

THE SEMANTICS OF GENDER IN MAYALI: PARTIALLY PARALLEL SYSTEMS AND FORMAL IMPLEMENTATION

NICHOLAS EVANS

DUNSTAN BROWN

GREVILLE G. CORBETT

University of Melbourne

University of Surrey

University of Surrey

Mayali has four genders and five morphological classes, with formal identity between the gender prefixes and four of the morphological class prefixes. Gender and morphological class are assigned according to different but largely overlapping semantic principles. We analyze these partially overlapping systems within the NETWORK MORPHOLOGY framework; an implemented model demonstrates that the analysis gives the correct forms for the majority of nouns in a basic lexicon, and further extends to understanding assignment in the avoidance register. Our account depends on recognizing two different types of default: NORMAL CASE DEFAULT, the expected outcome in a given domain, and EXCEPTIONAL CASE DEFAULT, the last resort short of full lexical specification.*

INTRODUCTION. In this article we bring together three strands of research: extended fieldwork on Mayali, work on the formal framework of NETWORK MORPHOLOGY, and a detailed typology of the grammatical category of gender. Starting from the rich data on the gender and morphological class systems of Mayali, we give an account based on different notions of default. Since we implement our Network Morphology account in the lexical knowledge representation language DATR (Evans & Gazdar 1996), which has an interpreter, we are able to demonstrate the extent to which our analysis is valid.¹ And this in turn makes us confident in extending the typology of interactions between gender and morphological class. Thus we are able to give a clear picture of this part of the structure of Mayali, to confirm the relevant theoretical claims of Network Morphology, and to elaborate the typology of gender systems. Using two partially parallel semantic systems, our account successfully predicts the appropriate gender and morphological class assignments and details the nature and number of overrides to be specified in the lexicon. This demonstrates the value of formal approaches for typology.²

* The research reported here was supported by the Economic and Social Research Council (UK) under grant number R000238228. This support is gratefully acknowledged. Evans would further like to thank the Australian Research Council (grants Polysemy and Semantic Change in Australian Languages and Reference Grammar of Mayali: Cross-dialectal materials), as well as the Humboldt Foundation, for supporting his fieldwork and writing up of the Mayali material. We thank Toby Gangele, Eddie Hardy, David Karlbuma, Ruby Ngalmindadjek, Mick Kubarkku and Big Bill Birriya-birriya for furnishing information on Mayali, and Ken Hale and Murray Garde for generously making available their lexical files, and Murray Garde a second time for checking out some of the gender assignments in the field. Versions of this work were presented at the ESRC seminar Challenges in Inflectional Description, University of Essex, April 1, 1998, the Chicago Linguistic Society 34th annual meeting April 17–19, 1998, and at the workshop Processing of Grammatical Gender, Max Planck Institute of Cognitive Neuroscience and Center of Cognitive Sciences, University of Leipzig, Leipzig, July 24–25, 1998. A portion of the material appeared in Evans, Brown and Corbett 1998. We are grateful to all who have commented, especially Roger Evans, Gerald Gazdar, Dick Hayward, Jim McCawley, Salikoko Mufwene, two anonymous *Language* referees, as well as Rob Pensalfini, who discusses the relationship between morphological class and gender in Jingulu (Pensalfini 1999).

¹ A network morphology fragment, written in DATR, underlies our explanation of the Mayali system. For some readers this will be the main point of interest and parts of this fragment are presented at various points in the article. This formal part demonstrates that our claims are consistent. The article has been structured to allow for those readers whose main interest is elsewhere and who may wish to take the formal demonstration on trust. The relevant DATR fragment for this paper, as well as derived theorems, can be viewed at <http://www.surrey.ac.uk/LIS/SMG/mayali>.

² The value of this formal approach is not to make direct claims about the nature of speakers' cognitive structures. Rather we undertake the essential prerequisite for such investigations, namely providing an analysis

1. OVERVIEW OF MAYALI GENDER.

1.1. MAYALI AND ITS VARIETIES. We use Mayali as a cover term for a dialect chain with a number of named varieties, as shown in Figure 1: Gundjeihmi (Dj), Kunwinjku (W), Kundedjnjenghmi (DNj), Kuninjku (I), Kune (in two subdialects, Narayek (E:NR) and Dulerayek (E:DR)) and Manyallaluk Mayali (MM). The prefix *Gun* or *Kun* in some of these names (the variation is orthographic only) is one of the morphological class prefixes to be discussed in this article, language and languages being an important subset of entities assigned to this class. See Evans 2002 for a fuller discussion of these varieties. Speakers of some of these dialects do not accept Mayali as a valid superordinate term, confining its reference to Gun-djeihmi, Kun-dedjnjenghmi and Manyallaluk Mayali, a group we will refer to as ‘the Mayali dialects proper’. The term Bininj Gunwok has recently been mooted as an alternative superordinate term, based on *bininj* ‘Aboriginal person’ and *gun-wok* ‘language’.

Differences in the systems of gender and morphological class are both analytically significant and sociolinguistically salient; they are regularly cited in discussions of dialect differences. The three main differences involve:

(a) the form of the vegetable prefix (see Figure 1), which is *(ng)an*³ in Gun-djeihmi, *man*- in Kunwinjku, Kuninjku and Kune, and a mixture of both in Manyallaluk Mayali and Kun-dedjnjenghmi, basically *(ng)an* on nouns and adjectives and *man*- on some demonstratives. The vegetable prefix is predominantly found on plant terms (e.g. *man-dubang* or *an-dubang* for ‘ironwood tree’) and their parts and products.

