

# **Nominal juxtaposition in Australian languages: An LFG analysis**

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(Received 15 May 2007; revised 19 April 2009)

## **Abstract**

It is well known that Australian languages make heavy use of nominal juxtaposition in a wide variety of functions, but there is little discussion in the theoretical literature of how such juxtapositions should be analysed. We discuss a range of data from Australian languages illustrating how multiple nominals share a single grammatical function within the clause. We argue that such constructions should be treated syntactically as set-valued grammatical functions in Lexical-Functional Grammar (LFG). Sets as values for functions are well-established in LFG and are used in the representation of adjuncts, and also in the representation of coordination. In many Australian languages, coordination is expressed asyndetically, that is, by nominal juxtaposition with no overt coordinator at all. We argue that the syntactic similarity of all juxtaposed constructions (ranging from coordination through a number of more appositional relations) motivates an analysis in which they are treated similarly in the syntax, but suitably distinguished in the semantics. We show how this can be achieved within LFG, providing a unified treatment of the syntax of juxtaposition in Australian languages and showing how the interface to the semantics can be quite straightforwardly defined in the modular LFG approach.

## **1 Introduction**

Australian languages, like many of the world's languages (Haspelmath 2004), frequently express nominal coordination with an asyndetic construction in which the coordinated nominals

are simply juxtaposed.<sup>1</sup> Nominal juxtaposition is also used in many of these Australian languages to express a wide range of other non-coordinated construction types (see e.g. Blake (1987)), including pronoun-noun appositions, part-whole constructions, generic-specific constructions and inclusory constructions, to be exemplified below. Juxtaposed nominal structures in Australian languages have received very little attention in the theoretical literature, yet they raise many interesting issues for syntactic analysis. In particular, the fact that such a range of coordinated and non-coordinated construction types are found with the same surface syntax has implications for many standard syntactic analyses which would assume that coordinations have a distinct syntactic structure from other nominal-nominal combinations, such as those postulating a CoordP for coordinate structures (Progovac, 1997; Johannessen, 1998)), for example. In this paper we provide an analysis of the full range of nominal juxtapositions in Australian languages in Lexical-Functional Grammar (LFG), which exploits the flexible architecture of LFG to capture the syntactic similarities of the various juxtaposed nominal constructions while allowing them to be suitably distinguished in the mapping to the semantics. On the view that we explore, the surface similarity between coordination and a whole range of other construction types which are expressed by means of juxtaposition motivates a similar treatment for each of these construction types in the syntax. Our analysis builds on the standard LFG approach to coordination (Kaplan and Maxwell, 1988; Dalrymple and Kaplan, 2000; Dalrymple, 2001) in which coordinated NPs are treated as set-valued grammatical functions at f-structure. We argue that non-coordinated juxtapositions, in which multiple nominals in juxtaposition share a single grammatical function in the clause, should likewise be treated as sets at f-structure, providing a unified analysis of a range of nominal juxtapositions common to many Australian languages. The differences between the various construction types are captured by distinguishing between them in the mapping to the semantics, which we discuss in some detail in §5. Our modular approach, which differentiates syntactically between different types of nominal juxtaposition *only* in so far as such differentiation is overtly justified,

provides a natural and unified account of nominal juxtaposition in Australian languages.

The paper is structured as follows. In §2 we introduce the range of construction types which are widely and productively expressed by means of nominal juxtaposition in some Australian languages. §3 outlines the LFG approach to the syntax of coordination, which will form the basis of our syntactic account of nominal juxtapositions in Australian languages. §4 shows how this approach can straightforwardly account for asyndetic coordination structures and extends this syntactic analysis to account for the syntax of other juxtaposed nominal structures in Australian languages as well, providing both a natural account of these constructions and a unified account of juxtaposition in Australian languages. In §5 we outline the semantics which differentiates these different construction types. §6 shows how a possibility inherent to our account of nominal juxtaposed structures provides for a straightforward account of inclusory constructions and §7 concludes.

## 2 Juxtaposed nominal constructions

The most common way to encode nominal coordination in Australian languages is through juxtaposition, whereby the coordinated nominals are simply listed with no particular marker of their coordinated status (1-6). The fact that such phrases have a conjunctive interpretation is shown by the form of elements which agree with the construction as a whole; for example the coreferential pronouns in (3) and (4), and the verbal agreement marker in (5) and (6) pick up the *resolved* number feature.<sup>2</sup>

- (1) *niya kurrka-tha barruntha-ya wuran-ki nguku-y.*  
heNOM take-ACT yesterday-LOC food-MLOC water-MLOC  
'Yesterday he took (with him) food and water.' (Evans, 1995, 250: Kayardild)

- (2) *Gaj-ba ngurru manganyma yangaji.*  
eat-FUT 1PL.INC(NP) tucker.(ACC) meat.(ACC)  
'Let's eat the bread and meat.' (Nordlinger, 1998a, 257: Wambaya)

- (3) *Paanth thono pam pul mimp katp-r*  
 woman one(NOM) man(NOM) 3du(NOM) cloth(ACC) grasp-NP  
 ‘A woman and a man are holding up a piece of cloth.’ (Gaby, 2006, 318: Kuuk Thaayorre)
- (4) *Dathin-a maku-wa bithiin-da bi-l-da warra-j.*  
 that-NOM woman-NOM man-NOM 3-PL-NOM go-ACT  
 ‘Those men and women are going.’ (Evans, 1995, 249: Kayardild)
- (5) *Ngayirni babi-rni ngiji-nginyi-nu kujkarrana yaminju-nu, nyu-rruku*  
 1SG.ERG older.brother-ERG see-1DU.EX-did two(M) shooting.star-did 2SG-went  
*nyinawarra.*  
 this.way  
 My brother and I saw two shooting stars when you’d gone. (Pensalfini, 2003, 178: Jingulu)
- (6) *Pala-nga ngatu jarri-nya-pinti-ngi, mima-nikinyi-yi puluku, kujarra*  
 that-LOC stationary INCH-NM-ASS-LOC wait.for-IMP-3PL.SUB 3DU.DAT two  
*kangkuru-jirri waraja yalapara.*  
 kangaroo-DU one goanna.  
 ‘And there, on the finishing line, the two kangaroos and one goanna waited for those two.’ (Sharp, 2004, 315: Nyangumarta)

Consistent with the ‘free word order’ properties typical of many of these languages (Hale, 1983; Simpson, 1991; Nordlinger, 1998b; Austin, 2001), such coordinations can also be discontinuous in some languages, as shown in (7) and (8) (compare these with the contiguous example from Kuuk Thaayorre in (3)).<sup>3</sup>

- (7) *Ngul ngay kirk kempthe kal-m thul=yuk*  
 then 1SG(ERG) spear(ACC) apart carry-P.IPFV woomera(ACC)  
 ‘I used to carry spears and woomeras separately’ (Gaby, 2006, 320: Kuuk Thaayorre)
- (8) *Nganip-n ngancn yik-nhat nganam-un*  
 father-DAT 1PL.EX(NOM) say-P.PFV mother-DAT  
 ‘we said to Dad and Mum’ (Gaby, 2006, 320: Kuuk Thaayorre)

Beyond coordination, Australian languages are characterised by extensive use of nominal juxtaposition, exhibiting a substantial amount of flexibility as to how nominal sequences are to be interpreted semantically (Blake (1987, 2001); Dixon (2002)). For example, many Australian languages make use of both generic-specific constructions and part-whole constructions in which nominals are placed in syntactic juxtaposition and jointly determine the referent of the syntactic argument. Below we provide examples from a selection of languages – Kalkatungu, Kayardild and Yidiny – illustrating the use of juxtaposition to encode generic-specific and part-whole constructions both across languages, and within a single language. (9) - (14) illustrate generic-specific constructions.

(9) *tjaa maa wartatji*  
 this vegetable.food orange  
 ‘the/this orange’ (Kalkatungu, Blake 2001: 418)

(10) *Ngayika ati-ntji ari-li thuwarr-ku.*  
 I meat-DAT eat-APASS snake-DAT  
 ‘I’m eating snake.’ (Kalkatungu, Blake 2001: 419)

(11) *Dathin-a dangka-a niya wumburung-kuru raa-ja wanku-ya*  
 that-NOM man-NOM 3SG.NOM spear-PROP spear-ACT elasmobranch-MLOC  
*kulkiji-y.*  
 shark-MLOC  
 ‘That man speared a shark with a spear.’ (Kayardild, Evans 1995: 244)

(12) *dathin-a jardi-wuthin-da badi-ja jul-i wuran-ki*  
 that-NOM mob-PLENTY-NOM carry-ACT bone-MLOC food-MLOC  
 ‘All those (ants) are carrying a bone.’ (Kayardild, Evans 1995: 244)

(13) *gana mayi jimirr jula:lin*  
 TRY vegetable(ABS) yam(ABS) dig-GOING-IMP  
 ‘Go and try to dig some yams up!’ (Yidiny, Dixon 1977: 247)<sup>4</sup>

- (14) *bama muula:rri wulngga:ny bana:*  
 person(ABS) initiated.man(ABS) cover-PAST water-LOC  
 ‘The initiated men were drowned by the (rising) water.’ (Yidiny, Dixon 1977: 247)

In all of these examples we find a ‘generic’ nominal (e.g. ‘vegetable food’, ‘meat’, ‘person’) combined with a ‘specific’ nominal (e.g. ‘orange’, ‘snake’, ‘initiated man’) to *jointly* determine the reference of the NP as a whole. The appropriate English equivalent of these generic-specific constructions is really a single referential NP, as per the translation provided. These constructions, therefore, are *not* equivalent to non-restrictive appositional constructions in English such as ‘I am eating meat, namely snake’, or ‘I saw the elasmobranch, namely the shark’, in which one single nominal specifies or defines the reference and the other provides elaboration. Nor are they equivalent to such English constructions in discourse or pragmatic terms. Rather the use of both nominals is, in these languages, a pragmatically neutral way to encode reference. See Wilkins (2000) for further discussion of this point in relation to the Australian data.

Part-whole juxtapositions operate similarly, as shown by the following examples:

- (15) *ngida wamburra*  
 tree trunk  
 ‘tree trunk’ (Kayardild, Evans 1995: 248)

- (16) *dangkaa ngabaya*  
 person spirit  
 ‘person’s spirit’ (Kayardild, Evans 1995: 248)

- (17) *jugi gubu gana ngayu wanggi wawa:lna*  
 tree(ABS) leaf(ABS) TRY I(NOM) up look(PURP)  
 ‘I must try to look up at the leaves on the trees.’ (Yidiny, Dixon 1977: 248)

In the examples above of the part-whole construction we find juxtaposed nominals each carrying the same case marking, serving as (part of) the same grammatical function, and jointly picking out the relevant referent for the NP as a whole.

