1992:20, ex 40, 1993:16, ex 2.8)

Progovac however points out that the example in (59) is problematic for this account, since an R-expression is licensed in the second Conjunct, despite being coreferential with the first Conjunct (see also Gazdar *et al* 1982:674). Example (60) shows that the results are the same where the R-expression is not a proper name, but an epithet. This contrasts with examples of unmistakable c-command, such as (61), where coreference between R-expressions is at best marginal and marked:

(59) [John$_i$ [*and* John$_i$'s wife]] are certainly invited. *English*

(Progovac 1997, ex 19)

(60) Annoyingly, [John$_i$ [*and* [the bastard]$_i$'s wife]] have both been invited.

(61) a) ?* John$_i$ certainly likes John$_i$'s wife. (Progovac 1997, ex 20)

b) * John$_i$ certainly likes [the bastard]$_i$'s wife.

Consider now how mutual adjunction deals with such examples. Since there is no c-command between Coordinands, any R-expression within the coordinate structure will be free, as long as there is no coreferential expression c-commanding the coordinate structure. The examples in (58)a), (59) and (60) are therefore unproblematic.

Concerning the example in (58)b), where an R-expression coreferential with the first Conjunct is ungrammatical in the second Conjunct, note that the ungrammaticality need not be attributed to c-command (Progovac 1997 *et seq*). The example in (62) below, where the second Conjunct contains an R-expression coreferential with a pronoun embedded within the first Conjunct (such that there is no c-command between the two even under the Boolean phrase analysis), is equally ungrammatical:

(62) * I [[greeted him$_i$] [*and* patted John$_i$'s dog]. *English*

It seems then that here at least, as suggested by Progovac (1997 *et seq*), the ungrammaticality must be due to some other, possibly pragmatic, principle unrelated to Principle C, perhaps involving precedence. This same principle can therefore be applied to (58)b), allowing us to maintain the lack-of-c-command hypothesis used to account for the NPI data, the anaphor binding data, and the examples in (59) and (60).

The second piece of evidence that has been cited in support of asymmetric c-command between Coordinands is concerned with variable binding, as in the examples in (63). Munn (1993:16) acknowledges that the example in (63)b) is independently ruled out due to the Leftness Condition (Chomsky 1976; Higginbotham 1980:687), which requires the quantifier binding the variable to appear to its left, but (63)a) is generally taken as evidence that the first Coordinand in English c-commands the second:

(63) a) [[Every man]$_i$ [*and* his$_i$ dog]] went to mow a meadow. *English*

b) * [[His$_i$ dog] [*and* [every man]$_i$]] went to mow a meadow. (Munn 1993:16, ex 2.7)

The validity of using this data to argue for asymmetric c-command is based on the assumption that a bound variable requires surface c-command in order to be licensed. However, this assumption is challenged by examples such as the following, where the variable is bound by an embedded quantifier, and hence there is no c-command at Spell-Out (May 1977, 1988; Higginbotham 1980). Of particular interest are the coordination examples in (66)-(67), where the quantifier is embedded within the first Coordinand:

(64) [[Every boy]$_i$'s mother] loves him$_i$. *English*

(65) [Somebody from [every city]$_i$] despises it$_i$/its$_i$ architecture. (May 1988:89, ex 7)

(66) A soldier [[found [every student]$_i$] [*and* shot him$_i$]]. (Rodman 1976:172, ex 23b)

(67) A (different) student [[likes [every professor]$_i$] [*and* wants him$_i$ to be on his committee]].
(Fox 1995:321, ex 56b, 2000:52, ex 62b)

That surface asymmetric c-command is not the correct explanation for the data in (63) is further confirmed by looking at parallel examples from Japanese. In Japanese, there is evidence that the coordinating conjunction *-to* forms a constituent with the first Conjunct (Munn 1987, cited in Zhang 2010:203; Zoerner 1995). This is illustrated by the following extraposition examples:

(68) a) Watasi [[Vivaldi=*to*] Mozart]=ga suki. *Japanese*
I Vilvaldi=and Mozart=NOM like

b) Watasi Mozart=ga suki [Vivaldi=*to*].
I Mozart=NOM like Vivaldi=and

'I like Vivaldi and Mozart.' (Sells 1999:3, ex 5, citing Simon 1989:10)

(69) a) Kodomo=wa [[ookii inu=*to*] [tiisai neko]]=o hosigatteru-no.
child=TOP big dog=and small cat=ACC want-EMPH

b) Kodomo=wa [tisai neko]=o hosigatteru-no [ookii inu=*to*].
child=TOP small cat=ACC want-EMPH big dog=and

'My child wants a big dog and a small cat.' (ex 6, citing Simon 1989:128)

The structure of coordination in Japanese is therefore the inverse of that in English (cf. example (4) above). According to the predictions of the Boolean phrase, therefore, in Japanese it is the second Conjunct that should asymmetrically c-command the first (Johannessen 1998; Zoerner 1995). Note however that a bound variable in the second Conjunct (the putative specifier) can still be licensed by a quantifier in the first:

(70) a) [[[Dono otoko]$_i$=*to*] [soitu$_i$=no inu]]=ga sanpo=ni it=ta no? *Japanese*
which man=and that.guy[25]=LNK dog=NOM walk=to go=PST Q
'Which man and his dog went for a walk?'

b) * [[Soitu$_i$=no inu=*to*] [dono otoko]$_i$]=ga sanpo=ni it=ta no?
that.guy=LNK dog=and which man=NOM walk=to go=PST Q
(Reiko Vermeulen, p.c.)

Looking at the English data in (64)-(67) and the Japanese data in (70) therefore suggests that surface c-command need not necessarily provide the explanation for variable binding in (63)a). Instead, Progovac (1997 *et seq*) suggests that (63)a) is made possible only by QR at LF, which would also account for the data in (64)-(67) (Ruys 1992; Fox 1995:321-322, 2000:52-53). Progovac's proposal for (63)a) is confirmed by comparison with the example in (71) below, where the variable bound by the universal quantifier is an epithet, rather than a pronoun:

English

(71) [[Every corrupt politician]$_i$ [*and* [the bastard]$_i$'s false promises]] were met with booing and hissing.

[25] Although *soitu* is glossed 'that guy' here, it is a variable and not an epithet (Hoji 1995; Ueyama 1998).

As pointed out by Hornstein and Weinberg (1990:134), an epithet bound by a quantifier is still subject to Principle C (unlike the bound pronoun), hence the ungrammaticality of (72) below, where the quantifier phrase uncontroversially c-commands the epithet (cf. (61)b) above):

(72) * [Every corrupt politician]$_i$ certainly likes [the bastard]$_i$'s false promises. *English*

Therefore where an epithet functions as a bound variable it requires, like any other variable, a c-commanding binder, but, like any other R-expression, cannot be bound from a c-commanding A-position. This means that any licensing of a bound epithet by a quantifier requires movement of the quantifier from a non-c-commanding position to a c-commanding A'-position (Hornstein and Weinberg 1990:§1.2). Firstly, since (71) is grammatical, we must conclude, *contra* the predictions of the Boolean phrase, that *every corrupt politician* does not c-command *the bastard* in its base-position, thereby avoiding a Principle C violation. Secondly, since the quantified phrase will have to c-command *the bastard* at some point in the derivation, we can conclude that QR of *every corrupt politician* to some c-commanding A'-position takes place at LF.

Although in the case of the coordinate structures in (63)a), (66), (67) and (71) QR involves an apparent violation of the CSC, at least in the case of (66) and (67) there is direct evidence from scope readings that QR has taken place. These sentences are ambiguous between a reading where the existential quantifier *a* scopes over the universal quantifier every, and one in which the universal quantifier *every* scopes over the existential quantifier *a*. The second, inverse, reading is presumably available due to QR of the universal. Moreover, as Ruys (1992:36-37) points out, apparent violations of the CSC at LF in the context of variable-binding are not limited to QR. Analogous examples can be found with *wh-in-situ* (see Ruys 1992:37-38; Fox 1995:§3.2, 2000:§2.3.2 for possible explanations as to why the CSC does not hold in these contexts):[26]

English

(73) Which student [[likes [which professor]$_i$] [*and* wants him$_i$ to be on his committee]]?

(Fox 1995:322, ex 58a, 2000:53, ex 62b)

Under Progovac's proposal, therefore, these data, like the NPI licensing, anaphor binding and Principle C data, are perfectly compatible with the lack-of-c-command hypothesis, and hence the structure of mutual adjunction. On the other hand, we have seen that the NPI, anaphor binding and Principle C data – both when the R-expression is coreferential with a proper name

[26] Munn (2000:8) points out that the quantifier subject of a clause cannot bind a pronoun contained in another clause conjoined with it. The impossibility of QR here is presumably due the clause-bounded nature of QR:

ix) a) [[Each woman]$_i$ [*and* her$_i$ child]] read a story. *English*

b) * [[[Each woman]$_i$ read a story] [*and* her$_i$ child read a story]]. (Munn 2000:8, ex 21)

and with a quantified nominal – are unexpected under an analysis involving asymmetric c-command, such as the Boolean phrase.

4.3.3 Coordination of Non-Maximal Projections

Another issue to be considered is how the different analyses of coordination deal with the coordination of non-maximal projections, as in the examples in (74)-(78) below, where two heads are coordinated. (See Johannessen 1998:180-185, 197; Borsley 2005:471-473; Abeillé 2006 and Neeleman 2006:2 for arguments that such examples are indeed the result of head coordination, rather than some deletion or movement process such as Right-Node Raising.)

(74) It's impossible to [persuade [*or* convince]] you. *English*

(75) [Can [*and* will]] Mary fend off the other contenders to win the egg-and-spoon race?

(76) I can manage fine [with [*or* without]] you.

(77) Je [lis [*et* relis]] souvent tes poste-s. *French*
I read and reread often your post-PL
'I often read and reread your posts.'

(78) Paul cherche [le [*ou* la]] responsable.
Paul look.for the.M or the.F responsible
'Paul is looking for the (male or female) person responsible.' (Abeillé 2006:14, ex 18a)

For the structure of mutual adjunction, there is nothing in principle prohibiting the coordination of heads or any intermediate level of projection, as long as the conditions in (16) are met. Since the top node of the structure is a segment shared by two (or more) categories, the coordinate structure as a whole will share the distribution of these categories, whether head, intermediate projection or maximal projection. What therefore distinguishes the coordination of non-maximal projections from that of maximal projections is exactly the same property distinguishing any other non-maximal projection from a maximal projection: the head is required to project further. As explained by Neeleman (2006:6-7), this requirement leads to the prediction that if non-maximal projections are coordinated, they must be of like category: in order not to violate the condition in (16)a), the categorial features of Coordinands can only project if they are non-contradictory. This prediction appears to be borne out, as evidenced by contrasting the examples in (79) (see also Abeillé 2006:18-19). In (79)a), the coordination of a PP and a VP is permitted, since neither P nor V needs to project further, either to discharge a θ-role or to satisfy any c-selectional requirements of the selecting head of the coordinate structure, the copula. In

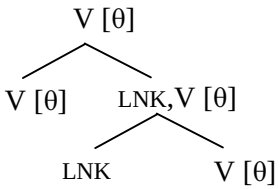
(79)b), however, the situation is different. P and V must project beyond the head-level in order to discharge their internal θ-role to *the shed*. The condition in (16)b) however prohibits projection of contradictory categorial features within a mutual adjunction structure. The resulting coordination of the heads P and V is therefore ungrammatical:

(79) a) He is [[in the shed] [*and* painting the shed]]. *English*

b) * He is [in [*and* painting]] the shed (Neeleman 2006:7, ex 20)

Consider now how the presence of a coordinator affects this process of coordination of non-maximal projections. The coordination of two verbs with unassigned internal θ-roles, as in (74) above, will be structured as follows (where the two unassigned θ-roles projected from each Coordinand are identified with each other in the top node, Neeleman and Van de Koot 2002:§7; Neeleman 2006):

(80)



A possible objection to the structure in (80) might be that the verb in the second Coordinand is merged with a functional head (LNK) prior to discharging its internal θ-role. This is not something that usually occurs – for instance, V must discharge its internal θ-role prior to its merger with T. This restriction, however, can be associated with the selectional properties of T, which selects a complement of a particular semantic type. Coordinators, on the other hand, like any other linker, have no such inherent restrictions: as mentioned in section 4.2 above, being semantically vacuous, they are in principle free to combine with a complement of any type, without adding any additional semantics-related features to the extended projection.

For the two asymmetric analyses, these issues are more complex. Firstly, in the case of the standard Boolean phrase, even if heads are coordinated, the coordinate structure as a whole will be phrasal, yet the examples in (74)-(78) above show that coordinated heads share the distribution of any other head (arguably, in the case of (75) and (77), via head movement). Secondly, for neither asymmetric analysis does there appear to be a way of deriving the requirement that non-maximal projections when coordinated should be of like category, while still allowing coordination of categorially distinct maximal projections (as in (27)c) and (79)a) above). Similarly, it is unclear how both verbs in examples such as (74) are able to θ-mark their object without resorting to discontinuous projection (Neeleman 2006:2). Even if we accept the

proposal that CoP inherits the categorial features of its specifier, the θ-marking of *you* by *convince* (the complement in the coordinate structure) remains problematic.

4.3.4 The Semantics of Conjunction and Disjunction

A final issue to be considered concerns the implications of the semantic relationships of conjunction and disjunction for the three different structures. In section 4.2 it was proposed that the coordinator itself is not responsible for either relationship; like the subordinating linker, the coordinating linker does not initiate a particular relationship, but simply marks its presence. The relevant relationship is encoded not by the linker marking the relationship, but within the syntax itself. This hypothesis was backed up by the possibility of asyndeton as a means of marking both conjunction (examples (28)-(31)) and disjunction (examples (11)-(15)), suggesting the conjunction and disjunction relationships occur independently of the coordinator (see also Ohori 2004 for similar arguments).

Rather, it seems that where there is no coordinator, as in the examples in (8)-(15) and (29)-(30), the correct interpretation is determined by default rules and pragmatic or semantic context. All else being equal, the default interpretation of asyndetic coordination will be conjunction. (Note that the disjunction relationship is far more restricted in its occurrence in discourse than the conjunction relationship, Ohori 2004:61-63.) Disjunction therefore must be marked in the morphosyntax. However, if the pragmatic or semantic context renders the conjunction interpretation unavailable, then disjunction becomes the default and need not be marked. We therefore expect to see unmarked disjunction only where the context renders conjunction unavailable.

This is precisely what we find in the examples of asyndetic disjunction in (11)-(15) above. Firstly, in the examples in (11)-(12), where two numerals are coordinated, a conjunction interpretation is ruled out by pragmatic principles of clarity; if conjunction of the numerals were intended, it could be rendered equally informatively by the sum of the two Coordinands – a simple numeral 'eleven' – without causing the hearer the unnecessary effort of processing the coordination. In both Dutch examples, the semantic environment provided by *het maakt mij niet uit* ('I don't care') in (13) and *welke* ('which') in (14) requires a choice from a set of alternatives – disjunction, rather than conjunction, provides this set of alternatives. Finally, in the Mandarin Chinese example in (15), the context again renders disjunction more relevant: one is unlikely to mix the two carbohydrates in the same dish. These results are confirmed by comparing the following Japanese examples, both containing asyndetic coordinate structures:

(81) a) – Doko=ni ikitai no? *Japanese*
where=DAT go.VOL Q

– [Kyoto, Nara, Kobe] da naa.
Kyoto, Nara, Kobe COP PRT

– 'Where do you wish to go?'
– 'Kyoto, Nara, (and) Kobe, I suppose.' (Ohori 2004:57, ex 59)

b) – Doko=ni sumitai no?
where=DAT live.VOL Q

– [Kyoto, Nara, Kobe] da naa.
Kyoto, Nara, Kobe COP PRT

– 'Where do you wish to live?'
– 'Kyoto, Nara, (or) Kobe, I suppose.' (p58, ex 60)

Ohori (2004:58) points out that it is possible to visit three cities in a single trip, but not usually possible to live in three cities simultaneously. Hence the default interpretation is conjunction in (81)a), but disjunction in (81)b), where the context renders conjunction unavailable.