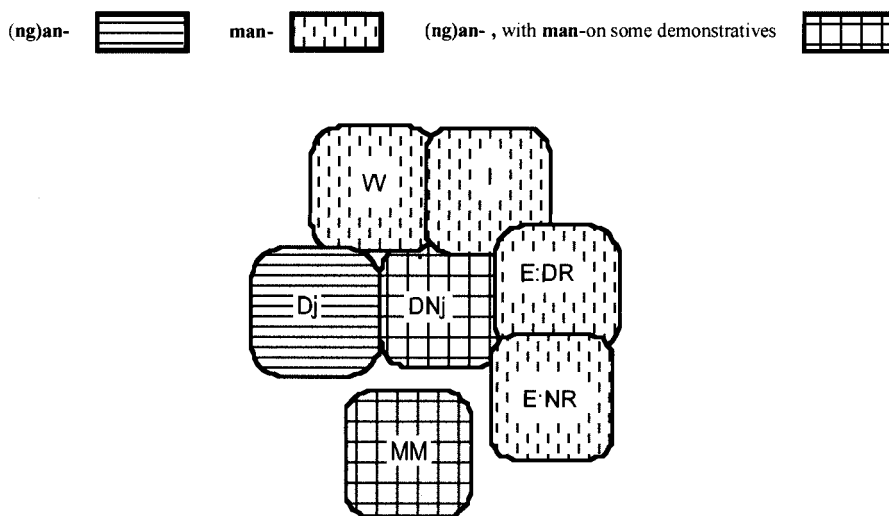


FIGURE 1. Form of vegetable class marker.

(b) the number of genders, with Kunwinjku having a four-gender system, the Mayali dialects proper having a three-gender system through the loss of the neuter gender, and

of complex linguistic data (which are particularly significant for a given typology), and testing it rigorously to ensure that the data are covered consistently.

³ Initial *ng*, another salient sociolinguistic marker, is dropped breath-group initially in these dialects before nonfront vowels in non-monosyllables, especially in Gun-djeihmi. Since citation forms undergo this change, speakers of these dialects prefer dictionary entries to be made without this initial *ng*.

Kune having only the forms of the masculine gender remaining, which effectively means there is no longer a gender system (see Figure 2).

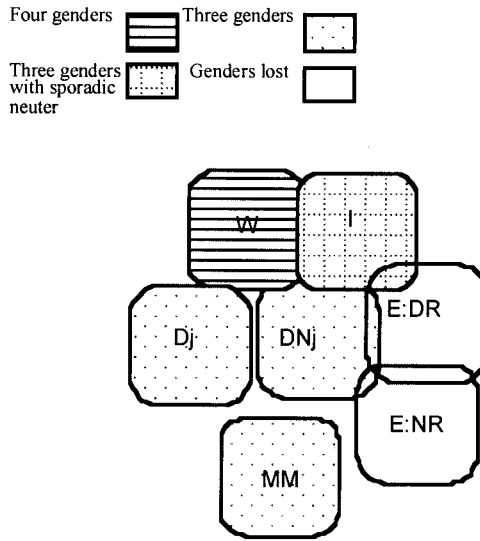


FIGURE 2. Number of genders.

(c) the extension, in Kune, of the suffix *-no*, which in other dialects marks nouns as anaphorically possessed by a third person referent (i.e. roughly ‘his, her, its’), to a general marker of part nouns, to the point where one can say things like *mimno ngarduk* for ‘my eye’, which in other dialects would have the nonsensical interpretation ‘my his/her eye’. Kuninjku is a transitional dialect with respect to this phenomenon, showing free variation between forms like *kun-mim* ‘eye’, with the class-IV prefix *kun-*, and *mim-no*, with the possessed suffix, but retaining the third person possessor interpretation of *-no*, so that one must say *kun-mim ngarduk* for ‘my eye’. We do not consider the marking of part-nouns with the *-no* suffix further in this article; see Evans (1997a, 2002) for details.

Despite these differences, all but the Kune data can be readily brought together into a single diasystem (for this useful concept see Weinreich 1954), in the sense that descriptive statements about certain dialect systems can readily be made in terms of statements about other dialects. For example, a large part of the difference between the Gun-djeihmi and Kunwinjku systems can be captured by the statement that nouns that are neuter gender in Kunwinjku are vegetable gender in Gun-djeihmi. Moreover, there is a high degree of conformity in the semantic rules assigning nouns to classes across dialects. Although for the most part we shall focus on Kunwinjku, which has the most elaborate and conservative system, we will draw on material from other dialects where this illuminates our argument.

In addition to geographical dialect differences, relevant data comes from a register known as *kun-kurrng*, *kun-balak*, or *ngarri-mikme*, which is basically used as a sign of respect between certain classes of affinal relative, particularly the dyads mother-in-law/son-in-law and mother-in-law’s brother/sister’s son-in-law. The male members of these dyads are known as *na-kurrng* and the female members as *ngal-kurrng*, illustrating the use of the *na-* and *ngal-* prefixes; *kun-kurrng* thus effectively means ‘language/

behavior appropriate to the *-kurrng* dyadic relationship'. Within kun-kurrng virtually all lexical items (but not grammatical morphemes or closed-class items like demonstratives or interrogatives) are replaced by formally unrelated morphemes, as shown in §6. What is relevant for present purposes is that the kun-kurrng vocabulary provides a second body of data for gender and noun morphological class, and that the membership rules are virtually identical, with one interesting exception to be discussed in §6. The exception is that many nouns that belong to the zero-marked class in the ordinary register have a nonzero prefix in kun-kurrng, and this is almost always congruent with the gender marking of the word in the ordinary register.