In addition to generic-specific and part-whole constructions, nominal juxtaposition is very common in expressing a number of other construction types in which multiple nominals and pronouns are strung together in a single clause, jointly determining a single referent or having overlapping reference. Examples include the following:<sup>5</sup>

(18) *Garidi-ni bungmanyi-ni gin-amany yanybi.*  
 husband.-ERG old.man.-ERG 3SG.M.A-P.TWD get  
 ‘(Her) old man husband came and got (her).’ (Nordlinger, 1998a, 133: Wambaya)

(19) *Pam-al ith nhul may carrots yakake:rr*  
 man-ERG that 3sgERG VE carrots cut:RDP:P.PFV  
 ‘The man cut up the carrots.’ (Gaby, 2006, 290: Kuuk Thaayorre)

(20) *Nhani mankada nhintha pani*  
 3SG.F.NOM girl(ABS) shame none  
 ‘The girl is shameless.’ (Austin, 1981, 102: Diyari)

(21) *yingu bama bunya bindam gali:ny*  
 this(ABS) person(ABS) woman(ABS) ‘name’(ABS) go-PAST  
 ‘This woman Bindam went.’ (Dixon, 1977, 252: Yidiny)

(22) *dathin-a dangka-a niya wirdi-j*  
 that-NOM fellow-NOM 3sgNOM remain-ACT  
 ‘That fellow (Kajurku) was waiting.’ (Kayardild, Evans 1995: 578)

In (18) - (22) we again find strings of nominals and/or pronouns jointly expressing reference to a single entity (or single group of entities). All of these constructions, including the generic-specific and part-whole constructions exemplified above, are often described as ‘appositional’ in the Australianist literature (Blake, 1979, 1983, 1987, 2001; Evans, 1995; Heath, 1978, 1984), where apposition is used in its broadest sense, as in the following traditional definition of this term (Crystal 1997):

**apposition:** A traditional term retained in some models of GRAMMATICAL description for a sequence of units which are CONSTITUENTS at the same grammatical LEVEL, and which have an identity or similarity of REFERENCE (p. 24)

Examples such as (18) and (19) illustrate two very straightforward variants of Australian-style ‘appositional’ constructions – a nominal-nominal appositional construction in (18) in which ‘old man’ is juxtaposed with ‘husband’ in subject function,<sup>6</sup> and a nominal-pronominal appositional construction in (19) in which the nominal elements ‘man’ and ‘that’ are juxtaposed with the coreferential third person pronoun *nhul*.<sup>7</sup> The use of such nominal appositions or juxtapositions is considerably less marked than appositional constructions in English (as in ‘Her husband, the old man, came and got her’, cf. (18)), and are usually best translated with simple non-apposed structures (e.g. ‘The man cut up the carrots’ in (19) and not ‘He, the man, cut up vegetables, being carrots’).<sup>8</sup> More generally, it is important to realise that the Australianist use of the term “apposition” should not be taken to imply that these constructions should be viewed as equivalent to the sorts of non-restrictive constructions often referred to as appositions in English.

Given the wide range of uses to which the term ‘apposition’ has been put in the literature, a terminological aside is important here to clarify our use of the term in this paper (and in the Australianist literature more generally). Note also that we generally seek to avoid this particular terminological minefield in the present paper by using the more neutral term nominal juxtaposition to describe the syntax of these constructions.

In the general literature on apposition a distinction is commonly drawn between restrictive and non-restrictive apposition (e.g. Quirk et al. (1985)) (also known as close vs. loose apposition (e.g. Lekakou and Szendrői (2007))). Consider the pair of examples below: in (23a) the two terms of the apposition, *Burns* and *the poet*, serve jointly to determine the reference of the NP. The expression *Burns* itself does not pick out a unique entity; the restrictive phrase in

a close (or restrictive) apposition restricts the denotation so that a unique referent is picked out. In (23b), on the other hand, *Burns* picks out a unique individual and the expression *the poet* makes a comment or provides further information about this individual. In English (and other languages) a loose apposition is set off intonationally, but in a close apposition the two elements constitute a single intonational unit.

(23) a. Burns the poet (close)

b. Burns, the poet (loose)

There is an extensive body of literature which explores this distinction in a range of languages and different formal frameworks. Much of the syntactic discussion concerning non-restrictive, or loose, appositions has centered on non-restrictive relative clauses, and on whether the relative clause is integrated syntactically, and if so, how or at what level. The ‘radical orphanage’ approach (Fabb, 1990; Espinal, 1991; Peterson, 2004) takes the non-restrictive modifier to be not integrated into the syntactic structure of the matrix at all, whereas integrated approaches generally take non-restrictive relative clauses to be adjoined to the nominal (Jackendoff, 1977; Kempson, 2003; Arnold, 2004, 2007). Amongst the properties of loose or non-restrictive appositions which both integrated and non-integrated accounts have sought to accommodate are a range of interpretational facts: for example, loose appositions appear to escape the scope of sentence negation and that of propositional verbs. For example, the (integrated) approach of Potts (2003, 2005) puts the semantic content of (loose) appositional material in a separate dimension from which it is not accessible to the normal propositional content.

Although the prevalent use of the term apposition in the literature on European languages is to refer to non-restrictive nominal, clausal or other phrases (loose appositions), there has also been work on the nature of close or restrictive apposition and how it relates to modifier-head constructions both syntactically and semantically (Keizer, 2005; Lekakou and Szendrői,

2007; Keizer, 2007; Acuña-Fariña, 1999).<sup>9</sup>

This is an area which is very little explored in Australianist work. It is clear from a look through a number of grammatical descriptions that there are examples which strongly suggest a close (restrictive) interpretation, but that equally, there are examples in which one nominal is set off from the sentence or phrase intonationally, suggestive of a loose or non-restrictive apposition. Unfortunately however, the Australianist literature provides almost no discussion of how these types of appositions may differ syntactically.<sup>10</sup> In this paper, we restrict ourselves to examples of close appositions, such as the examples provided above, which we take to introduce semantic content which is integrated into the truth-conditional semantics. Our use of the term ‘apposition’ (or indeed nominal juxtaposition) here should then also be interpreted as referring to close appositions only.

Returning now to the Australian language data, a further type of juxtaposed construction common to Australian languages is the inclusory construction (Singer, 2001, 2005) (also known in the literature as the ‘plural pronoun construction’ (Schwartz, 1988a)), in which a plural pronoun referring to the superset is combined with a subset nominal. In many languages the inclusory construction involves simple juxtaposition of the two elements, as in the following from Kayardild:

(24) *Nga-rr-a kajakaja warra-ja thaa-th.*

1-DU-NOM daddy.NOM go-ACT return-ACT

‘Daddy and I will go’ (lit. ‘We two, including daddy, will go’) (Evans, 1995, 249:

Kayardild)

Although inclusory constructions have much in common with the other juxtaposed constructions above, they differ in that the agreement features of the whole construction are those of only one of the constituent parts – namely the superset pronoun. We return to a discussion of inclusory constructions and their relationship to other juxtaposed constructions in §6.

Thus, across Australian languages we find juxtaposed nominal constructions used with a range of functions beyond coordination, including generic-specific constructions, part-whole constructions, inclusory constructions and various types of nominal-nominal ‘appositions’. While the specific construction types and their properties can vary across different languages, this general phenomenon whereby sequences of nominals can have multiple interpretations including coordinated and non-coordinated meanings is pervasive among Australian languages and is frequently referred to in the literature as a common characteristic of Australian languages in general (e.g. Blake 1987). Indeed, some researchers have gone so far as to claim for particular Australian languages that they have no noun phrases at all, with all nominals existing in apposition (in the broad sense of the term). This is the analysis given by Blake (1983) for Kalkatungu, for example; and by Heath (1978) for Ngandi in which “noun phrases which have more than one constituent are typically formed by apposition” (p. 52). Even languages with clear NP structures for head-modifier relations also have a range of constructions in which nominals are seemingly juxtaposed without any evidence of syntactic asymmetry. For example, Evans (1995: 247) in discussing the Kayardild constructions exemplified in (11) and (15) above, states that “there are no syntactic reasons for considering one nominal to be the head, and it is better to treat them as apposed nominals”.

Significantly, all of these juxtaposed construction types share the syntactic properties of the asyndetic coordinated constructions in that neither nominal can be clearly identified as the head of the phrase. Evans (1995), for example, treats both nominals in the generic-specific and part-whole constructions as filling the ‘head’ slot in the NP structure (p. 235). He argues explicitly that the constructions are double-headed on the grounds that either noun can function alone as the head of an NP so there is no syntactic dependency and the nouns may appear in either order (pp. 244-248). Similar arguments are made for analogous constructions in other Australian languages such as Kuuk Thaayorre (Gaby 2006: 283), Kalkatungu (Blake 1983) and Mparntwe Arrernte (Wilkins 2000).<sup>11</sup>

Indeed, the only clear formal difference between coordinated constructions and other juxtapositions is that the former show resolved agreement on the verb (in languages with verbal agreement) whereas the latter do not.<sup>12</sup> This difference arises from the fact that the two nominals in coordinated constructions establish distinct referents, whereas the two nominals in other types of juxtapositions combine to identify a single referent. Consider, for example, the Wambaya example below, repeated from (18) above. The fact that the auxiliary (*gin-amany*) shows singular number agreement forces the interpretation of the juxtaposed nominals as describing the same referent. If the auxiliary had dual number agreement here (*gurl-amany*), the NP would be interpreted as a coordination (i.e. ‘(her) husband and the old man’).

- (25) *Garidi-ni      bungmanyi-ni gin-amany      yanybi.*  
 husband-ERG old.man-ERG 3SG.M.A-P.TWD get  
 ‘(Her) old man husband came and got (her).’ (Nordlinger, 1998a, 133: Wambaya)

Note that verbal agreement in languages like English similarly disambiguates between true coordination and boolean coordination in examples such as *My wife and the mother of my children is/are singing*. We return to a discussion of boolean coordination in §7. Of course in both the Wambaya and the English case, verbal agreement cannot disambiguate if both elements are plural.

Apart from this semantically motivated difference (concerning the agreement features), all of these types of juxtaposed constructions – coordinations, generic-specific constructions, part-whole constructions, inclusory constructions and other types of nominal-nominal appositions – have the same basic syntactic structure in that they consist of sequences of nominals fulfilling the same grammatical function, neither of which is syntactically dependent upon the other. In fact, they all satisfy a broad definition of coordination, such as the following from Haspelmath (2007: 1):

The term *coordination* refers to syntactic constructions in which two or more units of the same type are combined into a larger unit and still have the same semantic relations with other surrounding elements.

This suggests that what is appropriate for all of these juxtaposed nominal constructions is an analysis as a multiply-headed structure in the syntax, in which each element is independently fulfilling the same grammatical function in parallel, similar to that usually assumed for coordination (see Blake 1983: 171-172 for a proposal along similar lines). In the following sections we will sketch out such an analysis in LFG and show how it provides an explanatory account of the Australian language data. We begin with a discussion of the standard treatment of coordination in LFG.