Consider now those cases where the coordinate structure is marked by an overt coordinator. In such cases the coordinator may mark (but does not initiate) whether this relationship of equivalence is one of conjunction or disjunction, but note that this is not always the case: in some languages, such as Aymará (Aymaran), Dakota (Central Siouan Proper), Sanskrit (Indo-Aryan), Tarahumara (Southern Uto-Aztecan) and Upriver Halkomelem (Central Salish), an identical coordinator may be used for both conjunction and disjunction (MacDonell 1927:149; Payne 1985:39, citing Döhmann 1974:41-42; Ohori 2004:57).[27,28] Examples are given below from Upriver Halkomelem (where the coordinator *qə* is glossed 'LNK'). Like the asyndetic examples in (8)-(15), (29)-(30) and (81) above, the interpretation 'depends on semantic environment' (Ohori 2004:57, citing Galloway 1993:363):

(82) Lə ləmálstəx^{w}əs tə Bill tə sq'ámál x^{w}əlém tə [Jim *qə* Bob]. *Upriver Halkomelem*
3 throw.3 DEM Bill DEM paddle to DEM Jim LNK Bob
'Bill threw the paddle to Jim and Bob.'
(Ohori 2004:57, ex 57, citing Galloway 1993:416)

[27] Note however that Payne (1985:40) expresses some scepticism about the validity of this claim for Tarahumara and Dakota.

[28] Similarly, Ohori (2004:58) points out that, while the examples in (81)a) and b) may be marked by the coordinators *-to* (conjunctive) and *-ka* (disjunctive) respectively (instead of zero-marking), another possibility in both cases is marking by coordinator *-toka*, again leaving the conjunction/disjunction distinction unmarked.

(83) Lí lɛ́m k'^{w}ə [Bill *qə* Bob]?
Q go DEM Bill LNK Bob
'Did Bill or Bob go?' (ex 58, citing Galloway 1993:416)

Similarly, there are certain contexts where there is no obvious distinction between conjunction and disjunction. Compare the following example from Japanese, where a conjunctive coordinator is used in the context of forced choice questions, with its English translation, which uses a disjunctive coordinator. This leads Ohori (2004:59) to conclude: 'The disjunctive relation is *not* part of the meaning of *-to*, but of the whole construction.'

(84) [Eigo=*to* nihongo(=*to*)] dotchi=ga ii? *Japanese*
English=and Japanese=and which=NOM good
'Which is better (for you), English or Japanese?' (Hinds 1986:97, ex 336)

In the same way, the distinction between conjunction and disjunction is often lost in negative contexts (that is, disjunction with wide-scope negation and conjunction with narrow-scope negation are logically equivalent, Payne 1985:41; Haspelmath 2007:§3.2). This can be seen by comparing the following Indonesian (North and East Malayo-Sumbawan) and Lezgian examples, one of which uses conjunction, and the other disjunction, in the context of negation:

Indonesian

(85) [Baik kepandaian *maupun* kecantikan] tidak berguna untuk mencapai kebahagiaan.
both ability and beauty not useful for achieve happiness
'Neither ability nor beauty is useful for achieving happiness.'
(Haspelmath 2007:16, ex 14a, citing Sneddon 1996:348)

(86) I k'walaxda-l [*ja* aburu-n rus, *ja* gada] razi tus-ir. *Lezgian*
this job-OBL or they-GEN girl or boy satisfied be.NEG-PST
'Neither their girl nor the boy was satisfied with this job.'
(Haspelmath 1993:334, ex 916a)

Even therefore in examples where the coordinator is overt, there is evidence that the coordinator does not contribute to the compositional semantics: rather, the relationship of equivalence unique to coordination must be provided by the syntax itself.

Such a possibility does not seem to be available if we adopt either of the asymmetric structures. Under such approaches the structure for coordination is no different syntactically from a subordination structure. The only difference between the standard Boolean phrase and any other phrase concerns the nature of its Head – the coordinator. Similarly, the only difference between Munn's adjoined Boolean phrase and any other adjunction structure concerns the

nature of the highest head in the extended projection of the adjunct – again the coordinator. In both cases, therefore, the only syntactic means of distinguishing coordination from any other grammatical relationship will have to be provided by this coordinator. The semantic distinction between conjunction and disjunction will likewise have to be provided by the semantics of the coordinator. However, the absence of the coordinator in examples such as (8)-(15), the irrelevance of the choice of coordinator in examples such as (83)-(86), and the fact the coordinator neither s-selects nor can be s-selected, all suggest that the coordinator does not initiate the conjunction or disjunction relationship, but simply marks its presence. The evidence from the semantics of conjunction and disjunction therefore lends support to our conclusion from the previous subsections that an asymmetric structure, whether Headed by the coordinator or by a single Coordinand, cannot adequately account for certain unique properties of the coordinate structure.

On the other hand, we have already seen that properties such as the shared Headship of the coordinate structure, the lack of c-command between Coordinands, and the coordination of non-maximal projections can be successfully captured by the structure of mutual adjunction. In the same way, the relationship of equivalence unique to coordination can be found in the structure of mutual adjunction, without having recourse to any semantics of the coordinator, since each Coordinand has equal syntactic status. As regards the distinction, or in some cases the ambiguity, between conjunction and disjunction, it seems possible that this is likewise independently present in the syntax. This possibility arises if we assume that mutual adjunction allows two possible interpretations. Under this proposal the top node of the mutual adjunction structure can either be read as a projection of all the Coordinands, or as a projection of only one Coordinand but with no means of establishing which one. The first reading would result in conjunction; the latter in disjunction. In this case both readings would be provided by the syntax and need not be attributed to the presence, or properties, of the coordinator.[29]

Concluding then our comparison of mutual adjunction and the two asymmetric Boolean phrase analyses as possible structures for coordination, we have seen that in terms of the Head of the structure as a whole, the lack of c-command relationship between Coordinands, and the coordination of non-maximal projections, it is only the structure of mutual adjunction that is

[29] There are various possibilities as to how the form of the coordinator – either conjunctive or disjunctive –, where relevant, is determined. One possibility is that the conjunction and disjunction readings are somehow independently differentiated in the syntax. In this case the form of the coordinator simply marks which of the two readings is present. A second possibility is that the syntax is genuinely ambiguous between the two readings. In this case, it may be that the coordinator filters out one of the two readings. It does not introduce either reading (i.e. in this sense it remains semantically vacuous) because both are independently present in the syntax. Alternatively, the relevant reading is selected at LF, and again the coordinator simply marks which reading has been selected. This latter option would allow correspondence between LF and PF (cf. Jackendoff 1997; Szendrői 2001; Bobaljik and Wurmbrand to appear).

able to capture the full range of data. Likewise, mutual adjunction provides a more promising means than the Boolean phrase of accounting for the semantics of conjunction and disjunction. In addition, Neeleman (2006) shows that mutual adjunction, by its very definition, accounts for two further defining syntactic properties of coordination (which are not discussed here, as they have no direct bearing on the structural or linear distribution of coordinators as linkers): the requirement that Coordinands share the same arity, and the CSC (see also Gazdar *et al* 1985: chapter 8; Sag *et al* 1985). On the other hand, although many different scholars have advocated various versions of the Boolean phrase analysis, there is no unified account of either the shared arity requirement or the CSC, suggesting that there is no straightforward means of deriving either under this analysis, or at least not without further stipulation.

These results are important, as the structure of mutual adjunction for coordination allows us to maintain the hypothesis (for which we have already seen some initial evidence in sections 4.2 and 4.3.4) that syntactically independent coordinators are a type of linker, serving to mark the presence of a relationship that is independently provided by the syntax. In addition, establishing the correct syntax for the coordinate structure provides a framework in which to interpret the rules established in the previous two chapters of structural intervention and invariable harmony associated with linkers as syntactically independent, semantically vacuous markers of a relationship.

4.4 Multitermed Coordination and *n*-ary Branching

The examples we have been concerned with so far have contained two Coordinands. Our study of such examples led us to conclude that what is semantically a symmetric relationship is represented syntactically by the symmetric structure of mutual adjunction. If we wish to establish the extent to which the structural and linear distribution of syntactically independent coordinators as linkers is determined by the unique syntax of the coordinate structure, we will also need to consider the syntax of coordinate structures involving more than two Coordinands. In this section we will turn to examples involving more than two Coordinands, as in the English examples in (87). We will distinguish between examples such as (87)a), where the coordinator is repeated, and (87)b), with a single coordinator. (We will concentrate on examples consisting of three Coordinands, since examples with more than three do not raise any additional issues.)

(87) a) A *and* B *and* C *English*

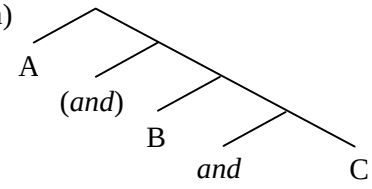
b) A, B *and* C

We will again see evidence firstly that a semantically symmetric relationship can exist between more than two syntactic objects, and secondly that such a relationship is represented syntactically by a symmetric or ‘flat’ structure. Again, I will argue that the possibility for such

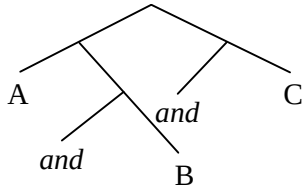
a symmetric structure is provided by the unique syntax of the coordinate structure (subsection 4.4.1).

While traditionally syntax was assumed to allow multi-branching structures, Kayne's (1984) proposal that phrase-structure is more restrictive, allowing only binary branching, has been widely, though not universally, accepted. Under this binary branching proposal, coordinate structures involving more than two Coordinands, such as those in (87), necessarily involve some kind of nested structure. For the surface string in (87)a), there will be two possible structures, as in (88)a) and b). In these structures, we are essentially dealing with a coordinate structure consisting of two Coordinands, one of which is itself a syntactic coordinate structure in its own right. In (88)a) *B* and *C* are firstly coordinated, and then this coordinate structure itself becomes a Coordinand when it is coordinated with *A* in a second coordination relationship. In (88)b) it is the syntactic coordination of *A* and *B* that is embedded in the higher coordination of *A and B* with *C*. The surface string in (87)b) will have the right-branching structure in (88)a). According to this analysis either the final two Coordinands (*B and C*) form a coordinate structure in their own right, attached to the first Coordinand (*A*) in a second coordination relationship by a null coordinator (Kayne 1994:57; Johannessen 1998:144), or the coordinator joining *B* and *C* moves and reprojects within the same coordinate structure to allow the merger of a third Coordinand (*A*), with obligatory spell out only of the lower copy of the coordinator (Zoerner 1995, 1999).

(88) a)

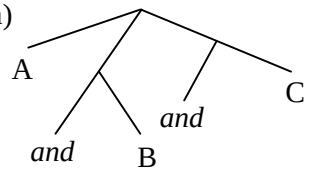


b)

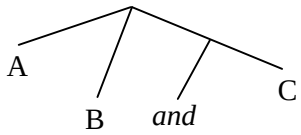


In this section, I will argue that multitermed coordination provides evidence that binary branching is not an invariable property of phrase-structure (cf. Grootveld 1992:62). This is not of course to say that no instance of multitermed coordination involves nested binary branching: nothing prohibits a coordinate structure in which one or more Coordinands is a syntactic coordinate structure in its own right, as in the trees in (88). I will propose that, in addition to the two binary branching structures in (88), there is evidence for a third possibility for the surface string in (87)a) – the ternary branching structure in (89)a) (cf. Dik 1968:231, and references cited there). The surface string in (87)b), on the other hand, with a single coordinator, I will suggest is incompatible with a binary branching structure and only allows the ternary branching structure in (89)b) (cf. Sag *et al* 1985; McCawley 1988:268-272):

(89) a)



b)



Firstly, various evidence shows that the final two Coordinands in examples with a single coordinator (as in (87)b)) do not behave as a separate coordinate structure consisting of two Coordinands (see Borsley 1994:§7, 2005:§3; Winter 2006:§3, and references cited in these works). This can be shown by differences in meaning between multitermed coordination with a repeated coordinator, as in (87)a) – where nested binary branching is uncontroversially possible – and multitermed coordination with a single coordinator, as in (87)b).

Firstly, consider the following simple binary coordination, where there are two possible interpretations: the distributive reading, whereby each man lifted the piano on his own, and the collective reading, whereby the two men lifted it together:

(90) [Tom *and* Dick] lifted the piano. *English*

(Borsley 1994:238, ex 67)

Consider now the equivalent sentence with a multitermed coordinate subject:

(91) a) [Tom *and* Dick *and* Harry] lifted the piano. *English*

(Borsley 1994:238, ex 69)

b) [Tom, Dick *and* Harry] lifted the piano. (p239, ex 72)

As Borsley (1994:238; see also Hoeksema 1988:26; Borsley 2005:468-469; Winter 2006:6) points out, the sentence in (91)a) is four ways ambiguous. It can mean either that each man lifted the piano on his own (distributive), that all three men lifted it together (collective), that Tom lifted it on his own while Dick and Harry lifted it together (mixed distributive-collective), or that Tom and Dick lifted it together while Harry lifted it on his own (mixed collective-distributive). The two mixed readings are available because either *Dick and Harry* or *Tom and Dick* can be interpreted as nested binary coordinate structures in their own right, as in the trees in (88); that is, either the coordinate structure *Dick and Harry* is one Coordinand and the simple nominal *Tom* is the other, as in (88)a), giving the mixed distributive-collective reading, or we are dealing with the conjunction of the coordinate structure *Tom and Dick* with *Harry*, as in (88)b), giving the mixed collective-distributive reading. Consider now the sentence in (91)b). Here, like the simple coordinate structure with only two Conjuncts, in (90), there are only two possible readings: the distributive reading, whereby each man lifted the piano on his own, and the collective reading, whereby the three men lifted the piano together. The mixed readings are

unavailable. This suggests that neither *Dick and Harry* nor *Tom and Dick* can be interpreted as coordinate structures in their own right. On the other hand, if (91)b) consists of a single coordinate structure with ternary branching, as in the tree in (89)b), the absence of mixed readings is entirely expected.

Winter (2006:§3.4) shows a similar effect for adverbials of alternation, as in the examples in (92) below.

(92) a) John alternately feels guilt and anger and hate for his family. *English*

b) % John alternately feels guilt, anger and hate for his family. (Winter 2006:9, ex 23)

The sentence in (92)a) is ambiguous. It could be that John alternates between the two states of guilt, and of simultaneous anger and hate. Alternatively, he alternates between the two states of simultaneous guilt and anger, and of hate. For some speakers there is a third interpretation available, whereby John alternates between the three states of guilt, anger and hate. For other speakers the adverb *alternately* requires a two-state alternation and hence this third interpretation is unavailable. The sentence in (92)b), on the other hand, has only one possible interpretation, whereby John's feelings alternate between three states. For speakers who only accept the use of *alternately* with two-state alternations, this sentence is infelicitous. The contrast between the two sentences can be easily understood if we assume that nested binary coordination, as in the structures in (88) – which gives us the two-state alternation – is only available where the coordinator is repeated, as in (92)a). Allowing ternary branching, as in the trees in (89), gives us the three-state alternation, available for the relevant set of speakers in both sentences.