1.2. TYPOLOGICAL BACKGROUND. Certain typological features of Mayali are relevant to the arguments developed in this article. Mayali is a polysynthetic language in which verbs have prefixal slots for subject and object pronominals, as well as (optionally) incorporated nominals which (simplifying somewhat) are related to the verbs as object or intransitive subject,⁴ or a body part⁵ of a 'whole' in object or intransitive subject relation. When nouns are incorporated they drop any morphological class prefix they may possess when used unincorporated (1a–d); this provides a good way of identifying morphological class prefixes, but cannot be applied with nouns that do not incorporate.⁶ Though all body part nouns are incorporable, incorporable nonpart nouns are limited to around sixty, mostly of a generic nature with meanings like 'meat', 'tree', 'place' and so on.

The following abbreviations appear in glosses. In subject/object combinations, the person and number of the subject precedes the slash, the person and number of the object follow, e.g. 3du/1pl '3rd person dual subject acting on 1st person plural'. If no indication of number is given overtly, e.g. 1 in 1a, this is to be interpreted as singular, but for nonhuman arguments this does not exclude nonsingular interpretations. Other abbreviations are IMM immediate, LOC locative, NP nonpast, P past, PP past perfective, REDUP reduplication, REL relative demonstrative (which introduces relative clauses, but is also more generally used to introduce new mentions that the hearer is expected to be able to identify easily). Language registers are abbreviated k.k. for kun-kurrng the avoidance register, and o.l. for ordinary language. Genders are MA masculine, FE feminine, VE 'vegetable' and NE 'neuter'; see also Table 2 on the glossing conventions for gender and morphological class.

(1) Gundjehmi

- a. Nga-ganj-ngune-ng (cf. *gun-ganj* 'meat').
1/3-meat-eat-PP
'I ate the meat.' (incorporation of generic noun in object relation)
- b. Ngan-garre-melme-ng (cf. *gun-garre* 'lower.leg')
3/1-lower.leg-touch.with.foot-PP
'(S)he touched me on the lower leg with her/his foot.' (incorporation of body part noun construed with object)
- c. Ga-rrulk-di an-dubang (cf. *gun-dulk* 'tree')
3-tree-stand.NP III-ironwood

⁴ See Evans 1997b for a fuller statement that takes into account the interaction of grammatical relations, noun incorporation and applicatives.

⁵ A more accurate statement of this would be 'parts and representations', since it includes 'name', 'voice', 'spirit' and a few others. See Evans 1995 for fuller discussion.

⁶ Fuller accounts of tests for segmenting morphological class prefixes, as well as an identification of some problematic cases, are in Evans 1997a, 2002.

‘There is an ironwood tree (there).’ (incorporation of generic noun in intransitive subject relation)

- d. Gu-gun nga-mim-babang (cf. *gun-mim* ‘eye’)
 LOC-right 1-eye-hurt.NP
 ‘My right eye hurts.’

Subject and object marking, in the pronominal slots, is for person and number, but not for gender—unlike in such related languages as Nunggubuyu (Heath 1984), Ngalakgan (Merlan 1983, Baker 2001) and, more distantly, Maung (Capell & Hinch 1970). Thus the prefix slots for subject in 2a and for object in 2b remain insensitive to variations in the gender of the object across masculine (*bininj* ‘man’), feminine (*daluk* ‘woman’), vegetable (*man-me* ‘(vegetable) food’) and neuter (*kun-wardde* ‘rock’). As a result, the only agreement site for gender is in the realm of nominal modifiers like adjectives (Table 1) and demonstratives like the Kunwinjku form *-mekbe* ‘that aforementioned’ in 2a,b (word order is flexible and here arbitrarily follows English order).

(2) Kunwinjku

- a. Na-mekbe bininj ka-manka-n
 MA-that man 3-fall-NP

 Ngal-mekbe daluk ka-manka-n
 FE-that woman 3-fall-NP

 Man-mekbe man-me ka-manka-n
 VE-that III-food 3-fall-NP

 Kun-mekbe kun-wardde ka-manka-n
 NE-that IV-rock 3-fall-NP
 ‘That (previously mentioned) man / woman / food / rock is falling.’
- b. Nga-na-ng na-mekbe bininj
 1/3-see-PP MA-that man

 Nga-na-ng ngal-mekbe daluk
 1/3-see-PP FE-that woman

 Nga-na-ng man-mekbe man-me
 1/3-see-PP VE-that III-food

 Nga-na-ng kun-mekbe kun-wardde
 1/3-see-PP NE-that IV-rock
 ‘I saw that man / woman / food / rock.’