### **3 LFG Analysis of Coordination**

LFG is a lexicalist constraint-based syntactic framework which posits two co-present levels of syntactic representation: c-structure, which encodes phrase structural relations (of precedence and dominance) between elements, and f-structure, which represents a level of internal syntactic structure based on grammatical functions, modelling predicate argument relations. C-structures are represented by phrase structure trees of a familiar sort and f-structures are represented by attribute value matrices. C-structures and f-structures (corresponding to a given string) are interrelated by means of a mapping function  $\phi$ , which places elements of c-structure (in the domain) in correspondence with f-structures. The mapping is expressed by means of equations associated with lexical items and phrase structure nodes. The relation between c-structure and f-structure is many-to-one and onto (f-structures can arise which are not related to specific c-structure nodes, and more than one c-structure node can correspond to a single f-structure). Of particular interest is the f-structure which is the minimal structure satisfying a collection of constraints associated with the (c-structure) of a given utterance (the minimal

model): this is the f-structure associated with that utterance. F-structures are subject to well-formedness constraints, notably those of *completeness* and *coherence*, which ensure that all and only the arguments of a predicate are present (as values of subcategorisable grammatical functions) in the f-structure projected by a predicate. For comprehensive introductions to the formalism see Bresnan (2001) Dalrymple (2001) and Falk (2001).

The framework provides a highly modular and flexible framework for syntactic description: in particular it has proved to be sufficiently flexible to provide an appropriate tool for modelling the syntax of widely divergent languages ranging from the highly configurational to the radically non-configurational. A significant body of work has developed LFG analyses of phenomena in Australian Aboriginal languages (Simpson and Bresnan, 1983; Simpson, 1991; Austin and Bresnan, 1996; Nordlinger, 1998b; Wilson, 1999).

A simple sentence such as (26) would have the f-structure (27). F-structures are simple attribute-value matrixes, where values can be atomic or complex. A particular feature of LFG is the use of sets as values of attributes (that is, the value of the attribute is a *set* of f-structures), as in the case of the grammatical function ADJunct in (27), alongside atomic and complex valued features (TENSE and SUBJ respectively in (27)).

(26) Kim wept yesterday.

(27) 
$$\left[ \begin{array}{l} \text{SUBJ} \quad [ \text{PRED} \quad \text{'KIM'} ] \\ \text{ADJ} \quad \{ [ \text{PRED} \quad \text{'YESTERDAY'} ] \} \\ \text{TENSE} \quad \text{PAST} \\ \text{PRED} \quad \text{'WEEP} < \text{SUBJ} > \end{array} \right]$$

When a property is asserted to hold of a set, how it behaves will depend on the nature of the property: the majority of properties are *distributive* and such a feature is an attribute of every member of the set. The grammatical functions are distributive, thus *Kim* is the SUBJ of both the f-structure of *shout* and of the f-structure of *cry* in the (set of) f-structures for *Kim*

*shouted and cried*. As we will see below, agreement features and the CONJFORM feature are non-distributive: when a feature is non-distributive it and its value are a property of the set as a whole.

A standard analysis of NP coordination in LFG (Dalrymple and Kaplan, 2000; Dalrymple, 2001) assumes a c-structure coordination schema along the lines of (28) in which each coordinand is defined as belonging to a set-valued f-structure by virtue of the annotation  $\downarrow \in \uparrow$ .<sup>13</sup>

$$(28) \quad \begin{array}{cccc} \text{NP} & \rightarrow & \text{NP} & \text{CONJ} & \text{NP} \\ & & \downarrow \in \uparrow & \uparrow = \downarrow & \downarrow \in \uparrow \end{array}$$

The representation of a coordinate structure involves a hybrid object, that is, a set which additionally may itself have properties (the non-distributive properties referred to above) alongside the elements or members of the set. Consider the representation of (29), given in (30):

(29) John and I met.

$$(30) \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'MET<SUBJ>'} \\ \text{TENSE} \quad \text{PAST} \\ \\ \text{SUBJ} \quad ji: \left\{ \begin{array}{l} j: \left[ \begin{array}{l} \text{PRED} \quad \text{'JOHN'} \\ \text{INDEX} \quad \left[ \begin{array}{l} \text{NUM} \quad \text{SG} \\ \text{PERS} \quad 3 \end{array} \right] \end{array} \right] \\ i: \left[ \begin{array}{l} \text{PRED} \quad \text{'PRO'} \\ \text{INDEX} \quad \left[ \begin{array}{l} \text{NUM} \quad \text{SG} \\ \text{PERS} \quad 1 \end{array} \right] \end{array} \right] \end{array} \right\} \\ \text{CONJFORM} \quad \text{AND} \\ \text{INDEX} \quad \left[ \begin{array}{l} \text{PERS} \quad 1 \\ \text{NUM} \quad \text{PL} \end{array} \right] \end{array} \right]$$

In (30), each conjunct contributes an f-structure to the set of f-structures which is the value of the SUBJ attribute (labelled  $j$  and  $i$  in (30)). Additionally, the SUBJ (labelled  $ji$ ) has some features which express properties of the set as a whole - in this example, the feature CONJFORM with the value AND and the INDEX feature which expresses the person/number/gender

PNG agreement features of the coordinate structure as a whole (as noted above, agreement features are taken to be non-distributive). A common pattern of agreement with coordinate NPs involves syntactic resolution, whereby the agreement features of all the conjuncts are taken into account in ‘calculating’ the agreement features of the coordinate structure as a whole. Dalrymple and Kaplan (2000) develop an approach to syntactic feature resolution using set valued agreement features and the simple operation of set union. Thus for example, if PERS features are represented as shown in (31), set union gives the standard resolution pattern for this feature. Features such as CONJFORM and INDEX are non-distributive (i.e. resolving) while most features, including grammatical functions such as SUBJ and OBJ, as already noted, are distributive.<sup>14</sup>

$$\begin{aligned}
 (31) \quad & \{\mathbf{S,H}\} (1\text{ST}) \cup \{\mathbf{H}\} (2\text{ND}) = \{\mathbf{S,H}\} (1\text{ST}) \\
 & \{\mathbf{S,H}\} (1\text{ST}) \cup \{\} (3\text{RD}) = \{\mathbf{S,H}\} (1\text{ST}) \\
 & \{\mathbf{H}\} (2\text{ND}) \cup \{\} (3\text{RD}) = \{\mathbf{H}\} (2\text{ND}) \\
 & \{\} (3\text{RD}) \cup \{\} (3\text{RD}) = \{\} (3\text{RD})
 \end{aligned}$$

Similarly, a two gender (M, F) system with resolution to the masculine works as follows (with MASC corresponding to the set  $\{\mathbf{M}\}$  and FEM to the empty set):

$$\begin{aligned}
 (32) \quad & \{\mathbf{M}\} (\text{MASC}) \cup \{\mathbf{M}\} (\text{MASC}) = \{\mathbf{M}\} (\text{MASC}) \\
 & \{\mathbf{M}\} (\text{MASC}) \cup \{\} (\text{FEM}) = \{\mathbf{M}\} (\text{MASC}) \\
 & \{\} (\text{FEM}) \cup \{\} (\text{FEM}) = \{\} (\text{FEM})
 \end{aligned}$$

As shown in (33), the coordination schema for NP coordination in a language with syntactic feature resolution involves simple f-descriptions which ensure that the PERS and GEND features of each NP conjunct be a subset of the PERS and GEND features of the set (in the following, IND abbreviates INDEX).<sup>15</sup>

$$\begin{array}{l}
(33) \text{ NP} \longrightarrow \qquad \qquad \text{NP} \qquad \qquad \text{CONJ} \qquad \qquad \text{NP} \\
\qquad \qquad \qquad \qquad \qquad \downarrow \in \uparrow \qquad \qquad \downarrow = \uparrow \qquad \qquad \downarrow \in \uparrow \\
\qquad \qquad \qquad (\downarrow \text{ IND PERS}) \subseteq (\uparrow \text{ IND PERS}) \qquad \qquad (\downarrow \text{ IND PERS}) \subseteq (\uparrow \text{ IND PERS}) \\
\qquad \qquad \qquad (\downarrow \text{ IND GEND}) \subseteq (\uparrow \text{ IND GEND}) \qquad \qquad (\downarrow \text{ IND GEND}) \subseteq (\uparrow \text{ IND GEND})
\end{array}$$

Resolution of the NUM feature, on the other hand, is not purely syntactic, as shown by the minimally contrasting examples in (34), to which we return briefly in §7.

(34) The president and chief executive are attending the meeting in Beirut.

The president and chief executive is attending the meeting in Beirut.

In LFG it is possible to associate a collection of f-descriptions (or equations) with a name in a template definition. The rule schema can then call the template. This simple and convenient abbreviatory device has a number of useful properties. For example, because templates can call other templates, they can be organised to express linguistic generalisations succinctly (see Dalrymple et al. (2004) for further discussion). The PERS and GEND equations for NP coordination can be expressed in a template:

$$\begin{array}{l}
(35) \text{ NP-CNJT:} \quad (\downarrow \text{ IND PERS}) \subseteq (\uparrow \text{ IND PERS}) \\
\qquad \qquad \qquad (\downarrow \text{ IND GEND}) \subseteq (\uparrow \text{ IND GEND})
\end{array}$$

We can therefore represent (33) more simply as in (36), in which each NP has been associated with the coordination template in (35):

$$\begin{array}{l}
(36) \text{ NP} \longrightarrow \qquad \qquad \text{NP} \qquad \qquad \text{CONJ} \qquad \qquad \text{NP} \\
\qquad \qquad \qquad \qquad \qquad \downarrow \in \uparrow \qquad \qquad \uparrow = \downarrow \qquad \qquad \downarrow \in \uparrow \\
\qquad \qquad \qquad \qquad \qquad \text{@NP-CNJT} \qquad \qquad \qquad \qquad \text{@NP-CNJT}
\end{array}$$

## 4 Modelling nominal juxtaposition

In this section we show how the general LFG approach to coordination described above can be built upon to account for the full range of juxtaposed nominal constructions in Australian languages, discussed in §2. We first show how the basic syntactic analysis of coordination can be extended to account for asyndetic coordination (§4.1), and other non-coordinated juxtaposed constructions (§4.2). We argue that these constructions can all be treated as essentially the same at f-structure, with the differences between them captured in the mapping to the semantics. A preliminary semantic treatment of some of the construction types is provided in §5.<sup>16</sup>

### 4.1 Juxtaposition as Asyndetic Coordination

As we saw in §2, NP coordination in Australian languages is frequently encoded by juxtaposition, without any explicit marker of coordination. It seems reasonable to assume that such coordinate structures receive precisely the same syntactic treatment as (29) above, so that they differ only in the presence (or absence) of a coordinator. This suggests the c-structure schema in (37) for asyndetic nominal coordination. In (37) X is a categorial metavariable ranging over N and NP,<sup>17</sup> otherwise it differs from the standard schema in (36) above only in lacking a CONJ feature.<sup>18</sup> We defer full discussion of the agreement constraints (for the non-distributive INDEX features) to §5, but assume for the moment that the agreement template NP-CNJT is associated with each daughter node, as in (36).

$$(37) \quad X \quad \longrightarrow \quad X \quad , \quad X \\ \qquad \qquad \qquad \downarrow \in \uparrow \qquad \qquad \downarrow \in \uparrow \\ \qquad \qquad \qquad @NP-CNJT \qquad \qquad @NP-CNJT$$

The f-structure corresponding to the coordinated subject in (6) (repeated here) is then that in (39), with resolved INDEX features but no CONJ feature in the outer f-structure.

- (38) *Pala-nga ngatu jarri-nya-pinti-ngi, mima-nikinyi-yi puluku, kujarra*  
 that-LOC stationary INCH-NM-ASS-LOC wait.for-IMPF-3PL.SUB 3DU.DAT two  
*kangkuru-jirri waraja yalapara.*  
 kangaroo-DU one goanna.