Borsley (2005:469-470) shows similar results using *respectively*, an adverb which 'establishes a pairing between elements of two sets having the same cardinality' (Dalrymple and Kehler 1995:536; see also references cited there). This is demonstrated by the example below, where a pairing is established between *the two girls* and the simple binary coordination *Hobbs and Barnes*, giving the meaning that Hobbs saw one of the two girls and Rhodes the other:

(93) The two girls were seen by [Hobbs *and* Rhodes], respectively. *English*

(Borsley 2005:469, ex 38)

Consider now the following example, where *the two girls* is paired with a multitermed coordination with a repeated coordinator:

(94) The two girls were seen by [Hobbs *and* Rhodes *and* Barnes], respectively. *English*

(Borsley 2005:470, ex 39)

Here the pairing can be established between *the two girls* and either the binary coordination of *Hobbs* (as one Coordinand) and *Rhodes and Barnes* (as the other), as in the tree in (88)a), or the binary coordination of *Hobbs and Rhodes* (forming one Coordinand) and *Barnes* (the other), as in the tree in (88)b). In the first case Hobbs saw one girl and Rhodes and Barnes saw the other, while in the second case Hobbs and Rhodes saw one girl and Barnes saw the other. The same interpretation is not however available where the coordinator is not repeated:

(95) # The two girls were seen by [Hobbs, Rhodes *and* Barnes], respectively. *English*
(Borsley 2005:470, ex 40)

Here there is no binary coordination and hence the example is semantically infelicitous: *the two girls*, having a cardinality of two, cannot be paired with the ternary coordination *Hobbs, Rhodes and Barnes*, which has a cardinality of three. This again suggests that, unlike the examples in (94), the multitermed coordination cannot be interpreted as a binary coordination relationship in which one of the Conjuncts is itself a separate coordinate structure.

Borsley (1994:237-238, 2005:467-468) demonstrates similar results with the distribution of *both*, a distributive adverb introducing the presupposition that the expression in its complement refers to a group with exactly two members (Lasersohn 1995:151, cited in Wagner 2010:189). Where the complement of *both* is a coordinate structure, therefore, this coordinate structure must consist of exactly two Conjuncts. It is therefore predicted that *both* will be able to occur in nested binary branching structures such as those in (88), but not the ternary branching structures in (89). Consider now the data in (96)-(97) below in the light of these predictions. In the examples in (96), where a coordinator appears between each Conjunct, the possibility of nested binary coordination, as in the trees in (88), is uncontroversial – we have already seen evidence confirming this. As predicted, *both* can introduce the multitermed coordination in (96)a), as long as either *Tom and Dick* or *Dick and Harry* is interpreted as a unit – that is, a coordinate structure in its own right. The fact that *Dick and Harry* in this example can be interpreted as separate coordinate structure with two Conjuncts is confirmed by (96)b), where *both* introduces only these two:

(96) a) both Tom *and* Dick *and* Harry *English*
(Borsley 1994:237, ex 63)

b) Tom *and* both [Dick *and* Harry] (ex 65)

This contrasts with the examples with a single coordinator in (97), where the appearance of *both* is impossible. This suggests that unlike the examples in (96), *Dick and Harry* cannot be interpreted as a coordinate structure in its own right forming one Conjunct in a binary coordination, confirming the results of previous tests. On the other hand, if such examples

consist of a single coordinate structure with three Conjuncts, the ungrammaticality of *both* is predicted.

(97) a) * both Tom, Dick and Harry *English*
(Borsley 1994:237, ex 64)
b) * Tom, both Dick and Harry (ex 66)

The evidence we have looked at so far has shown that, semantically, the final two Coordinands in examples with a single coordinator (as in (87)b)) do not behave as a separate coordination relationship consisting of two Coordinands (see Winter 2006:§3 and references cited there for additional arguments to the same effect). Syntactic evidence from gapping, taken from McCawley (1988:269-270) gives the same results (see also Borsley 2005:469). Gapping occurs in examples such as the following binary coordination, where the verb in the second Conjunct is deleted under identity with the verb in the first:

(98) Alice drank a martini, *and* Jane *ø* a beer. *English*
(Borsley 2005:469, ex 35)

Consider now the following multitermed coordination with a repeated coordinator. We have already seen evidence that such examples are compatible with a nested binary interpretation (as in (88)a) above), with the final two Coordinands forming a coordinate structure in their own right. It is therefore predicted that it should be possible to delete the verb in the third Conjunct under identity with the verb in the second. As Borsley (2005:469) shows, this prediction is borne out:

(99) Tom ate a hamburger, *and* [Alice drank a martini, *and* Jane *ø* a beer]. *English*
(Borsley 2005:469, ex 36)

This contrasts with examples where the multitermed coordination is marked by a single coordinator, confirming our previous conclusion that in such cases the final two Conjuncts cannot consist of a syntactic coordinate structure in their own right:

(100) * Tom ate a hamburger, Alice drank a martini, *and* Jane *ø* a beer. *English*
(McCawley 1988:269, ex 23b')

Gapping can however take place across the board in such examples, suggesting that all three Conjuncts have equivalent syntactic status (see also (30) above):

(101) Tom ordered a daiquiri, Alice *ø* a manhattan, *and* Jane *ø* a screwdriver. *English*

(McCawley 1988:269, ex 23a)

We have seen then both semantic and syntactic evidence that, where a multitermed coordinate structure is marked by a single coordinator, as in (87)b) above, the final two Coordinands neither express a semantic coordination relationship in their own right, nor do they form their own syntactic coordinate structure. On the other hand, the data we have looked at is exactly what we would expect to find if the three Coordinands in such examples belong to a single syntactic coordinate structure, as in (89)b), expressing a single semantic three-way coordination relationship. Similar examples with a repeated coordinator, as in (87)b) above, turn out, as expected, to be compatible with an interpretation whereby either the first and second, or the second and third, Coordinands form a coordinate structure in their own right, which then becomes a Coordinand itself in a higher coordinate structure, as in the trees in (88). Even here, however, semantic equivalence between the three Coordinands is also possible, as demonstrated by (92) above, where an alternation between three states is a possible interpretation of both types of multitermed coordination. This suggests that, like examples with a single coordinator, multitermed coordination with a repeated coordinator, as in (87)a) can also result from a single coordinate structure, as in (89)a), in addition to the two nested binary branching structures in (88).

N-ary branching, as in the trees in (89), is one – and perhaps the most obvious – way of allowing more than two Coordinands in what is syntactically a single coordinate structure. Certainly all the relevant examples we have looked at so far are compatible with such a structure. However, we must consider whether there are other means of allowing more than two Coordinands in what is both syntactically and semantically a single coordinate structure, whilst still maintaining the Binary Branching Hypothesis. One such approach is offered by Zoerner (1995, 1999), who, as mentioned above, proposes that the coordinator joining the final two Coordinands (*B* and *C* in (87)b)) moves and reprojects to allow the merger of a third Coordinand. This process can recur as many times as necessary to allow a potentially infinite number of Coordinands joined by a single coordinator. Spell-out rules require either spell-out of only the lowest copy, or of all copies of the coordinator. Since the whole structure is formed by the iterative projection of a single coordinator, it is considered a single syntactic coordinate structure. By this means Zoerner maintains a binary branching structure without the need to treat any two Coordinands as a syntactic coordinate structure in their own right.[30] The data we have looked at above are therefore equally compatible with both an *n*-ary branching approach

[30] An alternative binary branching, single coordinate structure, suggestion for examples such as (87)b) might be to allow multiple specifiers. However, this proposal cannot account for examples such as (92)a), where a single semantic coordination of three Conjuncts is a possible interpretation, but the coordinator is repeated. Moreover, we have already seen evidence from lack of c-command in section 4.3.2 above that initial Coordinands in languages like English simply do not behave like specifiers.

and Zoerner's binary branching approach. There may of course be theoretical objections to the latter proposal, in particular as regards idiosyncratic spell-out rules. (Theoretical objections to the *n*-ary branching hypothesis, in terms of overgenerating, will be addressed in subsection 4.4.1 below.) As far as I am aware, however, the literature has yet to provide any direct empirical evidence in favour of one approach over the other. In the remainder of this section I will provide such evidence by means of determining the constituency of the relevant coordinate structures. According to the binary branching approach, the final two Coordinands in a single multitermed coordination such as (87)b) must form a constituent. According to the *n*-ary branching analysis, they cannot. Evidence from the scope of adjuncts and from extraposition indicates that the latter prediction, and hence the *n*-ary branching analysis, is correct.

We begin by considering the scope of adjuncts. The binary coordinate structure in (102) is ambiguous between a reading where *maybe* has scope only over the Conjunct immediately to its right *(smokes a pipe)* and a reading where *maybe* takes scope over the entire coordinate structure, *maybe* attaching to this larger constituent *(smokes a pipe and reads a book)*:

(102) On a rainy Sunday afternoon, John maybe smokes a pipe *and* reads a book. *English*

Consider now the predictions in terms of multitermed coordination. If the structure is rightwards binary branching, as in the tree in (88)a), the final two Coordinands form a constituent in their own right, and therefore we expect any adjunct to be able to attach to this constituent. This is confirmed by (103) below, which, having a repeated coordinator, uncontroversially permits such a binary branching structure. As predicted, like the binary coordinate structure in (102) above, the sentence is ambiguous between a reading where *maybe* takes scope over only the Conjunct immediately to its right *(smokes a pipe)* and the larger constituent of *smokes a pipe and reads a book*:

English

(103) On a rainy Sunday afternoon, John puts his feet up *and* maybe smokes a pipe *and* reads a book.

Consider now the more controversial sentence in (104), with a single coordinator joining three Conjuncts. As in (102) and (103) above, we expect *maybe* to be able to attach to the Conjunct immediately to its right, *smokes a pipe*. If the final two Conjuncts form a constituent, as in (103) above, we would expect *maybe* also to be able to attach to this constituent, giving rise to the same ambiguity as in (103). If however we are dealing with a ternary branching structure, as in the tree in (89)b), the final two Conjuncts do not form a constituent, and hence we expect the reading whereby *maybe* takes scope over *smokes a pipe and reads a book* to be unavailable. It is this latter prediction that is borne out: unlike the sentences in (102) and (103), in (104) there

is no ambiguity: the sentence is only compatible with the reading whereby *maybe* takes scope only over the Conjunct immediately to its right, *smokes a pipe*:[31]

English

(104) On a rainy Sunday afternoon, John puts his feet up, maybe smokes a pipe *and* reads a book.

The second piece of evidence supporting a ternary branching analysis in terms of constituency comes from extraposition. We have already seen evidence that a single Coordinand can be extraposed when marked by a coordinator, as in (4), (5), (53), (54), (68) and (69) above. In addition, Zoerner (1995:21) shows that the coordinate structure as a whole can undergo Heavy-XP Shift:

(105) Robin bought yesterday [pencils *and* pens]. *English*

(Zoerner 1995:21, ex 20)

That the above extraposition is indeed the result of Heavy-XP Shift is confirmed by comparison with the following ungrammatical example, where the extraposed coordinate structure is not sufficiently heavy:

(106) * Robin bought yesterday [this *and* that] *English*

We now consider the predictions in the light of the above for a multitermed coordinate structure such as the following:

(107) Robin bought [books, pencils *and* pens] yesterday. *English*

According to the binary branching analysis, *pencils and pens* in the above example is a constituent in its own right, and therefore should be able to undergo Heavy XP-Shift, exactly as in (105) above. The fact that the resulting extraposition is ungrammatical seems to confirm our previous conclusion that the final two Coordinands in such examples do not form a constituent:

(108) * Robin bought books yesterday, pencils(,) *and* pens *English*

[31] Note that, by the same argument, the alternative binary branching structure – whereby it is the first two Conjuncts that form a constituent (cf. Progovac 1999:26-27, fn 3) – is also ruled out. The following example is ambiguous between a reading where *maybe* takes scope over only the first Conjunct and one where *maybe* scopes over the entire coordinate structure. The reading whereby *maybe* takes scope only over the first two Conjuncts is however absent:

x) On a rainy Sunday afternoon, John maybe puts his feet up, smokes a pipe, and reads a book. *English*

However, extraposition of the final two Coordinands in such examples is not ungrammatical if the penultimate Coordinand is sufficiently heavy, as the following example shows:

(109) Robin bought books yesterday, [some rather nice striped pencils,] [*and* pens]. *English*

This does not however force the conclusion that the final two Conjuncts in this example do form a constituent. Here it seems that we are dealing with a double extraposition, with extraposition of the penultimate Conjunct licensed by Heavy-XP Shift. Firstly, the following example provides independent evidence that two different constituents can each be extraposed separately:

(110) a) A [[man [with red hair]] [who I'd never seen before]] came in. *English*

b) A man came in [with red hair] [who I'd never seen before].

That extraposition of the penultimate Conjunct is permitted in (109), but not in (108), can be attributed to the relative heaviness of this Conjunct: in (109), but not in (108), the penultimate Conjunct is sufficiently heavy to license Heavy-XP Shift. This is shown independently by the examples below:

(111) a) Robin bought yesterday [some rather nice striped pencils]. *English*

b) * Robin bought yesterday pencils

This double extraposition analysis is further confirmed by the example in (112) below, where the first extraposed Conjunct is light, and the second heavy. If it were possible for these two Conjuncts to form a constituent (as in the binary branching analysis, in (88)a), and ruled out by the ternary branching analysis, in (89)b)), we would think that the lightness of the penultimate Conjunct should be immaterial as long as the constituent as a whole is sufficiently heavy. This, however, is not the case:[32]

[32] It seems that the order of the extraposed constituents cannot be changed from their order in base position, as evidenced by the ungrammaticality of the following:

xi)*Robin bought books yesterday, [*and* pens,] [some rather nice striped pencils] *English*

There are two possible explanations for this. Firstly, it could be that there is a general condition on multiple extraposition, such that the order of extraposed constituents cannot be changed from their base position. This condition would also account for the interpretation of the example in xii) below. This example cannot have the same interpretation as the sentences in (110), whereby the extraposed relative clause *who I'd never seen before* and PP *with red hair* are interpreted as separate constituents, each modifying the NP Headed by man (xii)a)). The only possible interpretation is that given in xii)b), whereby the extraposed material *who I'd never seen before with red hair* must be interpreted as a single constituent, a relative clause containing the PP *with red hair* (i.e. I have seen the man in question before, but this is the first time he's had red hair):

(112) * Robin bought books yesterday, [pens(,)] [*and* some rather nice striped pencils] *English*

Evidence from both the scope of adjuncts and from extraposition therefore suggests that the final two Coordinands in a single multitermed coordination such as (87)b) are two separate constituents, exactly as predicted by the *n*-ary branching analysis. The binary branching approach to such examples is too permissive, seemingly allowing ungrammatical examples such as (108) and (112), and unavailable interpretations as in (104) above.

4.4.1 N-ary Branching, Phrase-structure, and Selection

Multitermed coordinate structures therefore lead us to abandon the notion of binary branching as an invariable principle of phrase-structure. Outside the coordinate structure, however, the case for binary branching is well supported: both subordination relationships (either θ-role assignment or modification) and the functional sequence within extended projections provide evidence for binary branching (Kayne 1984; Hoji 1985, among others). I will argue that the binary branching requirement in these non-coordination relationships is independently motivated. The distinction between coordination and other syntactic relationships can be readily accounted for if we assume that binary branching is not a principle of phrase-structure, but a by-product of s-selection. I will propose here that branching is in principle potentially infinite, but that there is a restriction on selection such that only one s-selectional requirement can be satisfied per operation of merge.