A final typological feature worth mentioning is the representation of number. For humans—and, in cases of narrative empathy, sometimes for higher animates—number is obligatorily represented on the subject and object prefixes to the verb (3a–c). For other nominals number is not normally represented on the pronominal prefixes to the verb—the singular form is used without any implication as to number (3d). Nouns themselves do not normally show number, and a noun may be interpreted as singular or nonsingular according to the context (and, if human, the number shown by the verbal prefix). There are, however, a handful of reduplicated forms such as *daluk-daluk* ‘women’ (see 4c) and *goba-gohbanj* ‘old people’ (cf. *na-gohbanj* ‘old man’, *al-gohbanj* ‘old woman’). A couple of demonstratives, such as *naninjanu* ‘those’ have inherently plural interpretations; for others, the substitution of the normal gender marker by the masculine prefix *na-* is one indication of plurality (see 4c,d for examples). But this

pattern is not pervasive enough, in terms of affecting all modifiers, to warrant setting up a 'plural' class in *na-* that is homophonous with the masculine. Rather it is a matter of agreement reverting to the normal case default (the masculine) in many plural and some other quantificational contexts.⁷ Should the number of a nonhuman need to be made explicit, there are a range of ways of doing this including such modifiers as *na-wern* 'many' (4d), *ngong* 'group of' (in eastern dialects) and *rowk* 'all'.

(3) Gundjehmi

- a. Nga-na-ng bininj / daluk
1/3-see-PP man woman
'I saw the man / woman.'
- b. Ngabanbani-na-ng bininj / daluk
1/3du-see-PP man woman
'I saw the two men / woman.'
- c. Ngaban-na-ng bininj / daluk
1/3pl-see-PP man woman
'I saw the men / women.'
- d. Nga-na-ng duruk
1/3-see-PP dog
'I saw the dog(s).'

1.3. SKETCH OF THE SYSTEM. The alert reader will have already noticed five morphemes relevant to our discussion: masculine gender and morphological class I prefix *na-* (as in *na-kurrng* 'son-in-law, mother-in-law's brother'), feminine gender and morphological class II prefix *ngal-* (as in *ngal-kurrng* 'mother-in-law'), vegetable gender and class III *man-/ngan-*, neuter gender and class IV *kun-*, and the part suffix *-no* in Kune. In addition, nouns such as *bininj* 'man, person, Aboriginal person' have no prefix (morphological class V).

As indicated by the fact that we have attributed both a gender and morphological class to them, the first four prefixes are found both on nouns and modifiers, as exemplified by phrases like ↑*na-kohbanj na-kimuk* 'big old.man'⁸ and ↑*man-dubang man-kimuk* 'big ironwood.tree'. Because of this formal overlap, early investigators (e.g. Oates 1964, Carroll 1976) did not distinguish the two different types of grammatical information they represent. Throughout this article, however, we make a systematic analytic distinction between gender, which is an obligatory agreement category found on modifiers like *-kimuk* 'big' or *-mekke* 'that', and morphological class, which is simply part of the lexeme for some heads like *man-dubang* 'ironwood.tree'.⁹

Despite the formal identity of the gender prefixes with four of the morphological

⁷ In the Kunwinjku dialect some demonstrative roots allow prefixation with nonsingular third person prefixes in the case of humans, which displaces the gender prefix: cf. *na-mekbe* 'MA-that', *bene-mekbe* '3du-that', *birri-mekbe* '3pl-that'. Other dialects would simply use the masculine form of the demonstrative in these contexts.

⁸ The order of constituents in the noun phrase is relatively free. Because we prefer to cite phrases in the order in which they were offered spontaneously, the upward arrow will be used to identify the head, in this instance *na-kohbanj* 'old man', unless this is obvious from the context. To aid the reader, full stops link the words of multiword English glosses corresponding to a single Mayali word.

⁹ In an earlier publication (Evans 1997a), the first author used the term AGREEMENT CLASS for gender and HEAD CLASS for morphological class.

class prefixes, there are good descriptive reasons to distinguish them. First, although all dialects have basically the same system of morphological classes (leaving aside the development of a part-class in E), they have significant differences in gender systems (see middle column of Table 1): W has all four genders, Dj has lost the neuter gender, extending vegetable agreement to what in Kunwinjku are neuter nouns, and Kune has extended masculine agreement to all nouns and in the process gotten rid of all gender contrasts, while retaining the formal marker of masculine gender on modifiers, and the full set of class prefixes on nouns.

	CONGRUENT EXAMPLES (AT LEAST IN KUNWINJUKU)	ZERO-CLASS NOUNS WITH PARALLEL SEMANTICS
MASCULINE	‘good boy’	‘good man’
Kunwinjku	<i>na-rangem na-mak</i>	<i>bininj na-mak</i>
Gun-djeihmi	<i>na-rangem na-mak</i>	<i>bininj na-mak</i>
Kune	<i>na-rangem na-mak</i>	<i>bininj na-mak</i>
FEMININE (W, Dj only)	‘good old.woman’	‘good woman’
Kunwinjku	<i>ngal-kohbanj ngal-mak</i>	<i>daluk ngal-mak</i>
Gun-djeihmi	<i>al-gohbanj al-mak</i>	<i>daluk al-mak</i>
Kune	<i>ngal-kohbanj na-mak</i>	<i>daluk na-mak</i>
VEGETABLE (W, Dj only)	‘good food’	‘good cheeky.yam’
Kunwinjku	<i>man-me man-mak</i>	<i>kamarn man-mak</i>
Gun-djeihmi	<i>an-me an-mak</i>	<i>gamarn an-mak</i>
Kune	<i>man-me na-mak</i>	<i>kamarn na-mak</i>
NEUTER (W only)	‘good rock’	‘good water’
Kunwinjku	<i>kun-wardde kun-mak</i>	<i>kukku kun-mak</i>
Gun-djeihmi	<i>gun-wardde an-mak</i>	<i>gukku an-mak</i>
Kune	<i>kun-wardde na-mak</i>	<i>(kun-ronj na-mak)</i>

TABLE 1. Typical gender/morphological class correlations in three dialects.