‘And there, on the finishing line, the two kangaroos and one goanna waited for those two.’ (Sharp, 2004, 315: Nyangumarta)

- (39) 
$$\left[ \begin{array}{l} \text{INDEX} \left[ \begin{array}{l} \text{PERS} \quad 3 \\ \text{NUM} \quad \text{PL} \end{array} \right] \\ \left\{ \left[ \begin{array}{l} \text{PRED} \quad \text{'GOANNA'} \\ \text{INDEX} \left[ \begin{array}{l} \text{NUM} \quad \text{SG} \\ \text{PERS} \quad 3 \end{array} \right] \end{array} \right] \right\} \\ \left\{ \left[ \begin{array}{l} \text{PRED} \quad \text{'KANGAROO'} \\ \text{INDEX} \left[ \begin{array}{l} \text{NUM} \quad \text{DUAL} \\ \text{PERS} \quad 3 \end{array} \right] \end{array} \right] \right\} \end{array} \right]$$

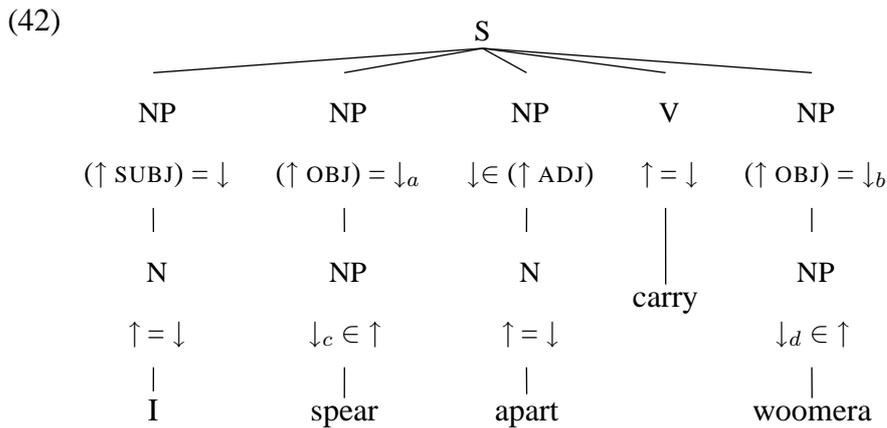
Recall from §2 that coordination structures can be discontinuous, as in the following examples. That these are truly coordinations (and not afterthoughts, for example) is readily established by such things as discourse context (Blake, 2001) and the fact that the verb shows resolved agreement (as in (40)).

- (40) *Kintja-(ng)ku=yana intji-mi-ngi-yu ntiya-(ng)ku tjipa-yi kurlayingu-thu.*  
 female-ERG=and pelt-FUT-me-they.DU stone-ERG this-ERG male-ERG  
 ‘The girl and boy will both pelt me with stones.’ (Blake, 2001, 423: Kalkatungu)

- (41) *Ngul ngay kirk kempthe kal-m thul=yuk*  
 then 1SG(ERG) spear(ACC) apart carry-P.IPFV woomera(ACC)  
 ‘I used to carry spears and woomeras separately’ (Gaby, 2006, 320: Kuuk Thaayorre)

Our analysis combines straightforwardly with the standard approach to discontinuity and non-configurationality in LFG to account for these cases. In LFG c-structure nodes are generally optional – by the Principle of Economy, only those nodes which are motivated by overt lexical material (or by some semantic requirement) are present (Bresnan, 2001).

In an example like (41) the two parts of the coordinate structure appear separated by the verb and its modifier: each is represented at c-structure as a coordinate structure with just one daughter present (42).



In non-configurational structures, the grammatical functions to be assigned to an element of c-structure are not identified in configurational terms but by morphological means. In the example at hand, it is the case marking on the nominals which indicates the SUBJ (marked ERG) and the (discontinuous) OBJ (marked ACC). Since in principle, a wide range of different annotations might be compatible with a string of categories we assume NP under S are freely annotated  $(\uparrow \text{GF}) = \downarrow$  where GF is a meta-variable over the relevant set of grammatical functions. It is the case markers which identify which grammatical function a nominal element maps to (Simpson, 1991; Austin and Bresnan, 1996; Nordlinger, 1998b).

The two ACC-marked NPs under S will both independently co-specify the OBJ f-structure (as shown by the labels *a* and *b* in (42), and contribute elements to the (coordinate) set.

$$(43) \left[ \begin{array}{l} \text{PRED} \quad \text{'CARRY<SUBJ, OBJ>} \\ \text{ADJ} \quad \{ \{ \text{PRED} \quad \text{APART} \} \} \\ \\ \text{OBJ} \quad a, b: \left\{ \begin{array}{l} c: \left[ \begin{array}{l} \text{PRED} \quad \text{'SPEAR'} \\ \text{CASE} \quad \text{ACC} \\ \text{INDEX} \quad \left[ \begin{array}{l} \text{NUM} \quad \text{SG} \\ \text{PERS} \quad 3 \end{array} \right] \end{array} \right] \\ \\ d: \left[ \begin{array}{l} \text{PRED} \quad \text{'WOOMERA'} \\ \text{CASE} \quad \text{ACC} \\ \text{INDEX} \quad \left[ \begin{array}{l} \text{NUM} \quad \text{SG} \\ \text{PERS} \quad 3 \end{array} \right] \end{array} \right] \end{array} \right\} \\ \text{INDEX} \quad \left[ \begin{array}{l} \text{PERS} \quad 3 \\ \text{NUM} \quad \text{PL} \end{array} \right] \\ \\ \text{SUBJ} \quad \left[ \begin{array}{l} \text{PRED} \quad \text{'PRO'} \\ \text{INDEX} \quad \left[ \begin{array}{l} \text{NUM} \quad \text{SG} \\ \text{PERS} \quad 1 \end{array} \right] \end{array} \right] \end{array} \right]$$

If we choose to associate some other annotation with the ACC marked NPs (treating one or both of them as contributing the whole OBJ function, for example), no complete and coherent f-structure would be produced. Our analysis of asyndetic coordination thus extends to account straightforwardly for the possibility of discontinuous coordinations in these languages.

#### 4.2 Juxtaposition Beyond Coordination: A common syntax

In §2 we saw that many Australian languages use nominal juxtaposition to encode a range of non-coordinated construction types, including generic-specific, part-whole, and nominal-pronoun appositions. These constructions show the same syntactic properties as asyndetic coordination: the juxtaposed nominals do not stand in a syntactic dependency relation with one another and fulfill the same grammatical function. Our proposal is that the full range of nominal juxtapositions discussed in §2 have the same surface syntax, and thus should be given the same syntactic analysis (*pace* the non-distributive agreement features) – namely, as

hybrid structures at f-structure. We are therefore arguing that the LFG analysis of coordination be extended to these other juxtaposed constructions also, with the differences between the construction types captured in the mapping to the semantics. Not only does this approach provide a unified account of nominal juxtaposition in Australian languages – both coordinated and non-coordinated – but representation of non-coordinated juxtaposed nominals as members of a set directly captures the intuition expressed by many researchers that these nominals are co-heads (e.g. Blake 1983, Evans 1995, Wilkins 2000, Gaby 2006).<sup>19</sup>

On our analysis, the f-structure corresponding to the nominal juxtaposition in (18), repeated in (44), is as in (45). Apart from the value of the non-distributive (INDEX) features of the set (which we discuss below), the f-structure in (45) is structurally identical to that associated with the coordination in (6) ((39) repeated as (46)).

- (44) *Garidi-ni bungmanyi-ni gin-amany yanybi.*  
 husband.I-ERG old.man.I-ERG 3SG.M.A-P.TWD get  
 ‘(Her) old man husband came and got (her).’ (Nordlinger, 1998a, 133: Wambaya)

(45) **Apposition:**

$$\left[ \begin{array}{l} \text{INDEX} \left[ \begin{array}{ll} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \end{array} \right] \\ \left( \left[ \begin{array}{ll} \text{PRED} & \text{'HUSBAND'} \\ \text{INDEX} & \left[ \begin{array}{ll} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{array} \right] \end{array} \right] \right) \\ \left( \left[ \begin{array}{ll} \text{PRED} & \text{'OLD.MAN'} \\ \text{INDEX} & \left[ \begin{array}{ll} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{array} \right] \end{array} \right] \right) \end{array} \right]$$

(46) **Coordination:**

$$\left[ \begin{array}{l} \text{INDEX} \left[ \begin{array}{l} \text{PERS} \quad 3 \\ \text{NUM} \quad \text{PL} \end{array} \right] \\ \left( \left[ \begin{array}{l} \text{PRED} \quad \text{'GOANNA'} \\ \text{INDEX} \left[ \begin{array}{l} \text{NUM} \quad \text{SG} \\ \text{PERS} \quad 3 \end{array} \right] \end{array} \right] \right) \\ \left( \left[ \begin{array}{l} \text{PRED} \quad \text{'KANGAROO'} \\ \text{INDEX} \left[ \begin{array}{l} \text{NUM} \quad \text{DUAL} \\ \text{PERS} \quad 3 \end{array} \right] \end{array} \right] \right) \end{array} \right]$$

This analysis directly reflects the fact that there is no visible syntactic distinction within the nominal strings themselves between nominal coordination and other types of nominal juxtaposition.<sup>20</sup> In fact, as discussed in §2 above, the nominal phrase in (44) is itself ambiguous between a coordinative and an appositional interpretation, disambiguated only by the verbal morphology. The auxiliary form *gin-amany* ‘3SG.M.A-P.TWD’ determines that the SUBJ is 3SG. If this example meant ‘the old man and her husband (they)...’ then the finite auxiliary would be encoded with 3DU. Crucially, the formal differences lie only in the agreement features of the set; there is no visible syntactic distinction within the nominal structure itself. Thus, as far as the syntax is concerned, our analysis needs to be able to account for the fact that the same nominal f-structure may sometimes involve feature resolution (i.e. in a coordination structure), and sometimes not (i.e. in an appositional structure).

Thus, we propose that both appositional and coordinative constructions are licensed by the basic phrase structure schema in (47), with different annotations depending on issues of feature resolution and semantics, as we shall soon see. Appositional and coordinate structures differ syntactically, on this view, purely in terms of the overall agreement features of the structure as a whole. Structurally, they are identical.