Firstly, we consider the relationship between a predicate and its arguments. A three-place predicate such as the verb *put* has two internal θ-roles to assign, and so selects for two internal arguments, one nominal and one prepositional. If the verb is merged with its two internal

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xii) A man came in who I'd never seen before with red hair. *English*
  a) * A man came in [who I'd never seen before] [with red hair]
  b) A man came in [who I'd never seen before with red hair].

While the example in xii) is therefore compatible with the assumption that extraposed constituents must preserve their base order, it should be borne in mind that there is also an alternative explanation available for the unavailability of the interpretation in xii)a). It could be that it is not the linear order that must be preserved from the base position, but the hierarchical position. In this case since the PP is merged lower than the relative clause in their base positions (as in (110)a)), it would also need to be merged lower than the relative clause when both are extraposed, thereby allowing (110)b), but ruling out xii)a). If we adopt the *n*-ary branching analysis of multitermed coordination marked by a single coordinator, however, there is no hierarchical asymmetry between Coordinands and hence this alternative explanation is unavailable for xi). Therefore while the assumption that linear order must be preserved in multiple extraposition remains a possible explanation for the ungrammaticality of xi), we do not have any uncontroversial independent evidence that this assumption is correct.

The second possibility is that extraposed material is not moved to, but base-generated in, its rightwards postion (following, among others, Koster 1978; Culicover and Rochemont 1990; Haider 1997; Rochemont and Culicover 1997, and references cited in these works). The CSC would provide an independent reason for this analysis in the case of the extraposition of Coordinands, as in xi). In this case the restriction requiring the coordinator to appear on the final Coordinand in its base position would therefore apply equally where the Coordinands are extraposed. (See §4.6.2 for an explanation of this restriction.)

arguments via a single operation of merge (resulting in a ternary branching structure), the restriction of satisfying only one s-selectional requirement per merger is violated, since two θ-roles are simultaneously assigned. On the other hand, if the verb is merged first say with the nominal argument, and then the resulting constituent is merged with the prepositional argument via a second operation of merge, resulting in a nested binary branching structure, there is no problem: each of the two operations of merge assigns exactly one internal θ-role, so satisfying one s-selctional requirement per operation of merge. Therefore in the case of the predicate-argument relationship, binary branching is ensured.

We next turn to the relationship between modifier and modifiee. Here the modifying adjunct s-selects for the Head (of the phrase) that it modifies. Suppose that a verb (phrase) is modified by two manner adverbs, each of which s-selects for the verb. It will not be possible to merge this verb (phrase) with the two adverbs in a single, ternary branching, operation of merge, since two s-selectional requirements – one introduced by each adverb – will be satisfied simultaneously. On the other hand, if each adverb is merged with the verb (phrase) separately, through different applications of merge, this problem does not arise. Binary branching is therefore again ensured.

Now consider what happens where a predicate both selects for an argument, and is modified by some kind of adjunct. Again, there is a problem if all three are merged in a single operation, since two s-selectional requirements will be satisfied simultaneously – one in which the predicate selects for its argument, and one in which the adjunct selects for the predicate. Again nested binary branching circumvents this problem by ensuring only one s-selectional requirement is satisfied per operation of merge.

We now consider the effects of selection in building an extended projection. As Grimshaw (1991/2005:§8) points out, while the relationship between structurally adjacent heads in an extended projection may be one of s-selection, this is not always the case. The classic example is NegP, which never appears to be obligatory in a clause, and therefore cannot be selected in its own right. Grimshaw (1991/2005:62) attributes this to the fact that Neg is a type-preserving head, whereas s-selection is selection for semantic type. Since the merger of Neg does not change the semantic type of the (partial) extended projection, there can be no specific s-selection of NegP that cannot equally be satisfied by the selection of its complement. On the other hand, while NegP is never specifically selected, the head Neg within a given language does appear to select for the semantic type of its complement (see section 3.4 and references cited there). For example, a language might display the sequence TP>(NegP>)VP (with > representing immediate domination), where the hierarchical order of the three phrases is fixed, but only TP and VP are obligatory. Since the functional sequence can occur without NegP, and since Neg is type-preserving, we cannot claim that T s-selects for NegP. Instead, both T and

Neg s-select for a complement of the same semantic type. Either NegP or VP are able to satisfy this s-selectional requirement. Hence both the sequence TP>VP and the sequence TP>NegP>VP are possible.[33] What will not be possible, however, is a ternary branching structure in which V(P) satisfies the s-selectional requirements of both Neg and T simultaneously. Again then, binary branching is required in order to ensure only one s-selectional requirement of the relevant kind is satisfied per operation of merge.

We now turn to coordinate structures. Unlike the predicate-argument relationship, the modifier-modifiee relationship, and the relationship between heads in an extended projection, there is no evidence that the coordination relationship is mediated by means of s-selection. Certainly the relationship between Coordinands is not one of θ-assignment – indeed it cannot be, since θ-assignment requires c-command of the predicate by its argument (Williams 1980), and we have already seen evidence that there is no c-command between Coordinands (section 4.3.2).[34] Since no s-selectional requirements are satisfied through merging Coordinands, there is in principle no restriction on the number of Coordinands that can be merged together.

By attributing the restriction of binary branching not to phrase-structure, but to the principles of selection, we have therefore been able to account for the presence of *n*-ary branching in multitermed coordinate structures, while still maintaining the binary branching hypothesis for asymmetric relationships such as the Head-Dependent relationship (whether predicate-argument or modification) and the relationship between heads in the extended projection.[35]

Finally, we consider the implications of all this on the role of the linker within a structure. We have already seen ample evidence both from section 2.4 and from this chapter that the subordinating or coordinating linker invariably forms a constituent either with the Dependent in the Head-Dependent relationship, or with a single Coordinand in the coordination relationship. Therefore the linker cannot occur in a multi-branching structure either with both the Head and Dependent or with multiple Coordinands; both subordinating and coordinating linkers are invariably restricted to a single sister, and hence binary branching, even though in the latter case

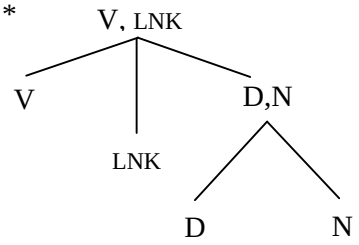
[33] According to principles of s-selection alone, recursion of NegP will also be possible. This option is usually ruled out by pragmatic considerations.

[34] θ-assignment between Coordinands within the mutual adjunction structure is in fact ruled out on two grounds: lack of c-command and violation of the condition in (16)b) – if θ-roles are assigned in the top node of the coordinate structure, the top node automatically becomes a new category (Neeleman and Van de Koot 2002; Neeleman 2006).

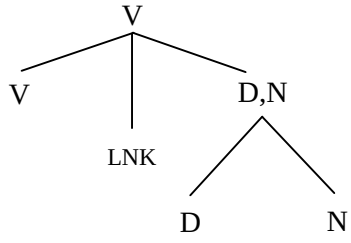
[35] This accounts for the situation as far as base-generated, or external, merge is concerned. In the case of movement, binary branching is likewise ensured under theories whereby the trace of the moved constituent introduces some kind of selectional requirement that is satisfied by the (internal) merger of moved constituent, such as the slash feature of Generalised Phrase Structure Grammar and Head-Driven Phrase Structure Grammar (Gazdar 1981, 1982; Gazdar *et al* 1985; Pollard and Sag 1994; see also Neeleman and Van de Koot 2010).

the wider structure that they mark does not share this restriction. Since however the linker – whether in a coordination, or Head-Dependent, relationship – is semantically vacuous, it neither s-selects nor can be s-selected. Therefore the restriction on the satisfaction of s-selectional requirements will not in itself restrict the appearance of linkers to binary branching structures. The fact that linkers are invariably merged in binary branching structures follows not from any restriction on the satisfaction of s-selectional requirements, but from the structural intervention requirement that we established in chapter 2. According to this latter requirement, in order to mark a relationship between two or more items, a projection of the linker must dominate some instance of one of the items, and no projection of the linker can dominate any instance of the other(s). For example, suppose a case-marking linker is used to mark the relationship between a verb and its nominal internal argument. The examples in (113)a)-b) show that it is impossible for the linker to mark such a relationship in a ternary branching structure: if the linker projects, as in (113)a), it will violate the structural intervention requirement by dominating both the Head V and the nominal Dependent D,N; if the linker does not project, as in (113)b), it violates the structural intervention requirement by dominating neither Head nor Dependent. On the other hand, if the linker merges first with the Dependent and then with the Head in nested binary branching structures, as in (113)c), the structural intervention requirement is met: a projection of the linker dominates the Dependent headed by D,N, and fails to dominate the Head V. Precisely the same results follow if the linker marks not a Head-Dependent relationship, but a coordination relationship, which we will look at in more detail in the next section: again, if the coordinating linker projects in a multi-branching structure, it will dominate all the Coordinands, whereas if it fails to project, it will dominate none of them.

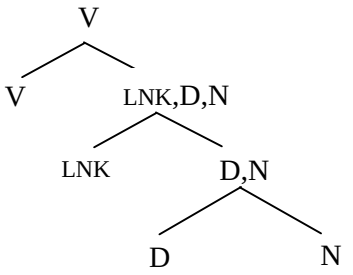
(113) a) *



b) *



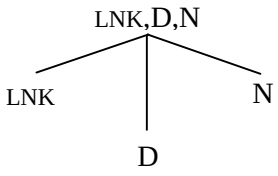
c)



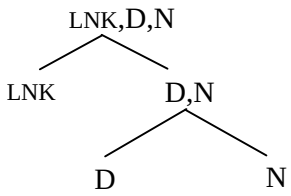
The structural intervention requirement therefore ensures that a linker cannot appear alone as one branch in a multi-branching structure with either both Head and Dependent or multiple Coordinands – the linker must form a constituent with the Dependent in the former case, or with a single Coordinand in the latter case. The next question to be considered is whether this

Dependent or Coordinand can consist of a ternary branching structure involving a linker, as in the structure in (114)a) below, where the linker is either a case-marker or coordinator marking either a nominal Dependent or a nominal Coordinand, consisting of the (partial) extended projection of N headed simultaneously by D and N. Here, by the structural intervention requirement, the linker must dominate this nominal Dependent or Coordinand. While in the ternary branching structure the linker dominates both D and N as independent objects, it does not dominate the nominal Dependent or Coordinand as a whole, headed by D,N. On the other hand, in the nested binary branching structure in (114)b), the linker merges directly with the nominal extended projection headed by D,N, and hence dominates it:

(114) a) *



b)



In this subsection I have argued that binary branching is not a principle of phrase-structure, but a by-product either of s-selection or of the structural intervention requirement for linkers that we established in chapter 2. This has the desired result that multi-branching structures are possible only in the context of the merger of more than two Coordinands in a single coordinate structure.

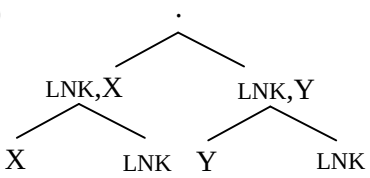
4.5 The Structural Distribution of Coordinators

In the previous sections, we established firstly that coordinators, like any other linker, are semantically vacuous functional heads serving only to mark an independently existing relationship (section 4.2). The only difference between coordinating linkers and the subordinating linkers we studied in chapters 2 and 3 therefore concerns the nature of the relationship that is marked. Secondly, we investigated the syntactic nature of the relationship marked by coordinating linkers, and concluded that a number of properties found in, and in many cases unique to, coordination are best explained by the symmetric structure of mutual adjunction, as proposed by Neeleman (2006) (sections 4.3-4.4 above). We are now in a position to return to the notion of coordinators as linkers, and consider how their properties as linkers determine their structural and linear distribution within the structure of mutual adjunction.

We begin by considering the structural distribution of coordinators. As we have already discussed above, linkers are required to structurally intervene between the members of the relationship they mark. We saw in chapter 2 that in terms of the Head-Dependent relationship, every projection of the linker invariably structurally intervenes between Head and Dependent, by dominating the Dependent, and failing to dominate the Head. This condition is also met in coordinate structures: at least where the coordinator is syntactically independent and therefore a

linker, the syntactic position of the coordinator cannot occur either internally to a Coordinand, nor outside the coordinate structure. Instead, the coordinator, where there is one, invariably structurally intervenes between Coordinands – the projection of each coordinating linker dominates one Coordinand, and fails to dominate any of the others. We have seen this both in monosyndetic structures, such as (19), and in polysyndetic structures, as in (115) below. Here there are two coordinators, each structurally intervening between the coordinators X and Y: that is, the projection of the coordinator marking X dominates some instance of X, and does not dominate any instance of Y, while the projection of the coordinator marking Y dominates some instance of Y, and does not dominate any instance of X.

(115)



Occasionally we do find examples where the syntactically independent coordinator appears internally to a Coordinand in terms of linear order. This we have already seen in the Latin example in (3) above. As Zwart (2005:3, 2009:1594; see also Embick and Noyer 2001:§6.2.1) points out, here we are dealing a second-position clitic, which attaches syntactically to the left edge of the Coordinand – thereby meeting the condition of structural intervention – but as a phonological enclitic is spelt out attached to the right edge of the first phonological word of this Coordinand.[36] This is demonstrated by the example in (116) below:

(116) ingenia [fecunda [totius=*que* naturae capacia]] *Latin*
mind.PL.ACC fertile.PL.ACC all.SG.GEN=and nature.SG.GEN grasping.PL.ACC
'minds that are fertile and able to grasp the entire universe.'
(Zwart 2009:1594, ex 11, citing Pliny the Elder, *Natural History* II.190)

Other languages with second-position clitic coordinators of this kind include the South Semitic languages Amharic and Zay, Hausa (West Chadic), Evenki (Northern Tungusic), Turkish (Southern Turkic), Bella Coola (Salishan), Fon (Volta-Congo), Jacaltec (Kanjobalan-Chujean), Kalasha-ala (or Waigali, Indo-Aryan), Lezgian[37] (Northeast Caucasian), Shipibo (North-Central

[36] Note that there is a difference in behaviour between coordinating clitics, as in (3) and (116), and coordinating affixes, as in (6) and (7) above. While both are phonologically dependent and selective in terms of attachment, and thereby may appear internally to a Coordinand in terms of linear order, their means of selection is different: the clitic selects for the edge of a syntactic phrase, and is indiscriminate as to category, while the affix selects for a specific morphological object.

[37] Lezgian is an interesting case. In phrasal conjunction, the enclitic coordinating conjunction *-ni* invariably attaches to the right edge of the Conjunct as a whole, as in (52)-(54) above (Haspelmath 1993:327-328). In clausal conjunction, on the other hand, it cliticises to the right edge of first word of the final Conjunct (pp335-336). In both cases, therefore, it attaches syntactically to the edge of the Conjunct

Panoan), Wardaman (Gunwingguan), West Greenlandic (Eskimo-Aleut), and Zaghawa (Eastern Saharan) (Zwart 2005:3, 2009:1594; see also discussion of further examples from Ancient Greek and West Greenlandic in section 4.6.1 below).