Second, the two systems are logically independent, even though there is a large measure of congruence between them. (We use congruence for the situation exemplified by *man-me* and *ngal-kohbanj*, in which a noun controls gender agreement of the same form as its (non-zero) class prefix.) A large proportion of animate nouns, and some inanimate nouns, have no overt class prefix (hence belonging to class V, the zero class). Zero-class nouns, nonetheless, belong to one of the four genders, as shown by the behavior of their modifiers. See the righthand column of Table 1. Cases such as this furnish the most obvious evidence against an analysis in which noun form is used as the basis for assignment to gender in Mayali, since the zero morphological class has such poor predictive value. Though one could always retort that form-based assignment could be used for nouns of the *na-rangem* type, i.e. those with an overt prefix, there are two problems with this: (a) it works for only a minority of cases, at least for animate nouns, and (b) since gender in these cases can be successfully assigned by semantic criteria anyway, it is more economical to use the same semantic criteria for both the prefixed and the unprefixed cases.

In addition, partially distinct semantic principles govern the assignment of nouns to genders and to morphological classes (e.g. life-form plant names will go into the *kun-*morphological class, but the vegetable (*man-*) gender). As a result there are a significant number of lexemes where morphological class and gender are noncongruent, e.g. *man-djewk* (W)/*an-djeuk* (Dj) ‘rain, rainwater’, which always governs masculine agreement.

One of the formal challenges for our analysis, then, is to give semantic rules for assignment that not only capture the large measure of congruence between the two

systems of gender and morphological class but can also operate independently in one domain or another. In line with our analysis, we use separate glossing conventions for gender and morphological class prefixes, as shown in Table 2.

AFFIX	MORPHOLOGICAL CLASS GLOSS	GENDER GLOSS
<i>na-</i>	I	MA (masculine)
<i>ngal-</i>	II	FE (feminine)
<i>man-/ngan-</i>	III	VE (vegetable)
<i>kun-/gun-</i>	IV	NE (neuter)
∅-	(V) (not usually glossed)	
<i>-no</i>	POSSD ('possessed')	

TABLE 2. Glossing conventions for gender and morphological class.

1.4. SUSPENSION OF AGREEMENT. In discussing the independent systems of gender and morphological class, we will abstract away from another source of disagreement between the morphological marking on head and modifier. There are three main conditions under which modifiers show up as masculine regardless of the gender of the head:

(a) with the demonstrative *na-wu* 'this one that you should be able to identify from the following word(s)' (4a–b), suspension of agreement in favor of the masculine form is extremely common;

(b) with the presentational demonstrative *na-(n)hni* 'this one I am showing to you', as in (4c);¹⁰

(c) in plural contexts, such as other quantifier-like modifiers like *-wern* 'many' (4d).

In some dialects agreement is suspended in further contexts as well, such as with *barrkid* 'different' and a few other modifiers (see Evans 1997a:139, 2002). Note that the expected genders for the nouns in these examples would be vegetable in 4a, neuter in 4b, feminine in 4c (cf. 2a,b), and vegetable in 4d.

(4) Gundjehmi

- a. Yo **na-wu** gun-wardde-rurrk.
 yeah MA-REL IV-rock-cave
 'Yeah, this rock cave.'
- Kunwinjku
- b. wanjh ngadman birri-djal-balhme **na-wu kun-dolng** kadberre.
 well we (emphatic) 3pl-just-stopNP MA-REL IV-smoke our
 'Well . . . they've just cut off our tobacco supply.'
- c. na-ngale-ngale bene-boken **na-nhni** daluk-daluk?
 MA-who-who 3du-two MA-this.PRESENTAT REDUP-woman
 'Who are these two women?'

¹⁰ Other 'lookback' demonstratives, such as *na-mekbe* (W) or *na-mekke* (Dj) 'that which we were talking about' and *na-kka* (all dialects) 'that which we were talking about just now' do show agreement with the gender of the head. Examples illustrating the variously prefixed forms of *namekbe* are given in 2 and 3; the forms of *nakka* are: masculine *na-kka*, feminine *ngal-kka*, vegetable *ma-kka*, and neuter *kun-ukka* (this last found only in the Kunwinjku dialect). The 'relative' form *na-wu* has gender-specific forms (masculine *na-wu*, feminine *ngal-bu*, vegetable *man-bu* ~ *manu* (W) or *an-du* (Dj), and neuter *kun-u*), though in dialects other than W it normally only uses the full gender range when introducing relative clauses, and even then this is not always strict; in other uses the form *na-wu* is used regardless of the gender of the head noun. In W this form often exhibits gender agreement (many examples are in §3.1) though this is by no means obligatory.

Kuninjku

- d. **na-wern** djarduk ø-nguneng kure kaddum ø-barndi.
 MA-many red.apple 3P-eatPP LOC up 3P-be.highPP
 ‘He ate many red apples while he was up (in the tree).’