(47)  $X \longrightarrow X \quad , \quad X$   
 $\quad \quad \quad \downarrow \in \uparrow \quad \quad \downarrow \in \uparrow$

Recall from §3 above that feature resolution in coordination structures is licensed by the NP-CNJT template, repeated here from (35), which is associated with each NP in the coordinated phrase:

$$(48) \text{ NP-CNJT: } (\downarrow \text{ IND PERS}) \subseteq (\uparrow \text{ IND PERS})$$

$$(\downarrow \text{ IND GEND}) \subseteq (\uparrow \text{ IND GEND})$$

In non-coordinated juxtapositions such as (44), on the other hand, the juxtaposed constituents are co-referential and there is no feature resolution at the level of the set: the features of the set are the same as the features of each of the members. Thus, in our terms, these constructions generally involve INDEX sharing between the set and the members of the set. We define the ‘appositional’ template in (49), which is associated with each of the daughter constituents in the above phrase structure rule in a non-coordinated juxtaposed construction, as in (50).<sup>21</sup> This template ensures that the INDEX features of each daughter constituent are shared with the INDEX features of the set (i.e. a set containing two 3SG daughters will likewise have 3SG INDEX features).

$$(49) \text{ NP-APPOS: } (\downarrow \text{ IND}) = (\uparrow \text{ IND})$$

$$(50) \text{ X} \quad \longrightarrow \quad \text{X} \quad \text{X}$$

$$\quad \quad \quad \downarrow \in \uparrow \quad \quad \downarrow \in \uparrow$$

$$\quad \quad \quad @\text{NP-APPOS} \quad @\text{NP-APPOS}$$

Thus, the only structural difference between the coordinated phrase in (51) and the non-coordinated phrase in (52), both repeated from above, is that the two members of the coordinated phrase are associated with the NP-CNJT template (as in (37)), and the two members of the non-coordinated phrase are associated with the NP-APPOS template (as in (50)), resulting in different INDEX features for the set as a whole. In all other respects, the two are structurally identical.<sup>22</sup>

(51) *Pala-nga ngatu jarri-nya-pinti-ngi, mima-nikinyi-yi puluku, kujarra*  
that-LOC stationary INCH-NM-ASS-LOC wait.for-IMPF-3PL.SUB 3DU.DAT two  
*kangkuru-jirri waraja yalapara.*

kangaroo-DU one goanna.

‘And there, on the finishing line, the two kangaroos and one goanna waited for those two.’ (Sharp, 2004, 315: Nyangumarta)

(52) *Garidi-ni bungmanyi-ni gin-amany yanybi.*  
husband.I-ERG old.man.I-ERG 3SG.M.A-P.TWD get

‘(Her) old man husband came and got (her).’ (Nordlinger, 1998a, 133: Wambaya)

Finally, note that all of the non-coordinated juxtaposed construction types (generic-specific, nominal-pronoun etc.) can be also discontinuous, as exemplified with the generic-specific construction in (53).

(53) *Ngayika ati-ntji ari-li thuwarr-ku.*

I meat-DAT eat-APASS snake-DAT

‘I’m eating snake.’ (Blake, 2001, 419: Kalkatungu)

This will follow directly from the analysis of discontinuous coordinate constructions discussed in §3 above. Namely we assume that each element in the c-structure rule is optional, under the Principle of Economy of Expression (Bresnan, 2001, 91), thereby allowing each nominal to constitute an NP on its own in the c-structure, while still contributing to a set at f-structure.

## 5 Computing Meanings: Semantic Composition

We have argued that both coordinated and non-coordinated juxtapositions are rightfully analysed as structurally identical, with the syntactic differences lying only in the relationship between the INDEX features of the set and those of the member elements, and in the mapping to the semantics. In this section we present a semantic analysis of some of these construction types and show how it integrates with the syntactic analysis presented above. We show how it

is possible in LFG to adopt a single syntax and distinguish the construction types in the mapping to the semantics. Our focus is not so much on the details of the semantic analysis itself, about which much more could be said, but rather on the interface itself.<sup>23</sup>

## 5.1 Coordinate Meanings

As we have seen, nominal juxtapositions can have coordinate meanings, involving syntactic feature resolution and the construction of a coordinate semantics. Coordinate agreement can be captured in the template (35), repeated below as (54), following Dalrymple and Kaplan (2000), which will suffice for present purposes as our focus is not on the details of agreement itself.<sup>24</sup> This template is associated with each constituent in the phrase structure rule, as in (55), where we have coordinate readings.

$$(54) \text{ NP-CNJT: } (\downarrow \text{ IND PERS}) \subseteq (\uparrow \text{ IND PERS})$$

$$(\downarrow \text{ IND GEND}) \subseteq (\uparrow \text{ IND GEND})$$

$$(55) \text{ X} \quad \longrightarrow \quad \text{X} \quad , \quad \text{X}$$

$$\quad \quad \quad \downarrow \in \uparrow \quad \quad \quad \downarrow \in \uparrow$$

$$\quad \quad \quad @\text{NP-CNJT} \quad \quad \quad @\text{NP-CNJT}$$

We now turn to the semantics, and in particular to semantic composition, that is, how meanings are associated with (and derived from) the syntactic structures we are discussing. It is generally assumed in LFG that semantic composition involves reference to f-structures, that is, to representations of syntactic predicate-argument structure, rather than c-structures. Thus despite the widely varying c-structures that languages have, their semantics is largely invariant, in that the same sorts of meanings are encoded by a diverse range of external syntactic structures.<sup>25</sup>

The predominant approach to semantic composition in LFG, which we adopt here, uses linear logic for meaning assembly. The meanings themselves will be represented as simple

predicate logic expressions. These can be viewed as abbreviatory shorthand for more elaborate meaning expressions. Our focus here is primarily on the process of meaning assembly, that is, how meanings are associated with syntactic structures, and in particular on the syntax-semantics interface.

In the glue (linear logic) theory of semantic composition instructions for combining meanings are stated as premises in a logical deduction. The order of composition is therefore determined only as the logic itself determines it (and thus details of syntactic structure, such as the phrasal composition, are not important). A crucial aspect of the use of glue, or linear logic, for meaning assembly is its resource sensitivity: once a premise is used, it is used up and no longer available for subsequent steps in the deduction. The approach is therefore motivated by the observed resource sensitivity of natural language interpretation. A highly accessible introduction to meaning composition in LFG is provided by Dalrymple (2001, chapter 9), on which this brief outline is based. In this approach meaning constructors are associated primarily with lexical items (though they can also be associated with phrase structure nodes in rules).

Meaning constructors have two parts: they are made up of a meaning on the left hand side of the colon and a logical formula over semantic structures corresponding to that meaning on the right hand side of the colon (semantic structures are related to f-structures by the projection  $\sigma$ ). Consider as an example the meaning constructor associated with the lexical entry for *yawned* given in Dalrymple (2001, 233) and shown in (56).

$$(56) \text{ } \textit{yawned}, V: (\uparrow \text{ PRED}) = \text{ 'YAWN } \langle \text{ SUBJ } \rangle \text{ '}$$

$$\lambda X.\textit{yawn}(X) : (\uparrow \text{ SUBJ})_\sigma \multimap \uparrow_\sigma$$

The meaning side of the constructor in (56) gives the meaning of *yawn* as one-place predicate (of course, other more complex meanings can be substituted for FOPL expressions if required). Meaning expressions are typed (so that the constant *Kim*, for example, is of type *e*): type information will determine how meaning expressions combine with others. The glue side uses

linear implication:  $(-\circ)$  is an implication which can be read as saying that if the meaning resource for the SUBJ is available then it can be consumed to produce the meaning of the sentence.<sup>26</sup> Finally it is standard practice to introduce labels as names of meaning constructors to ease reference to them, a practice we will adopt. Thus the meaning constructor for the individual *Kim* might be labelled as **Kim** :

$$(57) \text{ **Kim** } \quad Kim: \uparrow_{\sigma}$$

Dalrymple (2001) provides an analysis of the semantics of NP coordination which associates the semantic contribution **g-and** (group-forming *and*) in (58) with the coordinator *and* in its lexical entry (60). In the meaning constructor, recall that the left hand side is a meaning expression and the right hand side is a glue constructor for resource sensitive semantic construction using linear implication. On the meaning side, the lambda expression denotes the group forming function - here a function from two individuals to the group containing those individuals. On the glue side, **g-and** consumes the semantics of one conjunct  $(\uparrow \in)_{\sigma}$  and produces a function from the semantics of the other conjunct to the semantics of the coordinate structure as a whole. For more than binary coordination, a further semantic contribution **g-and2**, involving the ! (of course) operator, can be used any number of times (including zero), each time adding an individual into the group (59). Since our primary focus here is on binary coordination, we will have no more to say about coordination involving multiple conjuncts.

$$(58) \text{ **g-and** } \quad \lambda X. \lambda Y. \{ X, Y \} : \\ (\uparrow \in)_{\sigma \langle e \rangle} \multimap [ (\uparrow \in)_{\sigma \langle e \rangle} \multimap \uparrow_{\sigma \langle e \rangle} ]$$

$$(59) \text{ **g-and2** } \quad \lambda X. \lambda Y. \{ X \} \cup Y : \\ !(\uparrow \in)_{\sigma \langle e \rangle} \multimap [ \uparrow_{\sigma \langle e \rangle} \multimap \uparrow_{\sigma \langle e \rangle} ]$$

(60) *and*      ( $\uparrow$  CONJ) = AND

[**g-and**]

[**g-and2**]

Following Dalrymple (2001) and the arguments presented therein, we take it that NP coordination is correctly characterised in this way as group formation. However in the case of asyndetic coordination, there is no coordinator in the structure with which to associate the semantics of **g-and**.

Notice also that in languages (such as these) with three number distinctions (singular, dual and plural), it is not possible simply to associate the use of the group-forming semantics with NUM resolution to PL, because the syntactic NUM of a group containing just a pair is DU. For present purposes, we restrict ourselves to binary coordination, and define the NUM resolution as in the template in (61). This captures the generalisation that *either* the overall number is DU (i.e. when two singular nominals are coordinated) *or* (at least) one of the constituents is non-singular, in which case the overall number is PL. Note that since this makes reference to elements of the (coordinate) f-structure, rather than to c-structure daughters, NUM resolution will operate correctly in cases of discontinuous coordination as well as cases of contiguous coordination by simple juxtaposition.

(61) BINARY:     $\{(\uparrow \in \text{INDEX NUM}) \neq \text{SG} \wedge (\uparrow \text{INDEX NUM}) = \text{PL}\}$   
                  |  $(\uparrow \text{INDEX NUM}) = \text{DUAL}$

To complete the interpretation of nominal juxtapositions as coordinative, we need to associate the template BINARY and the meaning constructor **g-and** with the phrase structure rule in (55) (restricting attention to cases of binary coordination). Since there is no coordinator, in asyndetic coordination we arbitrarily associate them with one of the daughter constituents. The phrase structure rule for juxtaposed NPs in coordination, is therefore that in (62).<sup>27</sup>

$$\begin{array}{l}
(62) \text{ X} \quad \longrightarrow \quad \text{X} \quad , \quad \text{X} \\
\qquad \qquad \qquad \downarrow \in \uparrow \qquad \qquad \downarrow \in \uparrow \\
\qquad \qquad \qquad @\text{NP-CNJT} \quad \qquad @\text{NP-CNJT} \\
\qquad \qquad \qquad @\text{BINARY} \\
\qquad \qquad \qquad \mathbf{g\text{-and}}
\end{array}$$

Our analysis of the juxtapositions with coordinate semantics is thus analogous to the analysis of (non-juxtaposed) coordinate constructions in other languages (Dalrymple and Kaplan 2001, Dalrymple 2001). In the next section we see how this same general approach can also provide an analysis of the Australian ‘appositional’ juxtapositions exemplified in §2 above.