In chapter 2 we saw that there is a second condition restricting the structural distribution of the linker marking the Head-Dependent relationship, which is concerned with the process of building an extended projection. 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. However, because the structural intervention condition requires that a projection of the linker dominate exactly one member of the relationship it is marking, further projection of the linker will not be permitted if it results in the linker dominating both or all the members of the relevant relationship. We saw in chapter 2 that the combination of these two conditions prohibits a linker from marking the Head in a Head-Dependent relationship: if the linker continues to project as required by the principles of extended projection, it will violate the structural intervention requirement by dominating both Head and Dependent; if it does not continue to project, the structural intervention requirement is met, but the principles of extended projection are violated. For the same reason it is simply impossible for a linker to mark the relationship between two heads in the same extended projection, since the linker cannot both structurally intervene between the two heads and continue to project throughout the entire extended projection. In the case of subordination relationships, therefore, a functional sequence cannot continue to be built within an extended projection after the introduction of a linker.

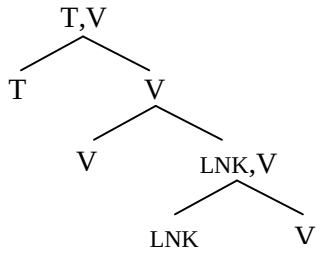
How then does this second restriction affect coordinators? Unlike the case of subordinating linkers, it seems that the introduction of a coordinating linker does not invariably close off the building of a functional sequence. For instance, in the Dutch example in (26)e) the coordinating conjunction *en* conjoins two APs. This coordinate structure, headed by A, is then selected by the functional head Deg containing the degree expression *te* ('too'). Similarly, in the English example in (74) two verbs coordinated by *or* appear as the complement of the head *to*, in T.

– to the right edge in phrasal conjunction, and to the left edge in clausal conjunction. Phonologically, it always encliticises to the right edge of whichever word is at the relevant edge of the Conjunct as a whole.

This apparent difference in behaviour between coordinating and subordinating linkers does not however force the conclusion that coordinators are inherently any different from subordinating linkers. Rather, the difference can be attributed to the syntax of the mutual adjunction structure. The obligatory feature percolation that characterises the building of an extended projection occurs through complementation (Grimshaw 1991/2005, 2000). This restriction however does not come into play where the linker appears internally to a mutual adjunction structure. In mutual adjunction, the projection headed by the linker is merged with its sister not by complementation but by adjunction. While projection or percolation of features from daughter to mother in mutual adjunction is permitted (providing this does not lead to a contradiction in categorial features), it is by no means obligatory. The fact that the coordinator, as a linker, cannot project without violating the structural intervention requirement is therefore unproblematic.

The resulting structure, using the clause as in the English example by means of illustration, is demonstrated in (117) below. The coordinator is merged with one of the Coordinands via complementation. Since the coordinator is a functional head, the categorial feature [V] of its complement obligatorily percolates to head the Coordinand as a whole. This Coordinand is then merged with another Coordinand, also headed by V, via mutual adjunction. Since the categorial features of the Coordinands are not contradictory, they are permitted to percolate, such that the coordinate structure as a whole is headed by V. The coordinator is not required to project any further, and so meets the condition that it should dominate one Coordinand but not the other. The head T, which selects for a verbal complement, can then be merged with this coordinate structure headed by V. Since T is a functional head, the categorial feature [V] of its complement obligatorily percolates:

(117)



In terms of structural distribution, therefore, there is no inherent difference between subordinating and coordinating linkers – both are subject to the same structural intervention requirement and to independently motivated principles of extended projection. The distinction between the two in terms of structural distribution results only from the difference in the syntax of Head-Dependent and coordinate structures. This is reflected in the following general lexical entry for any coordinating linker:

(118) *Lexical entry for coordinating linker*

INTERNAL SELECTION:

Sister: compulsory

Mother: bears the same lexical index as LNK

EXTERNAL SELECTION:

Sister(s): compulsory

Mother: projection is non-distinct from both the projection headed by LNK and its sister(s)

SEMANTICS: λx.x

The semantics and internal selectional requirements are identical to those of the subordinating linker (cf. section 2.2.3 above): the linker is a projecting head that does not introduce any features referring to semantics, but simply inherits the properties of its obligatory complement – that is, its semantics consists of the identity function. Again like the subordinating linker, the coordinating linker only appears in the context of marking a relationship between two or more items, and hence its maximal projection, LNKP, also requires at least one sister. The only difference between the two types of linker is concerned with the nature of the relationship that is marked, reflected in the external selectional requirements for the mother of LNKP. The coordinating linker marks a symmetric relationship in which the mother node is a segment shared by multiple categories – that is to say that the mother node is non-distinct in its features from any of its daughters. The lexical entry for the coordinating linker in (118) above accordingly allows the linker to appear both in structures where both Coordinands project, as in (19)a) above, and in those where neither projects, as in (19)b) and (115) above. Unlike the subordinating linker, however, the coordinating linker cannot appear in asymmetric structures in which only the sister of LNKP projects. As with subordinating linkers, an individual coordinating linker may be more specific in its syntactic selectional requirements, but must adhere to the general requirements in (118). It is not unusual, particularly in the case of conjunction, for a coordinator to c-select for the category of the Coordinands in its coordinate structure (Haspelmath 2004:§3, 2007:3, §3, 2008; Ohori 2004:§2.2). For example, Japanese *-to* in (51), (68)-(70) and (84) above is used only to coordinate nominals and hence its lexical entry will specify that both its internal and external sisters should be nominal.[38]

[38] I leave aside for future research the issue of how conjunctive and disjunctive coordinators differ in their lexical entries, as it is not clear at present at what point in the derivation the two are disambiguated. See discussion of the various possibilities in fn 29.

4.6 The Linear Distribution of Coordinators

So far, we have determined firstly the syntactic structure of coordination (sections 4.3 and 4.4), and secondly the consequent restrictions on the structural distribution of coordinators, as functional heads marking a relationship (i.e. linkers) (section 4.5). We are now therefore in a position to consider how this structural distribution is mapped onto linear order.

In chapter 3, we proposed that there are two types of word order constraint present in natural language: those dealing with harmony, which obey a fixed ranking, dominated by the Head-Proximate Filter (the Harmonic Word Order Ranking); and constraints referring to the lexical features of a head, or, where the head is functional, to syntactic features encoding semantics. Since linkers are functional heads lacking features encoding semantics, we established that it is only the former type of constraint – the general constraints dealing with harmony – that can apply. Since coordinators also belong to the class of linkers, it is therefore predicted that for them too, word order will be determined uniquely by any relevant constraints relating to harmony.

The constraints in the Harmonic Word Order Ranking that we have established so far are repeated below:

(119) HEAD-PROXIMATE FILTER

The highest head in the extended projection of a Dependent must be linearly contiguous with the Head it is subordinate to.

(120) FINAL-CLAUSE REQUIREMENT

A clausal Dependent must follow the Head it is subordinate to.

(121) HEAD UNIFORMITY

A functional head must match the lexical head of its extended projection in the direction of headedness.

Of these three constraints, the only one that is immediately applicable to the coordinate structure is Head Uniformity – here the coordinator, as a functional head, should match any lexical head within the Coordinand in direction of headedness.

The constraint Final-Clause applies only where the clause is a Dependent in an asymmetric Head-Dependent structure. There does not seem to be any equivalent constraint applying to the symmetric coordinate structure. The following examples show that a clausal Coordinand may

appear in any position within the coordinate structure, both in VO languages (as in (122)-(124)), and in OV languages (as in (125)):

English

(122) [[That Himmler appointed Heydrich] [*and* the implications thereof]] frightened many observers. (Sag *et al* 1985:165, ex 123b)

(123) [[Robin's reluctance,] [that Kim wouldn't help] [*and* Terry's bad attitude]] forced Pat to change plans. (Zoerner 1995:164, ex 71a)

(124) Robin saw [[that the sky was falling], [the gravity of the situation], [*and* that only Kim could save the day]]. (ex 72)

(125) a) eni-kkə [[avaL-Te peer=*um*] [avaL 1753-il mariccu enn=*um*]] a̲riyam. *Malayalam*
I-DAT she-GEN name=and she 1753-LOC died LNK=and know

b) eni-kkə [[avaL 1753-il mariccu enn=*um*] [avaL-Te peer=*um*]] a̲riyam.
I-DAT she 1753-LOC died LNK=and she-GEN name=and know

'I know her name and that she died in 1753.'

Some version of the Head-Proximate Filter, on the other hand, does seem to apply equally to subordination and coordination structures: as noted in section 4.2, there seems to be a cross-linguistic requirement that coordination, where syntactically marked, should be marked by an intervening coordinator. I therefore propose that the definition of the Head-Proximate Filter be expanded to encompass both the asymmetric Head-Dependent structure and the symmetric coordinate structure:

(126) HEAD-PROXIMATE FILTER

a) In a Head-Dependent structure, the highest head in the extended projection of the Dependent must be linearly contiguous with the Head it is subordinate to.

b) In a coordinate structure, the coordinator (as the highest head marking a Coordinand) must be linearly contiguous with every other Coordinand, unless the relationship with that Coordinand is already so marked.

The b) clause of the Head-Proximate Filter requires a coordinator marking a Coordinand to be linearly contiguous with every other Coordinand, unless the relationship between the two Coordinands is already marked by means of a coordinator. In binary coordination therefore, a coordinator will have to intervene between the two Coordinands. As long as the relationship

between the two Coordinands is marked in this fashion, there are no restrictions – at least in terms of the Head-Proximate Filter – on where any additional coordinator may appear.

To these two constraints – the Head Proximate Filter and Head Uniformity – the following constraints can be added, applying exclusively to the symmetric mutual adjunction structure of coordination:

(127) *ADDITIONAL COORDINATOR

> The number of times a coordinator is realised should not exceed the number of coordination relationships.

*Additional Coordinator is an economy constraint concerning the number of times a single coordination relationship is marked (cf. Progovac's 1998 *et seq* Avoid Conjunction, or Economy of Conjunction Principle). A coordination relationship here refers to any flat coordinate structure, which may be made up of any number of Coordinands expressing a single semantic relationship between them. If any of the Coordinands is itself a coordinate structure, this will be regarded as a separate coordination relationship, since it is a coordinate structure in its own right both syntactically and semantically. Any example with two Coordinands, such as those we looked at in section 4.3, consists of a single coordination relationship, as do multitermed examples conforming to the flat *n*-ary branching structures in (89). Nested multitermed coordinate structures, on the other hand, such as those in (88), are made up of more than one coordination relationship, since one or more Coordinands consists of a syntactic and semantic coordinate structure in its own right (the first in (88)b), the second in (88)a)). While in principle, as discussed in section 4.3, any and all Coordinands may be marked by a coordinator, if these Coordinands are merged in a single coordinate structure – i.e. there is a single syntactic and semantic relationship – all else being equal, the coordinator need only be realised once to mark that relationship. Therefore monosyndetic coordinate structures, such as those used in binary coordination in Latin, English, Hindi-Urdu, Dutch, Czech, Slovenian and Icelandic (see (3), (4), (5), (26)-(27), (36)-(38), (41)-(42) and (43) above), will satisfy this constraint, since a single coordinator is used to mark a single coordination relationship, whereas polysyndetic structures, such as those used in Kanuri and Malayalam (see (1) and (48), (50) respectively), will incur a violation, since two coordinators are used to mark a single coordination relationship. In terms of multitermed coordinate structures, the flat structure with a single coordinator as in the English example in (89)a) will satisfy *Additional Coordinator, but the equivalent structure with two coordinators, as in (89)b), will incur a violation. The English nested coordinate structures (88), on the other hand, do not incur any violations: although there are two coordinators, we are also dealing with two coordination relationships, one embedded in the other.

(128) MARK NON-INITIAL

Any non-initial Coordinand should be marked by a coordinator.

Mark Non-Initial is based on a cross-linguistic preference for marking the second Coordinand in binary coordination (Haspelmath 2004:6; Zwart 2005, 2009). Zwart claims this is an absolute universal; however, we have already seen evidence to the contrary from extraposition in Japanese (in (68) and (69)), where it is the initial Conjunct that is marked by the coordinator. The Japanese examples in (68)-(70) would therefore violate the constraint Mark Non-Initial. On the other hand, the constraint is satisfied both by monosyndetic structures where the medial coordinator attaches to the Coordinand to its right, such as English and Hindi-Urdu ((4) and (5)), and by polysyndetic structures, such as Kanuri and Malayalam ((1) and (48), (50)), since in both cases the second Coordinand is marked by a coordinator.

(129) EDGE DIFFERENT

The Coordinand at one edge must differ in marking from every other Coordinand.

Edge Different requires the Coordinand at one edge – i.e. either the initial or the final Coordinand – to differ in marking from every other Coordinand. That is, the Coordinand at one edge must be marked by a coordinator if the others are unmarked, and unmarked if the others are marked. Therefore, in terms of binary coordinate structures – those with two Coordinands – any monosyndetic structure will satisfy this constraint, since the Coordinand at one edge will be marked by a coordinator, while the Coordinand at the other edge will not be. Similarly, in English both options for multitermed coordination, shown in (87) above, satisfy this constraint: (87)a) because all the Conjuncts except the initial one are marked by a coordinator; (87)b) because it is only the final Conjunct that is marked by a coordinator, all the others remaining unmarked. On the other hand, any polysyndetic example, such as the Kanuri and Malayalam examples in (1) and (48), will violate the constraint Edge Different, because all the Coordinands are marked by coordinators.

That one of the peripheral Coordinands should have some kind of unique status in terms of morphosyntactic marking – termed unbalanced coordination by Johannessen (1998) – is independently motivated. For example, we looked at some examples of single Conjunct agreement in section 4.3.1, where agreement is controlled uniquely by either the first or the closest Coordinand. Agreement cannot however be controlled by any medial Coordinand, nor by, say, two out of three Coordinands. Similarly, it is relatively common in the world's languages for Coordinands to differ in terms of morphological case (Zoerner 1995, 1999:§4; Johannessen 1998 and references cited). Again, where this occurs in a flat multitermed coordinate structure expressing a single syntactic and semantic coordination relationship, it will always be one of the Coordinands at the edge which is singled out – never a medial Coordinand,

and never two out of three Coordinands. It is possible that, like the constraints concerned with harmony in the previous chapter (given here in (119)-(121)), Edge Different is motivated by third factor considerations concerned with ease and efficiency of processing. By providing a means of identifying the edge of the coordinate structure, Edge Different facilitates the parsing of the coordinate structure as a constituent.