Since in such cases the gender is determined either by the demonstrative itself (e.g. with *na-wu*) or by the constructional context (e.g. plurality, as in 4c, d), rather than by the head, we do not discuss them further here. (See Evans 1997a, 2002 for fuller details.) Obviously, though, a full formal account of gender agreement in Mayali must build this in at the level of constructing the noun phrase, and allow the masculine to override the gender assigned by the head in such situations.

2. NETWORK MORPHOLOGY APPROACHES TO GENDER ASSIGNMENT. We have shown above that there is formal identity of gender and morphological class prefixes for many nouns, a situation which it would be fairly trivial to model. The real challenge is to account for the examples where this is not so, while at the same time demonstrating that this does not have negative ramifications for the more straightforward case. Informal theories and ones that have not been checked computationally are at a disadvantage, since a neat solution to deal with certain problem examples may have unforeseen consequences. We are dealing not just with complex interactions but also with varying degrees of exceptionality, and it is difficult to be aware of all the possibilities and still be able to keep track of the potential effects of changing one part of the theory. This is why we choose to constrain our analysis using principles of the Network Morphology framework and to represent it with the aid of the lexical knowledge representation language DATR.

Detailed Network Morphology analyses of gender and class assignment already exist for Arapesh (Fraser & Corbett 1997), Polish (Brown 1998) and Russian (Fraser & Corbett 1995). As with the analysis presented here, these also have the benefit of explicit formal representation and have been checked using the DATR language developed by Evans and Gazdar (1989a, 1989b, 1996; see also Keller 1995). In this section we outline some of the theoretical constructs of network morphology.

2.1. CORE IDEAS. A core Network Morphology concept required for this article is that of **DEFAULT**. As Fraser and Corbett (1997) have argued, the widely used notion default is not well defined. Two distinct uses of the term may be distinguished: the **NORMAL CASE DEFAULT** and the **EXCEPTIONAL CASE DEFAULT**. The former can be understood as the general case that normally applies and the latter as the last resort. An analogy may be helpful here. Mary and John both work for a firm based in London. Mary is the personnel manager and works in the office in London. Occasionally, she goes to Paris on a training course. By default, then, Mary works in the office in London. John is a salesman. He normally spends Mondays in the south of England, Tuesdays in the west, and Wednesdays and Thursdays in the north. If, however, a client cancels an appointment, or he has a problem with his car, or there is a department meeting, he goes to the office in London. On Fridays he often plays golf, but if it rains he goes to the office. By default, then, John also works in the office in London. Intuitively the two cases are rather different. Mary is ‘normally’ at the office, John is not. And yet at a higher level of abstraction the office is the default workplace for both. It is these two types of default, both reasonable uses of the term, that have led to differences in usage in the literature, and to confusion. This is why we make the distinction: for Mary, working at the office in London is the normal case default, while for John, working in London is the exceptional case default.

As the name suggests, NETWORK MORPHOLOGY theories consist of a NETWORK where information is stored at NODES and is inherited by default. By convention, only node names begin with a capital letter. Figure 3 illustrates a small inheritance network in which the two lexical items *marrkidjbu* ‘sorcerer’ and *na-waran* ‘oenpelli python’ inherit information from a node NOUN.

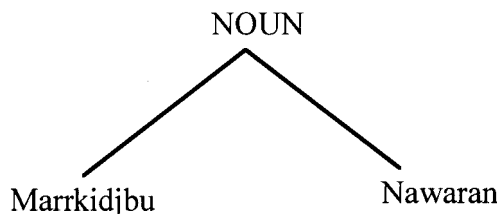


FIGURE 3. A simple inheritance network.

Figure 3 is obviously a simplification, since all other nouns will also inherit from the node NOUN. Furthermore, we need to consider what kinds of information may be stored at nodes such as those given in Figure 3. This is best done by illustrating with an example of one of these nodes represented in DATR. Example 5 is our lexical entry for the Mayali noun *marrkidjbu* ‘sorcerer’.

- (5) Marrkidjbu:
 ⟨⟩ = = NOUN
 ⟨sem gloss⟩ = = sorcerer
 ⟨root⟩ = = marrkidjbu
 ⟨sem⟩ = = HUMAN.

Located at this node, as elsewhere in the network, are FACTS which consist of a pairing of a left-hand and a right-hand side. Each left-hand side of a fact consists of a single PATH. Every path is enclosed in angle brackets. A right-hand side of a fact may consist of an atomic VALUE or another path, or may consist of a combination of one or more paths and values. There are four left-hand paths in example 5. These are ⟨⟩, ⟨sem gloss⟩, ⟨root⟩, and ⟨sem⟩. In 5 the label of the node is Marrkidjbu (it occurs before the colon). It is helpful to use mnemonic labels, but 4242 would do just as well. The form of the label is not part of the theory. Facts about the lexical item *marrkidjbu*, are that it inherits information from the node NOUN, that it can be glossed as ‘sorcerer’, that its root is *marrkidjbu*, and that it inherits information about its semantics from a node HUMAN (not given in Fig. 3). The path ⟨sem gloss⟩ is paired with the atomic value sorcerer. The value is ‘atomic’, because it consists of a single string of symbols with no intervening white space. The fact about the root of the noun *marrkidjbu* is of the same straightforward kind, where an atomic value is directly paired with a path. The other two facts, that the item in question belongs to the class of nouns and belongs to the semantic class of humans, are less straightforward, but crucial to our understanding of DEFAULT INHERITANCE.