## 5.2 Non-coordinate Meanings of Juxtaposition

We have argued that the range of nominal juxtapositions share the same basic f-structure. In the case of juxtapositions interpreted as close appositions, each constituent is associated with the NP-APPOS template, which ensures identity between the INDEX features of each constituent and the INDEX features of the set as a whole:

$$(63) \text{ NP-APPOS: } (\downarrow \text{IND}) = (\uparrow \text{IND})$$

$$\begin{array}{l}
(64) \text{ X} \quad \longrightarrow \quad \text{X} \quad \quad \text{X} \\
\qquad \qquad \qquad \downarrow \in \uparrow \qquad \qquad \downarrow \in \uparrow \\
\qquad \qquad \qquad @\text{NP-APPOS} \quad @\text{NP-APPOS}
\end{array}$$

As for the semantics of appositional juxtapositions such as (44), as a first approximation we take this to be basically intersective (applying to property-denoting nominal (rather than NP) meanings). One way of doing this is to propose a meaning constructor rather comparable to boolean *and* (as in the joint reading of *five linguists and philosophers*), taking two sets of properties and intersecting them (see Dalrymple (2004)):

(65) **b-and**  $\lambda X.\lambda Y.X \sqcap Y$

An alternative approach, which is the one we will follow here, is to model the semantics of close apposition on the semantics of nominal modification, as follows:

(66) **appos**  $\lambda Q.\lambda P.\lambda x.Q(x) \wedge P(x)$ :  
 $[ ( \% \text{NOM1}_\sigma \text{ VAR} ) \multimap ( \% \text{NOM1}_\sigma \text{ RESTR} ) ] \multimap$   
 $[ [ ( \% \text{NOM2}_\sigma \text{ VAR} ) \multimap ( \% \text{NOM2}_\sigma \text{ RESTR} ) ]$   
 $\multimap [ ( \uparrow_\sigma \text{ VAR} ) \multimap ( \uparrow_\sigma \text{ RESTR} ) ] ]$   
 $\% \text{NOM1} \in \uparrow$   
 $\% \text{NOM2} \in \uparrow$

On the meaning side, this is a function which applies to two nominal  $\langle e, t \rangle$  meanings and produces an abstraction over a logical conjunction of predications holding of this individual (so it takes two nominal meanings and produces a nominal meaning, where nominal meanings are of type  $\langle e, t \rangle$ ). On the glue side the meaning constructor consumes one nominal contribution and then the other nominal contribution to produce the meaning of the structure as a whole. Note that the meaning which results from this process is a nominal meaning, that is a property or function of type  $\langle e, t \rangle$ , rather than a generalized quantifier or typical DP meaning. This meaning cannot be of course be consumed directly by a verbal meaning constructor (given standard assumptions about the latter), but would need to be type-shifted (or the equivalent) to produce a full referential NP meaning. This is consistent with the fact that in these languages a bare nominal may be interpreted predicatively, but may also be interpreted as a full NP in context.

We can therefore complete our analysis of appositional juxtapositions by arbitrarily associating the **appos** semantics with some daughter in the appositional phrase structure rule:

$$\begin{array}{ccc}
(67) X & \longrightarrow & X \quad X \\
& & \downarrow \in \uparrow \quad \downarrow \in \uparrow \\
& & @NP-APPOS \quad @NP-APPOS \\
& & \mathbf{appos}
\end{array}$$

In order to see how this works, consider the nominal apposition in the now familiar Wambaya example (18). The semantics associated with each of the nominals in this construction is given in (68) and (69).

(68) *garidi-ni* (husband.I-ERG):

$$\lambda X.husband(X): (\uparrow_{\sigma} \text{VAR}) \multimap (\uparrow_{\sigma} \text{RESTR})$$

(69) *bungmanyi-ni* (old.man.I-ERG):

$$\lambda X.old.man(X): (\uparrow_{\sigma} \text{VAR}) \multimap (\uparrow_{\sigma} \text{RESTR})$$

The meaning constructor (66), associated with the appositional use of the juxtaposition schema, consumes (68) and (69) to produce another nominal meaning, as follows:

(70) *garidi-ni bungmanyi-ni* ((husband.I-ERG old.man.I-ERG):

$$\lambda X.old.man(X) \wedge husband(X):$$

$$(\uparrow_{\sigma} \text{VAR}) \multimap (\uparrow_{\sigma} \text{RESTR})$$

Note that in these languages, a bare nominal such as (68) or (69) (or indeed (70)) may be interpreted predicatively, but may also be given a range of NP meanings in context (e.g. ‘the old man’, ‘an old man’, ‘old men’). Pronouns and demonstratives may occur in “determinizing” function but are by no means obligatory in the production of full (referential) NP meanings. In these cases, where there are no demonstratives or pronouns, we take it that additional meaning

constructors (not associated with lexical material) must be available to lift nominals into the appropriate range of NP meanings.<sup>28</sup>

Other construction types expressed by means of juxtaposition, and discussed in §2, such as generic-specific and part-whole constructions can also be straightforwardly accounted for by the approach suggested in this paper, although there is certainly more to be said on the details of their semantic analysis. These constructions are likewise licensed by the non-coordinate phrase structure rule (67), which is fully consistent with the consensus view in the Australianist tradition that treats such constructions as consisting of apposed nominals (e.g. Blake 1987, Evans 1995, Heath 1978, etc.).

The f-structure corresponding to the juxtaposed (generic-specific) construction in (71) is given in (72).

- (71) *Dathin-a dangka-a niya wumburung-kuru raa-ja wanku-ya*  
 that-NOM man-NOM 3SG.NOM spear-PROP spear-ACT elasmobranch-MLOC  
*kulkiji-y.*  
 shark-MLOC  
 ‘That man speared a shark with a spear.’ (Evans, 1995, 244: Kayardild)

$$(72) \left[ \begin{array}{l} \text{INDEX} \left[ \begin{array}{ll} \text{PERS} & 3 \\ \text{NUM} & \text{SG} \end{array} \right] \\ \left\{ \left[ \begin{array}{l} \text{PRED} \quad \text{'ELASMOBRANCH'} \\ \text{INDEX} \quad \left[ \begin{array}{ll} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{array} \right] \end{array} \right] \right\} \\ \left\{ \left[ \begin{array}{l} \text{PRED} \quad \text{'SHARK'} \\ \text{INDEX} \quad \left[ \begin{array}{ll} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{array} \right] \end{array} \right] \right\} \end{array} \right]$$

Standard (nominal) meaning constructors along the lines of (68) are given for *wanku-ya* (elasmobranch-MLOC) and *kulkiji-y* (shark-MLOC) in (73) and (74). These combine with the appositional meaning constructor to give (75):

(73) *wanku-ya* (elasmobranch.MLOC):  $\lambda x.elasmobranch(x): (\uparrow_{\sigma} \text{VAR}) \multimap (\uparrow_{\sigma} \text{RESTR})$

(74) *kulkiji-y* (shark.MLOC):  $\lambda x.shark(x): (\uparrow_{\sigma} \text{VAR}) \multimap (\uparrow_{\sigma} \text{RESTR})$

(75) *wanku-ya kulkiji-y* (elasmobranch-MLOC shark-MLOC)

$\lambda X.elasmobranch - fish(X) \wedge shark(X): (\uparrow_{\sigma} \text{VAR}) \multimap (\uparrow_{\sigma} \text{RESTR})$

In the case of the generic-specific constructions, there is an additional relationship between the properties that the nominal predicates introduce, in that one (the ‘generic’ term) is (typically) a hypernym whose denotation would properly include that of the other (‘specific’) term. We abstract away from this here but assume that this further semantic restriction on the construction could be captured by an additional meaning postulate specifying that an appropriate relationship must hold between the two nominal restrictor properties.

## 6 Templatic mismatch: inclusory constructions

Above we have argued that the range of juxtaposed nominal constructions that we find in many Australian languages – including coordinations, close appositions, generic-specific constructions, part-whole constructions and nominal-pronoun combinations – can be accounted for with a modular approach in which these constructions have the same surface syntactic structure as f-structure sets, with the differences resulting from feature resolution or identity, and in the mapping to the semantics. We have proposed a single basic phrase structure rule (76), and two alternative sets of annotations corresponding to coordinate constructions and non-coordinate constructions respectively, laid out in (77).

(76)  $X \longrightarrow X \quad , \quad X$   
 $\qquad \qquad \qquad \downarrow \in \uparrow \qquad \qquad \downarrow \in \uparrow$

(77) a. Annotate each daughter @NP-CNJT and some daughter @BINARY and **g-and ; OR**

b. Annotate each daughter @NP-APPOS and some daughter **appos**

These sets of annotations ensure that the coordinated constructions involve feature resolution and a coordinate semantics, while the non-coordinated constructions involve feature identity between the set and its members, and a close appositional semantics.

However, the existence of a single “coordinate” phrase structure rule and two different templates governing the interaction between the INDEX features of the set and its members, allows for the possibility that there may be a mismatch between the templates associated with each constituent of the “coordinated” phrase. In other words, it is possible for one constituent to be associated with the NP-CNJT template and the other with the NP-APPOS template. In this section we show that this possibility is, in fact, exactly what we find in inclusory constructions.<sup>29</sup>

As already discussed in §2 above, the inclusory construction is another type of nominal juxtaposition structure common to many Australian languages. An inclusory construction typically involves two juxtaposed elements, one a pronominal referring to the group as a whole and the other a (pro)nominal picking out a subset of the group. Examples include the following:

(78) *Tjirlpi-lu nyupali kati-ku-nti*  
old.manERG.NAME 2DU.(ERG) take-FUT-MAYBE  
‘You and the Old Bloke might take (us).’ (lit. ‘you two, including the old bloke, might take (us)’) (Goddard, 1985, 101: Yankunytjatjara)

(79) *nga-rr-a kajakaja warra-ja thaa-th.*  
1-DU-NOM daddyNOM go-ACT return-ACT  
‘Daddy and I will go’ (lit. ‘we two, including daddy, will go’) (Evans, 1995, 249: Kayardild)

Inclusory constructions (also called ‘plural pronoun constructions’ in the literature) are found in languages from many different families (Schwartz, 1988a,b; McNally, 1993; Lichtenberk,

2000; Bril, 2004), and are described for Australian languages in Singer (2001, 2005).<sup>30</sup> The correct analysis of the inclusory construction has been the source of some debate in the literature. Schwartz (1988b,a) analyses the inclusory construction as deriving from a coordination construction, as do Hale (1966, 1973) and Nash (1986) in their analysis of inclusory constructions in the Australian language Warlpiri. Singer (2001), on the other hand, argues that the inclusory construction in Australian languages is a distinct construction type, albeit similar in some respects to coordination constructions, based on the fact that the inclusory construction is an endocentric construction with the features of one of the elements (i.e. the superset pronominal) being identical to the features of the whole argument. This is shown most clearly in a language with verbal agreement, as in the following from Nunggubuyu:

- (80) *nurru=wa-ng ma:gurn nurru*  
 we(EX.PL)killed.it [name] we(EX.PL)  
 M and us killed it (buffalo) (Heath, 1984, 542: Nunggubuyu)

In terms of their surface syntax, (Type 1) inclusory constructions generally consist of two juxtaposed nominal elements, and are therefore syntactically similar to the other juxtaposed constructions we have discussed above. Indeed, many language descriptions treat them as a type of ‘appositional’ construction similar to part-whole and/or generic-specific constructions (e.g. Dench 1995, Evans 1995, among others). We therefore propose that they should likewise be analysed as sets at f-structure, capturing their syntactic similarity with apposition and coordination constructions.