Of the five constraints applying to the coordinate structure, it is again the Head-Proximate Filter that takes precedence. (Of course, since the Harmonic Word Order Ranking is universal, the Head-Proximate Filter will have to take precedence over Head Uniformity, exactly as it does in chapter 3, when applied to the Head-Dependent relationship.) There is no universal ranking of the remaining constraints, which may be freely reranked with respect to each other within a given language. The resulting universal ranking is given below:

(130) *Harmonic Word Order Ranking* (constraints applicable to the coordinate structure)
HEAD-PROXIMATE FILTER >> *ADDITIONAL COORDINATOR, MARK NON-INITIAL, EDGE DIFFERENT, HEAD UNIFORMITY

4.6.1 Binary Coordination

We begin by considering the more simple case of binary coordination – two Coordinands in a simple coordinate structure – a single syntactic and semantic relationship. We have already seen in section 4.3 that in principle a coordinator can attach to either or both Coordinands. Where there is a single coordinator, it invariably intervenes between the two Coordinands, attaching either to the first Coordinand, as we have seen for *-to* in the consistently head-final OV language Japanese ((68)-(69)), or to the second, as in the largely head-initial VO languages English (4) and Hausa (Abdoulaye 2004:175), Mandarin Chinese (Zhang 2008a), which is VO with head-final constructions elsewhere, OV languages such as Hindi-Urdu (5), which is largely head-final, as well as OV languages displaying more mixed headedness, such as Dutch (footnote 11), German (Haspelmath 2004:7) and the South Cushitic language Iraqw (Mous 2004:118). According to Haspelmath (2004:6), the latter strategy is cross-linguistically more common than the former. This is not surprising, since, as we have seen, attachment of an initial coordinator to the final Coordinand occurs in both VO and OV languages, while to the best of my knowledge attachment of a final coordinator to the initial Coordinand only occurs in OV languages. We now consider polysyndetic coordination. As already stated in section 4.3.1, while it is possible for an initial coordinator to attach to both Coordinands (prepositive polysyndeton), the presence of the additional coordinator on the first Coordinand, whether in VO or OV languages, is not required to mark the coordination relationship, but rather contributes a contrastive or distributive reading. The coordination relationship itself is marked only by the medial coordinator. Therefore it is safe to say that the prepositive polysyndetic

strategy is not employed as a means of marking simple coordination. On the other hand, we have already seen examples where the use of polysyndeton with identical final coordinators (postpositive polysyndeton) is both obligatory and completely neutral in interpretation (as in the Malayalam example in (50)). According to Stassen (2000:15), this use of postpositive polysyndeton is found exclusively in OV languages. Mixing the prepositive and postpositive strategies, such that one Coordinand is marked by an initial coordinator and the other by a final coordinator, is not possible.[39] Putting all this together, of the eight logically possible means of marking simple binary coordination, only one is available in VO languages, while three are employed in OV languages, resulting in the following typology:

(131)

VO languages:	*OV languages:*
A[CO B]	**A[CO B]**
*[A CO]B	**[A CO]B**
*[A CO][B CO]	**[A CO][B CO]**
*[CO A][CO B]	*[CO A][CO B]
*[A CO][CO B]	*[A CO][CO B]
*A[B CO]	*A[B CO]
*[CO A]B	*[CO A]B
*[CO A][B CO]	*[CO A][B CO]

This typological variation is precisely captured by the Harmonic Word Order Ranking in (130), as shown by the tableaux in (132)-(133) below. Firstly, the tableau in (132) considers the outcome where the two Coordinands are head-initial. (The direction of headedness of the lexical head of a Coordinand will be determined either by the direction of structural-Case-assignment parameter, discussed in section 3.3, or by Optimality Theoretic constraints of the kind discussed in section 3.4.) In the case where the Coordinands are head-initial, it is possible to obey all five constraints, by means of an initial coordinator on the second Coordinand (candidate a)): the coordinator intervenes between the two Coordinands, so satisfying the Head-Proximate Filter; there is only one coordinator marking what is a single coordination relationship, so satisfying *Additional Coordinator; the only non-initial Coordinand is marked by a coordinator, in compliance with Mark Non-Initial; the initial Coordinand is unmarked, while the final Coordinand is marked, satisfying Edge Different; and since we are dealing with head-initial Coordinands, the initial coordinator matches the lexical head of its extended

[39] Dik (1968:43-44) claims that mixing of prepositive and postpositive coordinators in a single coordinate structure is attested, though rare. However, it turns out that Dik's 'postpositive' coordinators are in fact the syntactically prepositive enclitics, or second-position clitics, *-que* and *te* in Latin and Greek respectively (see (116) and (137) respectively). As discussed in section 4.5, such coordinators are syntactically initial, or prepositive, coordinators. The Latin and Greek structures Dik is referring to therefore exhibit prepositive polysyndeton, with an initial coordinator on each Conjunct. As expected, the presence of the additional coordinator on the first Conjunct yields an emphatic or distributive reading.

projection in direction of headedness, in accordance with the requirements of Head Uniformity. No other candidate can meet all five of these requirements.

(132)

Head-initial	HEAD-PROXIMATE	*ADDITIONAL COORDINATOR	MARK NON-INITIAL	EDGE DIFFERENT	HEAD UNIFORMITY
a. ☞ A[CO B]					
b. [CO A][CO B]		*!		*!	
c. [A CO]B			*!		*!
d. [A CO][B CO]		*!		*!	*!*
e. [A CO][CO B]		*!		*!	*!
f. A[B CO]	*!				*
g. [CO A]B	*!		*		
h. [CO A][B CO]	*!*	*		*	**

Where we are concerned with head-final Coordinands, on the other hand, the situation is different, as shown in (133) below. It is not possible to simultaneously satisfy the Head-Proximate Filter, *Additional Coordinator, Mark Non-Initial, Edge Different and Head Uniformity. Therefore different optimal candidates will be possible in different languages depending on the language-specific ranking of these four. Any candidate which violates the undominated Head-Proximate Filter, on the other hand, such as candidates f)-h), will be universally ruled out. Of the candidates that satisfy the Head-Proximate Filter, the monosyndetic structure [A[CO B]] presented by candidate a) satisfies three of the remaining constraints, *Additional Coordinator, Mark Non-Initial and Edge Different, but, since we are dealing with head-final Coordinands, the presence of the initial coordinator incurs a violation of Head Uniformity. Similarly, the inverse monosyndetic structure [[A CO]B] in candidate b), in which the intervening coordinator is attached to the first Coordinand, satisfies the three constraints *Additional Coordinator, Edge Different and also Head Uniformity, but violates Mark Non-Initial. Therefore candidate a) will be optimal in any language in which Head Uniformity is dominated by Mark Non-Initial and either or both of *Additional Coordinator and Edge Different, while candidate b) will be optimal in any language in which Mark Non-Initial is ranked below Head Uniformity and either or both of the remaining two constraints. The postpositive polysyndetic structure in c) is the only candidate to incur no violations of either Mark Non-Initial or Head Uniformity, but, unlike candidates a) and b), violates both *Additional Coordinator and Edge Different. Therefore this candidate will be optimal in any language in which both Mark Non-Initial and Head Uniformity outrank both *Additional Coordinator and Edge Different (that is, every possible remaining ranking). *Additional Coordinator is violated in the polysyndetic candidate since we are dealing with a single coordination relationship, requiring by economy only one coordinator. Note however that the peripheral coordinator in this polysyndetic candidate, unlike that in candidate f), does not incur

a violation of the Head-Proximate Filter. The Head-Proximate Filter requires a coordinator marking a Coordinand to be linearly contiguous with every other Coordinand, unless the relationship with that Coordinand is already so marked. In candidate c), the coordinator marking the first Coordinand is linearly contiguous with the second. The coordinator marking the second Coordinand is not linearly contiguous with the first Coordinand, but this is immaterial, since the relationship between the two Coordinands is already marked by means of an intervening coordinator. Candidates d) and e), on the other hand, will never be optimal, irrespective of the relative ranking of the constraints dominated by the Head-Proximate Filter, since for every constraint for which they perform better than, or equally well with, one or more of candidates a), b) and c), there will be one or more of these three candidates that performs equally well on this constraint, better on at least one of the others, and no worse on any remaining constraints. This has the desired consequence that three different means of marking coordination are possible in head-final structures, depending on the language-specific ranking of the constraints. Where two or more constraints are equally ranked within a given language, more than one option will be available:

(133)

Head-final	HEAD-PROXIMATE	*ADDITIONAL COORDINATOR	MARK NON-INITIAL	EDGE DIFFERENT	HEAD UNIFORMITY
a. ☞ A[CO B]					*(!)
b. ☞ [A CO]B			*(!)		
c. ☞ [A CO][B CO]		*(!)		*(!)	
d. [CO A][CO B]		*(!)		*(!)	*(!)*
e. [A CO][CO B]		*(!)		*(!)	*(!)
f. A[B CO]	*!				
g. [CO A]B	*!		*		*
h. [CO A][B CO]	*!*	*		*	*

The predictions made by the Harmonic Word Order Ranking in (130) and the consequent tableaux in (132)-(133) are in fact more subtle than the simple typology in (131). While coordination with a single prepositive medial coordinator ([A[CO B]) is available irrespective of the direction of headedness of the Coordinands (explaining its cross-linguistic preponderance), the patterns [[A CO]B] and [[A CO][B CO]] are predicted to be possible, not simply in any OV language, but only in constructions where the Coordinands themselves are head-final. This certainly does appear to be the case for the postpositive polysyndetic pattern [[A CO][B CO]], which, at least where there are no obligatory additional interpretive effects, seems to be found only in consistently head-final languages.[40] Examples include the Northeast Caucasian

[40] Given the formulation of Head Uniformity in (121), it is in fact only the lexical heads that need to be final. Intervening functional heads can be head-initial without causing any violation of Head Uniformity by the coordinator.

languages Archi, Avar, Chechen, Dargi (or Dargwa) and Hunzib, the Northwest Caucasian languages Abkhaz, Kabardian and Ubykh, the South Dravidian languages Malayalam, Tamil and Kannada, the Tibeto-Burman languages Burmese and Manipuri (or Meitei), the Trans-New Guinea languages Asmat (Asmat-Kamoro), Kobon (Madang) and Marind, the Quechuan languages Huallaga Quechua (Quechua I) and Imbabura Quechua (Quechua IIB), Ainu, Alamblak (Sepik Hill), Amharic, Japanese, Korean and Nivkh (or Gilyak). Interestingly, the list also includes Kanuri (as in (1) above), which has a noun phrase which on the surface appears to be head-initial, but which we hypothesised in section 3.5.2 is underlyingly noun-final.

Testing the head-final prediction for the postpositive medial pattern [[A CO]B] is more difficult, since constituency tests are required to distinguish this postpositive pattern from the linearly identical prepositive medial pattern [A[CO B]]. We already know from extraposition tests in (68)-(69) that Japanese – which is rigidly head-final – exhibits this postpositive pattern. The same extraposition test in (53)-(54) above shows that the coordinator *-ni* in Lezgian, another consistently head-final language, also attaches syntactically to the Conjunct to its left, at least where this Conjunct is not a finite clause (see footnote 37). While the examples we were concerned with there were polysyndetic, yielding an obligatory emphatic distributive reading, it is more usual for this same coordinator to be used monosyndetically, without any additional interpretive effects. This is demonstrated by the example in (134) below. Since we already know that *-ni* attaches to the (non-clausal) Conjunct to its left, we can add Lezgian to the list of head-final languages displaying the pattern [[A CO]B]. (Based on binary coordination alone, these are the only languages for which we have direct evidence of this pattern. When we look at multitermed coordination in subsection 4.6.2, we will see further evidence for this pattern in Amharic and Classical Tibetan, both of which are also consistently head-final.)

(134) [[Isa-di=*ni*] Ali-di] sada=sada-w ğil-er wuga-na. *Lezgian*
Isa-OBL=and Ali-OBL one=one-ADESS hand-PL give-AOR
'Isa and Ali shook hands.' (lit. 'gave hands to each other')
(Haspelmath 1993:327, ex 896a, citing Jaraliev 1989:24)

Where a language, or a particular construction, is consistently head-final then, there are three options made available by the grammar for coordinator placement in binary coordination. An individual head-final language may utilise any, or all, of these options. An example in point is Japanese. We have already seen evidence from extraposition (in (68)-(69)) that Japanese exhibits a postpositive, or head-final, coordinator *-to*, used to conjoin noun phrases. This head-final coordinator may attach either only to the initial Conjunct, yielding the monosyndetic order [[A CO]B], as in examples (68)-(70) above, or to both Conjuncts, as in (51) and (84), resulting in the postpositive polysyndetic construction [[A CO][B CO]]. Whether or not the second instance of the coordinator occurs has no effect on the interpretation, as we have already seen.

Besides *-to*, Japanese has various other coordinating conjunctions, including *sosite*, which invariably appears in medial position, without the option of polysyndeton. The following example provides evidence that *sosite* forms a constituent with the Conjunct to its right (see also Zhang 2006:181, fn 4), thereby instantiating the third option for head-final constructions, [A[CO B]]:

(135) – Robin=wa sakana=o tabeta. *Japanese*
Robin=TOP fish=ACC ate
– [*sosite* gohan mo]!
and rice also
– 'Robin ate fish.'
– 'And rice also!'

It is sometimes assumed that the constituency of a coordinator (and consequently its direction of headedness) can be determined by its phonological attachment (J. Ross 1967/1986:100-101; Zoerner 1995:19-20, 61). We have already seen in chapter 2, however, that, for subordinating linkers, phonological attachment to a preceding word is not a valid argument for syntactic attachment. This syntax-phonology mismatch applies equally to coordinating linkers, as evidenced by data from Persian.[41] Persian has a coordinating conjunction *-o*, which cliticises to any non-final Conjunct, such that the linear order is [A-CO B(-CO C)] (as exemplified in (2) above). This coordinator can be used to conjoin both clauses and phrases such as VPs, NPs, APs and PPs. While Persian is an OV language, its NPs, APs and PPs are all head-initial. Since the presence of head-final, or syntactically postpositive, coordinators is ruled out where the Coordinands are head-initial (tableau (132)), while medial head-initial, or prepositive, coordinators ([A[CO B]) are permitted for both head-initial and head-final structures (tableaux (132)-(133)), it is therefore predicted that the enclitic coordinator *-o* attaches syntactically to the Coordinand to its right (or at least when conjoining head-initial Coordinands such as NP, AP and PP). The following extraposition example shows that this prediction is borne out:

(136) Xodâ [ye (dune) barâdar] dâd beh=és[=*o* ye xâhar]. *Persian*
God one CL brother gave to=3SG.OBL=and one sister
'God gave him a brother and a sister.' (Stilo 2004:280, ex 10)

Besides the three orders permitted by the Harmonic Word Order Ranking, it has occasionally been claimed that the order [A[B CO]] is also attested, though cross-linguistically rare (Dik

[41] Interestingly, this mismatch only seems to exist for head-initial coordinators. All the head-final coordinators I have come across, both mono- and polysyndetic, invariably form a phonological unit with the Coordinand to their left (see also Haspelmath 2007:8).

1968:42-43; Stassen 2000:14-15; Haspelmath 2004:6, 2007:6; Gáspár 2005:139). According to the predictions of the Harmonic Word Order Ranking, as presented by the tableaux in (132) and (133), this order should not occur.[42] With one potential, though unproven, exception (the Northern Iroquoian language Cayuga), examples of this kind fall into three categories, none of which turn out to be genuine counterexamples.

Firstly, we have already seen that, in some languages, such as Latin, the enclitic coordinator attaching syntactically to the left-edge of the final Coordinand is realised as a second-position clitic (as in (3) and (116) above). Where this final Coordinand consists of a single word, the resulting surface order will obviously be [A B CO]. Syntactically, however, such languages exhibit the pattern [A[CO B]] and are therefore perfectly compatible with the predictions of the Harmonic Word Order Ranking. Besides Latin, other languages which have been claimed to exhibit the order [A[B CO]] include Ancient Greek (Dik 1968:43) and West Greenlandic (Haspelmath 2007:11). The following examples show that the coordinator in these languages does not attach to the right edge of the final Coordinand, as would be the prediction if we were dealing with a head-final coordinator, but, as in Latin, invariably appears in second position, appearing to attach syntactically in initial position:

(137) kunes-sin [oiōnoi-si =*te* pa-si] *Ancient Greek*
dog-PL.DAT bird-PL.DAT = and all-PL.DAT
'for dogs and all birds' (Homer, *The Iliad*)

(138) [ippassaq tiki-pput] [aqaga=*lu* ikinnguta-at tiki-ssa-pput]. *West Greenlandic*
yesterday arrive-3.INDIC tomorrow=and friend-PL arrive-FUT-3.INDIC
'They arrived yesterday and their friends will arrive tomorrow.' (Fortescue 1984:120)

The second possible explanation for languages appearing to exhibit the order [A[B CO]] is that what appears to be a coordinate structure is in fact a comitative construction, and the apparent 'coordinator' is in fact a postposition expressing accompaniment in a subordination relationship. If we are dealing with a semantically contentful postposition, it is perfectly possible for a constraint referring specifically to the features of this postposition to override the Head-Proximate Filter (see chapter 3). Examples are given below from the Madang language Amele:

[42] Technically, the Harmonic Word Order Ranking predicts that this order cannot occur through base-generation. This entails that it cannot occur through movement either, since movement of Coordinands is independently ruled out by the CSC.