Paths in DATR contain any number of ATTRIBUTES down to zero, and the attributes are ordered in relation to each other within the angle brackets of the path. Attributes are used to describe linguistic structure or generalizations about linguistic structure. We use them to represent levels of structure, such as sem for semantics or mor for morphology. Further, we can pick out morphological types such as prefix, or morpho-syntactic features like gender. The reader has already seen the attributes sem, gloss, and root. In 5 the paths contain at most two attributes. As the metaphorical term PATH suggests, paths become more specific the more attributes they contain, just as one learns

more about a particular area by moving along a path. The paths $\langle \text{sem gloss} \rangle$, $\langle \text{root} \rangle$, and $\langle \text{sem} \rangle$ are more specific than the path $\langle \rangle$. That is, these paths, like any path that contains one or more attributes, are EXTENSIONS of the EMPTY PATH $\langle \rangle$. The paths $\langle \text{root} \rangle$ and $\langle \text{sem} \rangle$ do not stand in a relation of extension to each other, of course, because neither of them is more specific than the other. But the path $\langle \text{sem gloss} \rangle$ and $\langle \text{sem} \rangle$ do stand in such a relation, as $\langle \text{sem gloss} \rangle$ is an extension of $\langle \text{sem} \rangle$. Elsewhere we shall come across the path $\langle \text{sem cat} \rangle$ (not given in 5), which is also an extension of the path $\langle \text{sem} \rangle$.

In 5 the empty path is paired with the node NOUN, not seen yet, on its right-hand side. A path cannot be paired with a node without also making reference to another path and its extensions at that node. Hence paths may refer to other paths. By convention, where a path is paired with another node and no overt reference is made to a particular path at the node referred to, then the referring path refers to the identical path at the node referenced. Ex. 6 is a notational variant of 5.

(6) Marrkidjbu:

$\langle \rangle = =$ NOUN: $\langle \rangle$
 $\langle \text{sem gloss} \rangle = =$ sorcerer
 $\langle \text{root} \rangle = =$ marrkidjbu
 $\langle \text{sem} \rangle = =$ HUMAN: $\langle \text{sem} \rangle$.

In sum, the empty path at Marrkidjbu refers to the empty path, and its extensions, at NOUN. The path $\langle \text{sem} \rangle$ at Marrkidjbu refers to the path $\langle \text{sem} \rangle$, and its extensions, at HUMAN. If we require the value associated with the empty path at the node Marrkidjbu, it can be found by looking for the value associated with the empty path at the node NOUN. Furthermore, the value for any extension of a path that is not already specified at Marrkidjbu will be found by looking for a matching path at NOUN.

In 6 all three of the paths $\langle \text{sem gloss} \rangle$, $\langle \text{root} \rangle$, and $\langle \text{sem} \rangle$ are extensions of the empty path. As the values associated with the paths $\langle \text{sem gloss} \rangle$ and $\langle \text{root} \rangle$ are stated locally at the node Marrkidjbu in 6 we need look no further for them. But we wished to know, say, the syntactic category of this lexical item, there is no path $\langle \text{syn cat} \rangle$ that states this at the node Marrkidjbu in 6. To find the value for this path one must either find this path at Marrkidjbu or find the most specific matching path of which the path is an extension. The most specific match with the path $\langle \text{syn cat} \rangle$ at the node Marrkidjbu is the empty path. The first fact in 6 states that extensions of the empty path at Marrkidjbu can be found by looking at extensions of the empty path at the node NOUN. The node NOUN is given in 7.

(7) NOUN:

$\langle \rangle = =$ NOMINAL
 $\langle \text{syn cat} \rangle = =$ noun
 $\langle \text{syn gender} \rangle = =$ GENDER: $\langle \langle \text{sem cat} \rangle \rangle$
 $\langle \text{mor prefix} \rangle = =$ MOR__NOMINAL: $\langle \text{mor} \langle \langle \text{morphological class} \rangle \rangle \rangle$
 $\langle \text{morphological_class} \rangle = =$
 MORPHOLOGICAL__CLASS: $\langle \langle \text{eval_morphological_class} \rangle \rangle$
 $\langle \text{eval_morphological_class} \rangle = =$ $\langle \langle \text{prag register} \rangle \rangle \langle \langle \text{sem cat} \rangle \rangle$
 $\langle \text{congruence} \rangle = =$ CLASS__FROM__GENDER: $\langle \langle \langle \text{syn gender} \rangle \rangle \rangle$
 $\langle \text{prag register} \rangle = =$ o__l.

One of the paths in 7 is $\langle \text{syn cat} \rangle$, a path not given at the node Marrkidjbu. As Marrkidjbu inherits all extensions of the empty path from NOUN, unless they are already specified by it, Marrkidjbu's value for $\langle \text{syn cat} \rangle$ is the one stated at the node NOUN, namely noun. This rather obvious example illustrates what we mean by default inheritance,

namely that information is inherited by default, unless the information is specified at the inheriting node. Marrkidjbu inherits all information from NOUN, except for information specified at Marrkidjbu itself.