Inclusory constructions are a particularly interesting case, however, as the features of the set overall are identical to the features of one member of the set (the pronominal), in which the features of the other member must be included. Thus, inclusory constructions are a composite of the coordination and appositional schemas presented in (62) and (67) above. The constituent corresponding to the superset pronominal carries the appositional template (specifying that its INDEX features are identical to the index features of the whole) and the

constituent corresponding to the subset member carries the coordination template (specifying that its INDEX features must be a subset of the INDEX features of the whole).<sup>31</sup>

$$(81) \quad X \quad \longrightarrow \quad X \quad , \quad X$$

$$\quad \quad \quad \downarrow \in \uparrow \quad \quad \quad \downarrow \in \uparrow$$

$$\quad \quad \quad @NP-APPOS \quad \quad @NP-CNJT$$

$$(82) \quad \left[ \begin{array}{l} \text{INDEX} \quad \left[ \begin{array}{ll} \text{PERS} & 1 \\ \text{NUM} & \text{DUAL} \end{array} \right] \\ \left\{ \left[ \begin{array}{ll} \text{PRED} & \text{'DADDY'} \\ \text{INDEX} & \left[ \begin{array}{ll} \text{NUM} & \text{SG} \\ \text{PERS} & 3 \end{array} \right] \end{array} \right] \right\} \\ \left\{ \left[ \begin{array}{ll} \text{PRED} & \text{'PRO'} \\ \text{INDEX} & \left[ \begin{array}{ll} \text{NUM} & \text{DUAL} \\ \text{PERS} & 1 \end{array} \right] \end{array} \right] \right\} \end{array} \right]$$

Thus, our analysis of nominal juxtaposition in Australian languages extends directly to inclusory constructions, correctly capturing the fact that these various juxtaposed construction types are syntactically similar in many Australian languages.<sup>32</sup> Moreover, this analysis captures the various characteristics of the inclusory construction discussed in the literature. The fact that inclusory constructions are similar to coordination constructions is captured by the fact that, like coordination constructions, inclusory constructions are represented as sets at f-structure. The endocentricity of the inclusory construction (Singer 2001), namely that the features of the whole argument are identical to those of the superset pronominal, is captured by the fact that the pronominal carries the NP-APPOS template, which specifies that the features of the individual member are carried up to the set as a whole. The inclusory nature of the construction is captured by the fact that the other element must have features which form a subset of the features of the set.<sup>33</sup>

Treating inclusory constructions as sets at f-structure is further supported by the fact that in some Australian languages they can be marked with suffixes that explicitly indicate set membership. In Yidiny the ‘one of a group’ suffix *-ba* is used in both coordination constructions (83) and inclusory constructions (84):

(83) *darnggidarnggi:ba yaburruba galing*  
 old.woman-*ba*(ABS) young.girl-*ba*(ABS) go-PRES  
 ‘An old woman (being one of a group of people) and a girl (being another member of a group) are going.’ (Dixon, 1977, 177: Yidiny)

(84) *nganyti bunya:ba galing*  
 1NON-SING woman-*ba* go-PRES  
 ‘A woman and I (and some others) are going.’ (Dixon, 1977, 178: Yidiny)

Thus, our analysis of juxtaposition and asyndetic coordination in Australian languages extends naturally to inclusory constructions also, capturing the similarities amongst these constructions types and providing a unified analysis of the NP juxtaposition that is so prevalent in these languages.

## 7 Conclusion and further implications

We have shown how the range of juxtaposed NP constructions in Australian languages can be accounted for relatively straightforwardly within the constraint-based lexicalist formalism of LFG. We have developed an account in which nominal-nominal sequences all have essentially the same f-structure, but correspond to 3 different feature association patterns, as in (85)-(87), and map onto a range of different semantics correlated with these three different patterns. In the case of coordinate constructions, the INDEX features of the elements in the set-valued f-structure stand in a subset relation to the INDEX of the set itself. In the case of appositional constructions, the INDEX features of the elements are equivalent, and are also equivalent to

those of the set itself. Inclusory constructions involve a hybrid of the two, whereby one element of the set has the same INDEX features as the set itself, while the other element in the set stands in a subset relation to the overall INDEX.

(85) **coordination** –  $\mathbf{X} \supseteq \mathbf{Y}, \mathbf{Z}$

$$\left[ \begin{array}{l} \text{INDEX} \quad [\mathbf{X}] \\ \left\{ \begin{array}{l} [\text{INDEX} \quad [\mathbf{Y}]] \\ [\text{INDEX} \quad [\mathbf{Z}]] \end{array} \right\} \end{array} \right]$$

(86) **apposition** –  $\mathbf{X} = \mathbf{Y} = \mathbf{Z}$

$$\left[ \begin{array}{l} \text{INDEX} \quad [\mathbf{X}] \\ \left\{ \begin{array}{l} [\text{INDEX} \quad [\mathbf{Y}]] \\ [\text{INDEX} \quad [\mathbf{Z}]] \end{array} \right\} \end{array} \right]$$

(87) **inclusory** –  $\mathbf{X} = \mathbf{Y} \supseteq \mathbf{Z}$

$$\left[ \begin{array}{l} \text{INDEX} \quad [\mathbf{X}] \\ \left\{ \begin{array}{l} [\text{INDEX} \quad [\mathbf{Y}]] \\ [\text{INDEX} \quad [\mathbf{Z}]] \end{array} \right\} \end{array} \right]$$

The flexible architecture of LFG thus provides a unified syntactic account of a range of juxtaposed nominal constructions common to Australian languages, while still capturing their semantic differences. In this paper we have shown how the use of hybrid f-structures can be extended beyond true (semantically) coordinated constructions to generic-specific, part-whole and other types of close appositional constructions also, making a distinction between syntactic coordination (hybrid structures) and semantic coordination (corresponding to feature resolution and coordinate semantics) in a simple and intuitive way.

One of the implications of our analysis of Australian juxtaposed nominal constructions is that close appositions are structurally the same as coordinations in the syntax in these lan-

guages, which in turn raises the possibility that this might be true of close appositions and coordination in (some) other languages. A further implication of our general approach is that we may expect to find a structural relationship between non-asyndetic coordination and appositional constructions also. In other words, do we find non-asyndetic coordinated structures which can similarly be used with an appositional semantics? In fact, boolean coordination in languages like English may well fit into a continuum between coordination and close apposition in this way. The conjunction of singular nominals generally forms a plural noun phrase in English, under (some form of) group forming coordination as discussed in §3, but this is not always the case. As the SG verb agreement in the following example indicates, ‘vice-president’ and ‘president-elect’ refer here to the same individual. This boolean or joint reading is in contrast to (89) which involves a split or group-forming reading.

(88) The vice-president and president-elect is eating pizza (King and Dalrymple, 2004, 75)

(89) The vice-president and president-elect are eating pizza

As King and Dalrymple (2004) show (see also Heycock and Zamparelli (1999, 2000)) languages differ in terms of the distribution of these readings: languages such as English permit both joint and split readings (with singular nouns) under a single determiner such as *the* or *this*, while others permit only joint readings in these circumstances (such as Italian, Portuguese and German). The German example in (90), for instance, has just a joint reading.

(90) *mein bester Freund und Mann*  
 my-M.SG best friend-M.SG and husband-M.SG  
 my best friend and husband (King and Dalrymple, 2004, 93: German)

The distinction between split and joint readings is most evident with singular conjuncts, but is also relevant in terms of the interpretation of coordinate structures with plural conjuncts, as in *five philosophers and linguists*, which has a number of interpretations including the joint reading under which each individual (of 5) is both a linguist and a philosopher.

King and Dalrymple (2004) propose that the distinction between split and joint readings involves two different semantics for *and*, **boolean-and** and **group-and**. Group-forming *and* (‘normal’ coordination) simply requires a plural INDEX but they propose that **boolean-and** is associated with the syntactic INDEX requirement stated in (91),<sup>34</sup> which is very similar in effect to the INDEX constraint used in this paper for the cases of appositional juxtaposition.

(91) *boolean and* (↑ INDEX NUM) = (↑ ∈ INDEX NUM)

It is sometimes suggested that accounts of nominal coordination should involve just one semantics, in terms either of group forming or boolean coordination (for example, Heycock and Zamparelli (2000) propose one underlying semantics for *and* and associate different (semantic) procedures with various (abstract) syntactic features in English and Italian NPs). Similarly the use of the conjunctive coordinator *and* to conjoin alternative descriptions of a single individual might seem idiosyncratic. However our proposal provides further support for the existence of both group forming and boolean *and* in nominal coordination by placing the existence of boolean coordination (that is, the joint reading of *my friend and colleague*) in a rather different crosslinguistic context. We have argued that appositions, inclusories and (standard) conjunctions may all be associated with precisely the same syntactic device (of asyndetic coordination or juxtaposition). On our view, then, boolean coordination can be considered to be essentially similar to the (close) appositional juxtapositions we discuss in Australian languages, the only difference being the presence of an overt coordinator in the former (and note that in English, overt conjunctions, particularly *or* may occur in appositions). It is thus syntactically coordinated (having a hybrid f-structure), but semantically appositional (having no feature resolution and appositional (i.e. boolean) semantics).

## Notes

<sup>1</sup>This paper results from joint research into coordination strategies in Australian Aboriginal languages funded by a British Academy grant (SG-39545). Earlier versions of this work have been presented at the ALS05 Conference in Melbourne 2005, and the LFG06 conference in Konstanz, 2006. We thank both audiences for helpful feedback that has led to substantial improvements in the presentation and argumentation, and we are also grateful to two anonymous JL reviewers for comments and to Avery Andrews, Doug Arnold, Brett Baker and Mary Dalrymple for comments and discussion. Of course, we remain responsible for remaining errors and inadequacies.

<sup>2</sup>The abbreviations used in examples are: A ‘transitive subject’; ABS ‘absolutive’; ACC ‘accusative’; ACT ‘actual’; APASS ‘antipassive’; ASS ‘associative’; CON ‘continuous’; DAT ‘dative’; DU ‘dual’; ERG ‘ergative’; EX ‘exclusive’; F ‘feminine’; FUT ‘future’; IMP ‘imperative’; IMPF ‘imperfective aspect’; INC ‘inclusive’; INCH ‘inchoative’; LOC ‘locative’; MLOC ‘modal locative’; M ‘masculine’; NEUT ‘neuter’; NM ‘nominaliser’; NOM ‘nominative’; NON-SING ‘non-singular’; NP ‘non-past’; P ‘past’; P.IPFV ‘past imperfective’; PL ‘plural’; P.PFV ‘past perfective’; PRES ‘present’; PROP ‘propriative’; PURP ‘purposive’; RDP ‘reduplicated’; RECIP ‘reciprocal’; SG ‘singular’; SUB ‘subject’; TWD ‘directions towards’; VE ‘vegetable’.