(139) ija na sigin [sapol ca] *Amele*
I LNK knife axe with
'my knife and axe' (Haspelmath 2007:30, citing Roberts 1987:109)

(140) Banag [Bunag ca] ale due bele-si-a.
Banag Bunag with they.DU dance go-DU-TODPST
'Banag has gone to the dance with Bunag.' (Roberts 1987:105, ex 503)

That the particle *ca* does indeed head a postpositional phrase in some kind of subordination structure, rather than a Coordinand in a coordinate structure, is evidenced by the example in (141) below, where the phrase headed by *hina ca* ('with you') appears to occur in the absence of any other overt nominal – that is, any putative first Conjunct. It cannot be argued that this absent first Conjunct is simply a null pronoun, since *pro*-drop of a Coordinand in a coordinate structure is never permitted, even in the most permissive of radical *pro*-drop languages (Neeleman and Szendrői 2007:685):

(141) [Hina ca] due bele-w-an fo? *Amele*
you.SG with dance go-1DU-FUT Q
'Will you go to the dance with me?' (ex 504)

On the other hand, Haspelmath (2007:30) argues that the example in (139) must be a genuine coordinate structure, since the possessor and accompanying linker, *ija na* ('my'), takes scope over both *sigin* ('knife') and *sapol* ('axe'). If we were dealing with a subordination relationship, we would expect *ija na* to take scope only over the Head, *sigin*. However, it should be borne in mind that Amele is a radical *pro*-drop language. We have already seen evidence in section 2.4.4 that where a possessor is *pro*-dropped in such languages, any accompanying linker is also deleted. It is therefore perfectly possible that the construction in (139) is a genuine, subordinate, comitative structure, with *pro*-drop of the possessor in the comitative Dependent, as represented below:

(142) [[ijana] sigin] [ø sapol ca] *Amele*
I LNK knife axe with
'my knife with (my) axe'

Interestingly, a homophonous particle *ca* can be used to mark a genuine coordinate structure, as in (143) below. In this case, rather than a single *ca* following both Conjuncts in the illicit [A[B CO]] construction, *ca* is realised following each Conjunct in a polysyndetic construction ([[A CO][B CO]]). The presence of *ca* on both Conjuncts clearly indicates that here we are not

dealing with a comitative construction. That the coordination example in (143) and its comitative equivalent in (140) are not only syntactically, but also semantically, different is reflected in the different translations accorded to them by Roberts (1987:105). Where used as a semantically vacuous coordinator, therefore, the particle *ca* – as predicted – conforms perfectly to the structures permitted by the Harmonic Word Order Ranking for the coordination of head-final Coordinands (see (130), (133)):

(143) a) [[Banag *ca*] [Bunag *ca*]] ale due bele-si-a. *Amele*
Banag and Bunag and they.DU dance go-DU-TODPST
'Banag and Bunag have gone to the dance.' (Roberts 1987:105, ex 502)

The third possible explanation for the surface order [A B CO] may be that CO is a genuine coordinator within a coordinate structure, but that it is not marking a relationship between A and B. For instance, Stassen (2000:15, 2003:774) claims that the head-final Southwest Pama-Nyungan language Pitjantjatjara exhibits the order [A[B CO]], citing the following example:

(144) Henry-ku mama ngunytju *puṟu* *Pitjantjatjara*
Henry-POSS father mother and
'Henry's father and mother' (Stassen 2003:774, ex 52, citing Glass & Hackett 1970:66)

However, when we look at the original source, and Glass and Hackett's (1970:66) analysis, it seems that *puṟu* in the above example does not necessarily mark the coordination of *mama* ('father') and *ngunytju* ('mother'):

Pitjantjatjara

(145) [Henry-ku [mama ngunytju] *puṟu*] [Nyungkiya-ku [mama ngunytju] *puṟu*]
Henry-POSS father mother and Nyungkiya-POSS father mother and
'Henry's father and mother, and Nyungkiya's father and mother also'
(Glass & Hackett 1970:66)

This example in fact exhibits two different coordinative strategies: juxtaposition and postpositive polysyndeton. The example is made up of two Conjuncts, *Henryku mama ngunytju* ('Henry's father and mother') and *Nyungkiya mama ngunytju* ('Nyingkiya's father and mother'). According to Glass and Hackett's analysis, each Conjunct is marked by *puṟu* in final postion, while each of these two Conjuncts itself contains a morphosyntactically unmarked coordination – *mama ngunytju* ('father and mother'). Under this analysis the Pitjantjatjara data is therefore perfectly compatible with the coordinative strategies permitted for head-final languages.

Of course, it is possible to maintain Stassen's analysis, and claim that each occurrence of *puṟu* marks the coordination of *mama* ('father') and *ngunytju* ('mother'), while the conjunction of the phrases *Henryku mama ngunytju puṟu* ('Henry's father and mother') and *Nyungkiya mama ngunytju puṟu* ('Nyingkiya's father and mother') is morphosyntactically unmarked.[43] However, such an analysis is both unlikely and undesirable. Firstly, Glass and Hackett (1970:66) state that *puṟu* is mainly used to coordinate phrases rather than single items. Secondly, the use of simple juxtaposition to mark coordination cross-linguistically favours natural pairings or conceptual units such as 'father and mother' (Stassen 2000:8-9; Haspelmath 2004:13, 2007:7, 21 and references cited in these works). Finally, Stassen's analysis has the undesirable and unnecessary consequence of allowing the structure [A[B CO]] as a means of marking coordination, without sufficient independent evidence.

I am only aware of one example of the apparent surface order [A B CO] that does not obviously fit into one of the above three categories. This occurs in the Northern Iroquoian language Cayuga, as in the following example:

(146) ne:' tshõ: ne' onẽhẽ' sahe'tá hni' okwayẽthwẽ hne:' *Cayuga*
it only the corn beans also we.planted CONTR
'No, we only planted corns and beans.' (Mithun 1988:342, ex 27)

Here *hni'*, which is homophonous with an adverb meaning 'also', appears to conjoin the two nouns to its left, *onẽhẽ'* ('corn') and *sahe'tá* ('beans'). One possibility is that the two nouns are in fact coordinated by juxtaposition, with *hni'* retaining its adverbial function. This seems less likely however, since Mithun (1988:342) states that: 'It is systematically present when nominals are coordinated, and signals no more than the syntactic link between them.' If *hni'* did indeed function purely as an adverbial, we would expect its appearance to be optional. A second possibility is that *hni'* is in fact a second-position enclitic. Since all the data provided by Mithun (1988) involve single-word Conjuncts, I have no means of testing this hypothesis. Until proven otherwise by further data, I will assume that *hni'* in Cayuga in a second-position clitic and there are therefore no genuine examples of [A[B CO]] as a syntactic means of marking a coordinate structure.

4.6.2 Multitermed Coordination

We have seen then that the Harmonic Word Order Ranking, as formulated in (130), successfully accounts for the attested patterns found in binary coordination. We now consider the more

[43] Note that even under this analysis the construction is not necessarily problematic, since we could still argue that *puṟu* is a second position clitic.

complex case of multitermed coordination – that is, coordinate structures in which more than two Coordinands are coordinated to produce a single semantic relationship, represented syntactically by a multi-branching 'flat' structure. (We will not consider nested structures, where one or more Coordinands is a coordinate structure in its own right, since these do not raise any additional issues: each separate coordinate structure will have to be grammatical in its own right.[44]) Where binary coordination is marked by a medial coordinator, there are two equivalent options available for multitermed coordination (as already demonstrated at some length by the English examples in section 4.4): either a coordinator appears between every Coordinand, or the construction is marked by a single coordinator. In languages in which the coordinator is uncontroversially head-initial, or prepositive, such as English, Dutch, German, and Hindi-Urdu, this single coordinator must attach to the final Coordinand, exactly as it does in binary coordination. This is illustrated by the following English and Hindi-Urdu examples:

(147) a) [earth,] [fire,] [water] [*and* air] *English*

b) * [earth,] [fire,] [*and* water,] [air]

c) * [earth,] [*and* fire,] [water,] [air]

(148) a) [namak,] [kal-ii mirch] [*aur* makkhan] *Hindi-Urdu*
salt black-F pepper and butter
'salt, black pepper and butter'

b) * [namak,] [*aur* kal-ii mirch] [makkhan]
salt and black-F pepper butter

Languages like Amharic and Classical Tibetan, on the other hand, display the inverse pattern, whereby a single coordinator can appear between the first two Coordinands, leaving any remaining Coordinands unmarked:

(149) kägäbäyä [[č̣äw=*ənna*] [bärbärre] [qəbe]] amäṭṭa^{w}h. *Amharic*
from.market salt=and pepper butter I.brought
'I brought from the market salt, pepper and butter.'
(Haspelmath 2007:12, ex 36b, citing Leslau 1995:725)

[44] The only possible restriction is phonological: in polysyndetic structures, one of two adjacent coordinators may undergo obligatory deletion as a result of haplology (see, for example, Kuno 1973:118-121 for a discuission of this phenomenon in relation to coordinators in Japanese).

(150) [sa=*daṅ*] [tšhu] [me] [rluṅ] *Classical Tibetan*
earth=and fire water air
'earth, fire, water and air' (Beyer 1992:241)

This contrast between the Amharic and Classical Tibetan examples, and the uncontroversial [A[CO B]] languages, suggests that something different is going on here. If the head-initial coordinator must attach to the final Coordinand both in binary and in multitermed coordination, it seems reasonable to assume that the head-final coordinator, which attaches to the initial Coordinand in binary coordination ([[A CO]B]), should also attach to the initial Coordinand in multitermed coordination. On the basis of the data in (149)-(150), therefore, I assume that Amharic and Classical Tibetan, like Japanese and Lezgian, also exhibit postpositive, or head-final, medial coordinators, bearing out the prediction that languages using this strategy must be consistently head-final.

Note that the option of being realised only once in multitermed coordination does not seem to be available for all coordinators. In some cases a medial coordinator must appear between every Coordinand. For example, the head-initial coordinating conjunction *-o* in Persian must appear on every non-initial Conjunct (as in (2) above; Stilo 2004:285), while the head-final coordinating conjunctions *-to* in Japanese and *-ni* in Lezgian obligatorily appear on every non-final Conjunct (Hinds 1986:94; Haspelmath 1993:327). As for polysyndetic coordination, wherever binary coordination is marked by polysyndeton, the equivalent multitermed coordinate structure will always be marked by polysyndeton as well (Haspelmath 2004:5).

Putting these different means of marking multitermed coordination together results in the following typology:

(151)

Head-initial:		*Head-final:*	
Binary:	Multitermed:	Binary:	Multitermed:
A[CO B] →	[A][B][C][CO D] [A][CO B][CO C][CO D]	A[CO B] →	[A][B][C][CO D] [A][CO B][CO C][CO D]
		[A CO]B →	[A CO][B][C][D] [A CO][B CO][C CO][D]
		[A CO][B CO] →	[A CO][B CO][C CO][D CO]

The tableaux in (152)-(153) show that this typology is precisely captured by the Harmonic Word Order Ranking in (130). We use examples with four Coordinands since examples involving more than four do not raise any additional issues:

(152)

Head-final	HEAD-PROXIMATE	*ADDITIONAL COORDINATOR	MARK NON-INITIAL	EDGE DIFFERENT	HEAD UNIFORMITY
a. ☞ [A][B][C][CO D]			*(!)*		
b. ☞ [A][CO B][CO C][CO D]		*(!)*			
c. [CO A][CO B][CO C][CO D]		*(!)**(!)		*(!)	
d. [A CO][B][C][D]			*(!)**(!)		*(!)
e. [A][B][CO C][CO D]		*(!)	*(!)	*(!)	
f. [A CO][B CO][C CO][D]		*(!)*	*(!)		*(!)
g. [A CO][B CO][C CO][D CO]		*(!)**(!)		*(!)	*(!)***
h. [A][B][CO C][D]	*!		**	*	

(153)

Head-final	HEAD-PROXIMATE	*ADDITIONAL COORDINATOR	MARK NON-INITIAL	EDGE DIFFERENT	HEAD UNIFORMITY
a. ☞ [A][B][C][CO D]			*(!)*		*(!)
b. ☞ [A CO][B][C][D]			*(!)**(!)		
c. ☞ [A][CO B][CO C][CO D]		*(!)*			*(!)**
d. ☞ [A CO][B CO][C CO][D]		*(!)*	*(!)		
e. ☞ [A CO][B CO][C CO][D CO]		*(!)**(!)		*(!)	
f. [A][B][CO C][CO D]		*(!)	*(!)	*(!)	
g. [A][B CO][C CO][D CO]	*!	**			
h. [A][B CO][C][D]	*!		**	*	

Firstly, we consider the case of head-initial Coordinands, given in the tableau in (152). There is no single candidate that satisfies all five constraints. The optimal candidate or candidates will therefore have to satisfy the undominated Head-Proximate Filter, and perform better than the other candidates that also satisfy this constraint on some possible ranking of the remaining four constraints. Of the seven candidates that satisfy the Head-Proximate Filter (a)-g)), candidate a) will be optimal wherever *Additional Coordinator dominates Mark Non-Initial at some point in the ranking. Conversely, candidate b), which obeys Mark Non-Initial but incurs two violations of *Additional Coordinator, since a single coordinate structure is marked three times, will be optimal wherever Mark Non-Initial dominates *Additional Coordinator. Candidates c)-g), on the other hand, will never be optimal, irrespective of the relative ranking of the constraints dominated by the Head-Proximate Filter, since for every constraint for which they perform better than, or equally well with, some other candidate, either candidate a) or candidate b) performs equally well on this constraint, better on at least one of the others, and no worse on any remaining constraints. Therefore, a) and b) remain the optimal candidates, reflecting the attested options for head-initial Coordinands: [[A][B][C][CO D]] and [[A][CO B][CO C][CO D]]; that is, two different means of marking coordination are possible for multitermed coordination in head-initial structures, depending on the language-specific ranking of the constraints *Additional Coordinator and Mark Non-Initial. Where *Additional Coordinator and Mark Non-Initial are equally ranked within a given language, both options will be available, as in English.

We now turn to head-final Coordinands, in the tableaux in (153). Again, there is no candidate that satisfies all five constraints. Of the candidates that satisfy the undominated Head-Proximate Filter (a)-f)), candidate a) will be optimal wherever *Additional Coordinator dominates Mark Non-Initial, which in turn dominates Head Uniformity. Candidate b) will be optimal wherever both *Additional Coordinator and Head Uniformity dominate Mark Non-Initial. Candidate d) will be optimal wherever both Edge Different and Head Uniformity dominate Mark Non-Initial, which in turn must dominate *Additional Coordinator. Candidate e) will be optimal wherever both Mark Non-Initial and Head Uniformity dominate *Additional Coordinator and Edge Different. Any remaining ranking results in c) as the optimal candidate. This has the desired consequence that, depending on the language-specific ranking of the constraints ranked below the Head-Proximate Filter, there are cross-linguistically five possible optimal candidates (a)-e))for multitermed coordinate structures where the Coordinands are head-final, corresponding to the five orders attested for such structures in (151).

We have seen then that by proposing a universal ranking of ordering constraints applying to coordinate structures, as in (130), we can successfully account for the typological distribution of coordinators, in much the same way as we accounted for the distribution of subordinating linkers in chapter 3. In both cases the Head-Proximate Filter, requiring the relevant linker to

intervene, is undominated, such that linkers, whether subordinating or coordinating, are the only syntactic heads for which disharmony is unattested. In chapter 3 we compared the predictions of the Harmonic Word Order Ranking (together with the theory of feature-specific constraints applying to lexical, or semantically contentful, heads) with an alternative proposal for ruling out absent disharmonic orders, the Final-over-Final Constraint (FOFC, Holmberg 2000, Biberauer, Holmberg and Roberts 2007 *et seq*), and found that much of the data falls outside the explanatory scope of FOFC. The same is true when we compare FOFC with the Harmonic Word Order Ranking as applied to coordinate structures. In coordinate structures, head-initial coordinators are found heading both head-initial and head-final Coordinands, while head-final coordinators are only permitted where the Coordinand is also head-final, exactly as predicted by FOFC. However, this restriction alone does not give us the whole story. According to FOFC, in principle any of the eight logically possible patterns for binary coordination will be allowed where the Coordinands are head-final, while for head-initial Coordinands, as well as the grammatical [A[CO B]], FOFC also allows the unattested patterns [[CO A]B] and [[CO A][CO B]]. This problem of overpermissiveness will only be magnified as the number of Coordinands within the coordination relationship increases, since FOFC in principle will allow any coordinator to attach to any and every head-final Coordinand, and with head-initial Coordinands, only places a restriction such that the coordinator should be head-initial, and not on which Coordinands it can attach to. On the other hand, the Harmonic Word Order Ranking in (130) clearly and correctly predicts both which Coordinand(s) can be marked, as well as the direction of headedness of the coordinator.

4.7 Conclusion

In this chapter I have argued that syntactically independent coordinators constitute further examples of linkers, being semantically vacuous functional heads serving as a syntactic means of marking a grammatical relationship. Any differences in the behaviour of subordinating and coordinating linkers can be attributed not to any inherent difference in the type of linker, but rather to the differing syntax of the subordination and coordination relationships: the former is an asymmetric relationship motivated by s-selectional properties of either Head or Dependent, while the latter is a symmetric relationship of mutual adjunction occurring independently of s-selection. We have seen that subordinating and coordinating linkers are subject to various restrictions that are unique to the class of linkers: the structural intervention requirement of chapter 2 and the unviolated Head-Proximate Filter of chapter 3. The way in which these restrictions are played out is determined by the syntactic properties peculiar to the Head-Dependent and coordination relationships.

Chapter 5: Conclusion

The aim of this thesis has been to present evidence for a unified class of semantically vacuous functional heads serving as a syntactic means of marking a grammatical relationship through structural intervention. This class of heads we have termed 'linkers'. Through studying restrictions on the structural and linear distribution of subordinating and coordinating linkers cross-linguistically, the thesis has shed light on a number of broader areas of syntax: the nature of projection in morphology and syntax; word order principles; and the place of coordinate structures within phrase-structure principles.

Firstly, I proposed in chapter 2 that affixes are distinguished from independent syntactic words in that the latter, but not the former, project in their own right in the syntax. We saw empirical evidence supporting a distinction in the syntax between affixes and independent syntactic words through comparing the cross-linguistic distribution of relationship-marking affixes and independent syntactic words (linkers). We saw that while affixes may be used to mark both Heads and Dependents (Nichols 1986, 1992), as well as the relationship between heads within an extended projection, subordinating linkers are restricted to the Dependent-marking function, appearing as the highest head in the extended projection of the Dependent. It was proposed that this restriction arises due to a structural intervention requirement on relationship-markers that are syntactically independent (i.e. linkers). I further argued that, when we take into account the principles of extended projection as proposed by Grimshaw (1991/2005, 2000), the presence in the syntax of heads lacking features referring to semantics (i.e. linkers) does not pose a problem (*contra* Chomsky 1995b, 2000).

Secondly, I presented a theory of word order leading to a new generalisation over the presence or absence of disharmony cross-linguistically: we saw that for linkers disharmony is ungrammatical, while for any other head disharmony is simply dispreferred (chapter 3 and section 4.6). I proposed that the notion of harmonic word order is defined by the interaction of various independently motivated word order constraints in a universal Harmonic Word Order Ranking, with the Head-Proximate Filter taking precedence – a constraint requiring linear proximity between one member of a relationship and the highest head in the (partial) extended projection of another. It was proposed that disharmony occurs where either a lexical head or a head bearing syntactic features encoding semantics has an ordering constraint of its own, overriding some or all of the constraints of the Harmonic Word Order Ranking. Moreover, it was argued that these ordering constraints operate exclusively over the base-generated structure, suggesting that linearisation takes place prior to the deletion of any lower copies of moved material.

We saw that the combination of these theories of harmony and disharmony explains a number of different word order phenomena. Firstly, it leads to the restriction that linkers invariably intervene linearly between the members of the relationship they mark (*modulo* the additional coordinator in polysyndetic coordinate structures). Moreover, it explains why semantically contentful synchronic or diachronic counterparts of linkers, such as causative or comitative markers, do not share this restriction. Similarly, we saw that this same linear intervention restriction operating over linkers does not extend to affixes serving the same relationship-marking function, confirming the conclusion of chapter 2 that affixes do not project in their own right in the syntax.

Secondly, the theory of word order presented here provides an explanation for a number of left-right asymmetries. Regarding subordination structures (chapter 3), it explains why OV languages allow both initial and final subordinating complementisers, while VO languages allow only initial subordinating complementisers. Moreover, it accounts for why the supposedly 'disharmonic' pattern COV is just as common as the harmonic OVC pattern. In the same way, we have an explanation for why preverbal and postverbal complement clauses to verbs occur with near equal frequency in OV languages, while VO languages only allow postverbal complement clauses. Similarly, the fact that prenominal and postnominal relative clauses appear in OV languages with near equal frequency, while prenominal relative clauses in VO languages are rare, is explained. Moreover, a very precise prediction is made about exactly which VO languages will allow prenominal relative clauses: only those in which the noun consistently appears following any Dependents that are merged below the level of the relative clause.

In the same way, in terms of coordination (section 4.6), the Harmonic Word Order Ranking accounts for the fact that head-initial coordinators appear in both head-initial and head-final constructions, but that head-final coordinators only appear in head-final constructions. Similarly, polysyndeton – whereby every Coordinand is marked by a coordinator – is only used as a neutral means of marking coordination where it is postpositive, rather than prepositive, and again only in head-final constructions. Monosyndeton, on the other hand, is available in both head-initial and head-final constructions. A final asymmetry is concerned with the site of attachment of the coordinator where the coordinate structure is marked by a single coordinator: in head-initial constructions, the coordinator invariably attaches to the final Coordinand, whereas in head-final constructions, the coordinator may attach either to the final Coordinand (if the coordinator is head-initial), or to the initial Coordinand (if the coordinator is head-final).

In successfully accounting for the above phenomena, we saw that the theory of word order presented in this thesis is empirically superior to the Final-Over-Final Constraint (Holmberg 2000, Biberauer *et al* 2007 *et seq*), in terms of both what is permitted and what is disallowed.

Finally, chapter 4 was concerned with showing that syntactically independent coordinators form a unified class with subordinating linkers, being semantically vacuous functional heads serving as a syntactic means of marking a grammatical relationship through structural intervention. I argued that any differences in the behaviour of subordinating and coordinating linkers can be attributed not to any inherent difference in the type of linker, but rather to the differing syntax of the subordination and coordination relationships.

Concerning the syntax of coordination, I presented arguments showing that a number of properties of coordinate structures cannot be explained by the asymmetric Boolean phrase theory first proposed by Munn (1987), but are compatible with, or even predicted by, the symmetric structure proposed by Neeleman (2006) in which Coordinands are mutually adjoined to each other. In particular, it was noted that the majority of cases of postpositive polysyndeton – in many languages the only available means of marking a particular coordinate structure – fall outside the scope of the predictions of the Boolean phrase. In addition, new binding data was given supporting Progovac's (1997 *et seq*) conclusion that, *contra* the predictions of the Boolean phrase, there is no c-command between Coordinands.

Furthermore, in accounting for the syntax of multitermed coordinate structures, I argued against the popular view that phrase-structure is inherently binary-branching. Instead I suggested that the syntax allows the merger of a potentially infinite number of syntactic objects, but that there is a restriction such that only one s-selectional requirement can be satisfied per operation of merge. When combined with the structural intervention requirement of chapter 2, this leads to the possibility of *n*-ary branching for coordinate structures, but not elsewhere. While empirical evidence has previously been presented that is suggestive of *n*-ary branching in multitermed coordinate structures (Borsley 1994, 2005; Winter 2006), it is in this thesis that for the first time this *n*-ary branching hypothesis for coordination is backed up by unambiguous evidence from constituency. While it is often argued that *n*-ary branching analyses are too permissive, the constituency arguments from the scope of adjuncts and extraposition showed that in fact only an *n*-ary branching structure for coordination can successfully rule out certain ungrammatical structures and unattested interpretations: it is the binary branching analysis that is too permissive.

Putting these different results together, we have seen in conclusion that the behaviour of a particular linker can be determined by its defining characteristics of syntactic projection, lack of

features referring to semantics, and structural intervention, when combined with independently motivated principles of projection, word order and phrase-structure.

Appendix: Languages with Linkers in the Noun Phrase

Classification	No. of lgs. in sample	Language	Position of linker
Afro-Asiatic	10		
- Chadic	(9)		
Biu-Mandara	(8)		
A	(1)	Gude	Postnominal
B	(7)		
Kotoko-Yedina			
Kotoko	(5)		
North	(3)	Afade	Postnominal
		Goulfey	Postnominal
		Mpade	Postnominal
South	(2)	Lagwan	Postnominal
		Mser	Postnominal
Zina	(2)	Mazera	Postnominal
		Zina	Postnominal
West Chadic	(1)	Nyam	Postnominal
- East Cushitic	(1)	Dasenech	Prenominal
Austronesian	13		
- Formosan	(4)		
Atayalic		Mayrinax Atayal	Prenominal/Both
Bunnan		Isbukun Bunan	Prenominal
Central East Formosan		Amis	Prenominal
Northern Formosan		Pazih	Prenominal/Both
- Malayo-Polynesian	(9)		
Nuclear Malayo-Polynesian	(1)	Palauan	Both
Oceanic	(5)		
Central-Eastern Oceanic	(2)		
Central Pacific		Rotuman	Postnominal
Micronesian		Kiribati	Postnominal
Meso-Melanesian	(1)	Bali-Vitu	Postnominal
Polynesian	(1)	Samoan	Postnominal
Southern Oceanic	(1)	Malo	Postnominal
Philippine	(3)		
Central Philippine	(1)	Tagalog	Both
Northern Luzon	(2)		
Central Cordilleran		Batad Ifugao	Both

Ilocano		Ilocano	Both
Creole languages	2		
- Dutch Creole		Berbice Dutch Creole	Postnominal
- English Creole		Tok Pisin	Postnominal
Indo-European	18		
- Albanian	(1)	Albanian	Postnominal
- Indo-Iranian	(11)		
Indo-Aryan	(2)	Hindi	Prenominal
		Urdu	Both
Western Iranian	(9)		
Northwestern Iranian	(7)		
Caspian	(2)	Gilaki	Both
		Mazandarani	Both
Kurdish	(5)	Balochi	Postnominal
		Hawrami	Postnominal
		Kurmanji	Postnominal
		Sorani	Postnominal
		Zazaki	Postnominal
Southwestern Iranian	(2)	Persian	Postnominal
		Tajik	Postnominal
- Italic	(3)		
Romance			
East Romance	(1)	Romanian	Postnominal
Italo-Western	(2)		
Italo-Dalmation		Italian	Postnominal
Western		French	Postnominal
- West Germanic	(3)		
Anglo-Frisian		English	Postnominal
High German		German	Postnominal
Low Franconian		Dutch	Postnominal
Japonic	1	Japanese	Prenominal
Korean	1	Korean	Prenominal
Kwadi-Khoe	1		
- Khoe		Khoekhoe	Postnominal
Mayan	1		
- Cholan-Tzeltalan		Tzeltal	Prenominal
Niger-Congo	9		
- Atlantic-Congo	(10)		

Benue-Congo	(7)		
Bantoid			
Central Bantu			
Zone D	(1)	Kilega	Postnominal
Zone E	(2)	Gikuyu	Postnominal
		Kiitharaka	Postnominal
Zone G	(1)	Swahili	Postnominal
Zone J	(2)		
Haya-Jita		Haya	Postnominal
Konzo		Kinande	Postnominal
Zone N	(1)	Chichewa	Postnominal
Volta-Congo	(2)		
Eastern Kru			
Bete		Gbadi	Prenominal
Dida		Vata	Prenominal
Senegal-Guinea	(1)	Wolof	Postnominal
- Central-Southwestern Mande	(1)	Bambara	Prenominal
Nilo-Saharan	12		
- Central Sudanic	(9)		
East	(5)		
Lendu	(1)	Lendu	Prenominal
Mangbutu-Efe	(2)	Mamvu	Prenominal
		Mangbutu	Prenominal
Moru-Madi	(2)		
Central		Lugbara	Prenominal
Southern		Ma’di	Prenominal
West	(4)		
Bongo-Bagirmi	(3)		
Bongo-Baka	(1)	Bongo	Postnominal
Sara-Bagirmi	(2)	Bagirmi	Postnominal
		Sara Mbai	Postnominal
Kresh	(1)	Kresh	Postnominal
- East Sudanic	(2)	Dholuo	Postnominal
		Lango	Postnominal
- Songhay	(1)	Koyra Chiini	Prenominal
Penutian	1	Tsimshian	Postnominal
Sino-Tibetan	8		
- Sinitic	(3)		

Chinese		Cantonese	Prenominal
		Mandarin	Prenominal
		Taiwanese	Prenominal
- Tibeto-Burman	(5)		
Himalayish	(2)		
Mahakiranti		Newari	Prenominal
Tibeto-Kanauri		Byansi	Prenominal
Lolo-Burmese	(2)		
Burmish		Burmese	Prenominal
Loloish		Lahu	Prenominal
Northeast Tibeto-Burman	(1)	Bai	Prenominal
Tai-Kadai	1		
- Tai		Thai	Postnominal
Trans-New Guinea	1		
- Madang		Amele	Prenominal

Data from Tucker & Bryan (1966); Koopman (1984); M. Ross (1998); Zeitoun *et al* (1999); P. Li (2000); Matambirofa (2000); P. Li & Tsuchida (2001); Kinyalolo (2002); Rijkhoff (2002); Den Dikken & Singhapreecha (2004); Holmberg & Odden (2004); Kutsch Lojenga (2005); Shklovsky (2005); Svenonius (2006); Witzlack-Makarevich (2006); Dryer (2007, 2008e); Bögel *et al* (2008); Jahani (2008); Spencer (2008); Andreas *et al* (2009); Larson (2009); Tourneux & Mahamat (2009)

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