<sup>3</sup>Of course, it is possible that these are afterthought constructions, however Gaby (2006) does not describe them as having the sorts of intonational properties that would suggest such an analysis. In languages with verbal agreement it is more straightforward to show that such discontinuous examples are truly coordinated given the presence of resolved agreement on the verb. See (40) below for an example of this sort.

The possibility of discontinuous coordination is only mentioned in a subset of grammatical descriptions and thus we can’t provide discontinuous examples from all of the languages exemplified above. It is not known whether the lack of discussion reflects the fact that discontinuous

coordination is not possible in these languages, or whether the examples are sufficiently infrequent that they just didn't arise in the corpora on which the descriptions are based. In any event, it is clear that an analysis of coordination in Australian languages needs to be able to account for the possibility of discontinuous coordination in at least some languages.

<sup>4</sup>The Yidiny examples in this paper have been rewritten in a standard practical orthography which marks dental sounds with 'h', uses 'j' for a palatal stop and 'rɾ' for an alveolar trill, and 'ng' for a velar nasal.

<sup>5</sup>Note that in none of Kuuk Thaayorre (19), Diyari (20) nor Kayardild (22) is the pronoun grammatically required in the clause.

<sup>6</sup>Note that the two apposed nominals come before the auxiliary *gin-amany* here, showing them to jointly belong to an NP constituent since the Wambaya auxiliary must always be the second constituent in the clause (Nordlinger, 1998a).

<sup>7</sup>Note also in passing that (19) additionally exemplifies a generic-specific in 'vegetable', 'carrot'.

<sup>8</sup>See Stirling (2008) for a discussion of the role such 'double-reference' plays in Kala Lagaw Ya narratives.

<sup>9</sup>Lekakou and Szendrői (2007) provide an approach to the Greek polydefinite construction which they model on their approach to close apposition. They argue that both Greek polydefinites (as in (i)) and close appositions are multiply headed and jointly determine the denotation of the NP essentially by intersection.

(i) a. *o aetos to puli*  
the eagle the bird

b. *to puli o aetos*  
the bird the eagle Lekakou and Szendrői (2007, 141)

<sup>10</sup>For related discussion however, see Hale (1981), Nash (1986); Simpson (1991) on

‘merged’ vs. ‘unmerged’ interpretations of nominals in Warlpiri.

<sup>11</sup>Although note that some analyses of inclusory constructions in languages with verbal agreement morphology, have argued that the superset pronoun should be analysed as the head of the construction, since it is the features of this pronoun that show agreement on the verb.

<sup>12</sup>Note that there may well be intonational differences between the various construction types also, but the detailed empirical evidence for this is not currently available.

<sup>13</sup>This is an instance of a more general coordination scheme which combines like constituents, phrasal or lexical.

<sup>14</sup>The types of features are defined as follows:

For any *distributive* property  $P$  and set  $s$ ,  $P(s)$  iff  $\forall f \in s.P(f)$ .

For any *nondistributive* property  $P$  and set  $s$ ,  $P(s)$  iff  $P$  holds of  $s$  itself. (Dalrymple and Kaplan, 2000)

<sup>15</sup>The original formulation of syntactic resolution in Dalrymple and Kaplan (2000) does not refer to INDEX but simply to the individual PERS and GEND agreement features. Since then, a distinction between two sets of agreement features, INDEX and CONCORD has been postulated, see King and Dalrymple (2004), and we have updated the treatment of syntactic resolution here to be consistent with this later work.

<sup>16</sup>Note however, that nothing in our analysis hangs on the particular semantic analysis provided. In fact, the modularity of the LFG approach means that it is possible to use the same general glue approach to attach whatever semantic analysis one desires to this same syntactic structure.

<sup>17</sup>In the languages which we are concerned with, it is generally possible for ‘bare’ Ns to constitute full NPs on their own, and be associated with referential NP meanings. As a consequence, it is often impossible to tell whether coordination has taken place at the phrasal or lexical level and both are certainly possible. In some cases, the presence of a demonstrative

will sometimes make clear the level at which elements are juxtaposed.

<sup>18</sup>A reviewer raises the possibility of instead considering the coordinator to be null. While this is certainly possible, we do not see that it has any advantage over the analysis presented here, and in any case, LFG eschews the use of zero forms unless they are independently required (see, for example Bresnan (2001) for discussion).

<sup>19</sup>The observation that apposition and coordination may be syntactically similar is not, of course, new: it is also found in the literature on languages such as English, for example Quirk et al. (1985), de Vries (2006) and Meyer (1992). The latter observes that “while there are clear semantic differences between the two relations [i.e. apposition and coordination – LS & RN], syntactically the relations are quite similar” (Meyer, 1992, 45). Exploring the relationship of juxtaposition in Australian Aboriginal languages to e.g. apposition in these configurational IndoEuropean languages is, of course, well beyond the scope of the present paper, and we make no claims about these very different languages.

<sup>20</sup>Note that we are concerned here only with the lack of *syntactic* differences. There may well be intonational or other differences between the two construction types and as we discuss in §5, there are of course clear semantic differences.

<sup>21</sup>Recall that we use the term ‘appositional’ in a broad sense here, to mean simply sequences of juxtaposed elements having the same grammatical function and similar or overlapping reference.

<sup>22</sup>In the interests of clarity, we assume here that all INDEX features in appositional constructions will be shared between the members and the set. This is potentially an oversimplification, since it may well be the case that there will be instances of appositions in which the f-structures may differ in one or more INDEX features despite being descriptions of the same real world entity. A circumstance where this might arise could be where apparent person mismatches are allowed in appositional structures (e.g. in the English ‘us linguists’, ‘you children’). Another

difficult issue arises with part-whole constructions such as 'woman feet', where there may be a mismatch between the number of the part and the number of the whole. A further tricky area concerns gender, where a complicating factor in the interpretation of appositional data is the fact that it is proposed in the literature that nouns have both INDEX GEND features (usually relevant to phenomena such as predicate argument agreement) and CONCORD GEND features (potentially relevant to agreement within a NP, that is, cases of head modifier agreement), and these may not match (Wechsler and Zlatić, 2003; King and Dalrymple, 2004). Well-known cases of 'mismatch' nouns include the Serbo-Croatian collective nouns of the second declension, such as *deca* 'children', which are analysed as FEM.SG CONCORD but NEUT.PL INDEX by Wechsler and Zlatić (2003). The potential for non-matching between CONCORD and INDEX in GEND complicates the interpretation of putative mismatches in appositional structures in the languages we are concerned with, because of course it may be the case that such examples involve nouns differing in CONCORD GEND but not in INDEX GEND. Other cases of gender mismatch in appositional constructions could potentially arise from generic-specific constructions in which hyponyms and hypernyms clearly belong to different gender classes (e.g. VEgetable and NEuter), but we leave investigation of whether this occurs to further research. In sum, very little is known about gender agreement in the languages we are concerned with, and neither is the relevance of the distinction between INDEX and CONCORD features yet established for these languages. Should plausible examples of gender mismatch emerge, these constructions could be captured by modifying the above analysis in a number of ways. One possibility would be to have only one daughter in the appositional phrase structure rule contribute INDEX features to the set (i.e. be associated with the NP-APPOS template above), with the INDEX features of the other daughter only partially shared, or not shared at all. See the discussion of inclusory constructions in §6 for an example of how this might work.

<sup>23</sup>As we note above, nothing in our analysis hinges in the particular details of the semantic analysis presented here. Our general aim is to show how a single syntactic structure can be

associated with different semantics.

<sup>24</sup>Many Australian languages distinguish four or more genders (e.g. MA, FEM, NEUT, VEG) and exhibit defaults and underspecification in gender agreement, and thus it is likely that several interesting issues will arise in the formulation of the details of gender resolution and gender agreement in such languages. For an approach to gender using complex GEND features rather than set-valued features, see Dalrymple et al. (2007).

<sup>25</sup>Of course this is not to deny that other sources of linguistic information, or other types of linguistic structure, are relevant to the process of semantic composition and interpretation. The modular correspondence-based architecture of LFG allows non-syntactic levels of representation such as prosodic structure and information structure (which models discourse relations) to provide important information guiding semantic interpretation. Constraints arising through multiple projections may combine to determine the meaning of a given utterance.

<sup>26</sup>As well as linear implication, linear logic uses so-called multiplicative conjunction ( $\otimes$ ), a form of conjunction, and the of course operator (!), which permits a premise to be used without being consumed.

<sup>27</sup>In cases of discontinuous coordination, if neither part of the discontinuous structure is associated with these annotations, meaning construction will fail, whereas if both parts are associated with these annotations, meaning construction will also fail because there will be unconsumed premises. Therefore nothing more needs to be added to ensure that only the right combination of annotations is selected.

<sup>28</sup>Of course our account of the (various) semantics associated with nominal juxtaposition *per se* would also have to be extended to deal with examples such as (i) in which it appears that full NPs (e.g. of type *e*) are juxtaposed.

- (i) *ngada bala-thu niwan-ju naljirndirri-wu, marrwa-wu niya rabi-ju*  
I.NOM hit-POT him-MPROP scrub turkey-MPROP near-MPROP he-NOM get up-POT  
I'll shoot him, the scrub turkey, he'll fly up nearby (Evans, 1995, 239: Kayardild)

Such data raise many interesting issues which we leave for further research. In the case of (i), however, it is possible that what we have is in any case an instance of loose (non-restrictive) apposition as perhaps suggested by the translation offered by Evans.

<sup>29</sup>As noted above, this may also suggest an approach to feature mismatch in some part-whole constructions, such as ‘woman feet’.

<sup>30</sup>There are actually two types of inclusory construction. The first, exemplified here, involves two juxtaposed NP elements. The second involves a verb-coded superset pronoun and just one NP element, as in the example below. Singer (2001) refers to these as Type 1 and Type 2 respectively.

- (i) *nyari-bu-ydhi-ni*                      *rni-yul-pula*  
1DU.EX-hit-RECIP-P.CON M.SG-Aboriginal-DUAL  
‘I and a [aboriginal] man were fighting.’ (Heath, 1978, 291:Ngandi)

Our focus here is on Type 1 inclusory constructions, since they involve the juxtaposition of two nominal elements. However, our analysis of Type 1 inclusory constructions can be extended to this second type through the association of the properties of the superset pronominal with the verbal agreement morphology, including the specification that the features of the verb-inflected pronominal be equal to the features of the set (see below). For issues of space, however, we leave exemplification of this extension of the analysis for future work.

<sup>31</sup>This phrase structure rule is written to allow either ordering of the two elements (as indicated by the comma between the two NPs). However in some languages it may be necessary to fix the ordering of the two elements in the case of inclusory constructions.

<sup>32</sup>The semantics of the inclusory is that one member denotes a group and the other member of the set contributes a further restriction over the group by providing a specification about one of its members. We leave a detailed discussion of the semantics of the inclusory for future research.

<sup>33</sup>Note that, even in languages in which the two elements can appear in either order, the nature of the templates will ensure that the NP-APPOS template is associated with the superset pronominal and the coordination template with the subset (pro)nominal. This is because, were the associations to be reversed and the coordination template to be associated with the superset pronominal, its features would not be a subset of the features of the set (in this case, the features of the subset (pro)nominal).

<sup>34</sup>Additionally there is a semantic requirement (unformulated) which requires all conjuncts to have the same number.

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