As shown in 7, the node NOUN refers to the node NOMINAL for other extensions of the empty path; this captures the fact that there is a superordinate nominal word class, which includes adjectives and demonstratives, whose members share certain features. The node NOUN also specifies certain other extensions of the empty path, such as ⟨syn gender⟩, ⟨mor prefix⟩, and ⟨morphological__class⟩. The value for these is found at the nodes GENDER, MOR__NOMINAL and MORPHOLOGICAL__CLASS respectively. In each case the corresponding value at these nodes depends on the evaluation of information distributed elsewhere in the network. This is represented by the use of EVALUABLE PATHS. For instance, the value for ⟨syn gender⟩ is determined by evaluating the semantic category ⟨sem cat⟩ of the noun in question and then using that value to match or extend a path at the node GENDER in order to determine the value for ⟨syn gender⟩. In the DATR equation in 7 which represents this, the path ⟨sem cat⟩ is an evaluable path, and is therefore further enclosed within angle brackets (i.e. the right-hand is GENDER:⟨⟨“sem cat”⟩⟩). The evaluable path ⟨sem cat⟩ is also enclosed in quotation marks, marking GLOBAL INHERITANCE, where the value to be associated with the path may depend on the particular lexical item. (If there were no global inheritance, then only a value stated locally at the node in question—in this case, NOUN—could be used, if available. For gender assignment on the basis of semantic category, such an approach would not make sense as the value for gender naturally depends on the particular noun.) In practical terms, global inheritance means taking the value according to information available in the lexical entry.

Evaluations are also required to determine the value for ⟨mor prefix⟩ and ⟨morphological__class⟩. For ⟨mor prefix⟩ the value for morphological class is evaluated and this is inherited globally, so the value will depend on whatever is stipulated or inherited by the lexical item in question. By default, the NOUN node also provides a value for ⟨morphological__class⟩. If a noun is assigned morphological class according to the default system stipulated at the NOUN node, then this value will be used to determine the value of ⟨mor prefix⟩. If the lexical item overrides the assignment rules, then the value stipulated directly for the lexical item will be used (because ⟨mor prefix⟩ requires the evaluation of the globally inherited value of ⟨morphological__class⟩).

The path ⟨sem cat⟩ is evaluated to determine information about gender. Returning to 5, the lexical entry Marrkidjbu inherits all extensions of the path ⟨sem⟩ from the node HUMAN. In other words, the node HUMAN is the default source for information about the semantics of this noun. This illustrates two important properties of the architecture of Network Morphology theories. First, we can understand that the network of information is made up of different HIERARCHIES: the lexemic hierarchy, partially illustrated in Fig. 3 above, a morphological hierarchy, and a semantic hierarchy where information about the semantics is stated. The semantic hierarchy, to which the node HUMAN belongs, is illustrated in Fig. 4 and discussed further in §3.4. Second, we employ a sophisticated notion of default, which involves defaults being layered. For example, whereas the node NOUN is the default source for information of any kind about the noun in question, the node HUMAN is the default source for information about the semantics in the case of human nouns. Thus there is a default for a particular level of information, which is different from the overall, totally unspecified, default. Many instances of exceptionality, then, involve a switch from one level of default to another. Where an item behaves in an apparently exceptional way, it may not be totally

exceptional, but rather its exceptionality may be confined within strictly defined limits, set by the exceptional case default. This latter is chosen when the relevant normal case default fails to apply.

2.2. GENDER ASSIGNMENT. Languages with gender have ways to allot particular nouns to genders. Models of this property are known as assignment systems. Corbett (1991) develops a typology in which languages can have either a semantic assignment system or a semantic plus formal (morphological or phonological) assignment system. While there are languages that have strict semantic assignment systems (Corbett 1991:8–11), such as the Dravidian languages Kannada (Sridhar 1990:198) and Tamil (Asher 1985: 136–37), there are no gender languages that entirely lack semantic assignment (Corbett 1991:34, 63).

Fraser and Corbett (1995), representing their analysis explicitly in DATR, use the Network Morphology framework to capture the interplay of semantic and morphological assignment of gender in Russian. Here a default rule assigns nouns to genders on the basis of their semantics. If a noun denotes a male, then it will be masculine; if it denotes a female, it will be assigned feminine gender. Where the semantics fail to assign nouns to a particular gender, the formal assignment system takes over; here nouns are assigned to one of the three genders on the basis of their declensional class. If there is a clash between the formal assignment system and the semantic assignment system, then the semantic system takes precedence. This is exemplified by Russian nouns such as *djadja* ‘uncle’; though they belong to declension II, which normally assigns feminine gender, they are assigned masculine gender on the basis of their semantics.

Network Morphology work on mixed assignment systems is taken further by Fraser and Corbett (1997) in their analysis of Arapesh, a language of the Torricelli family, spoken on the north coast of Papua New Guinea. The analysis draws on data from Fortune’s 1942 grammar and work based on it in Aronoff 1992, 1994: 89–114. The Arapesh system has semantic assignment based on animacy and biological sex: nouns denoting female persons are assigned to one of the thirteen genders in Arapesh, and those denoting male persons to another. Otherwise, nouns of the different classes are assigned to genders according to the morphological classes to which they belong. There is always a rule, or normal case default, which can assign any noun to a gender. On certain occasions a noun may ‘misbehave’. If it cannot be assigned a morphological class and does not denote a person, then it must be assigned gender according to the exceptional case default. For instance the Arapesh noun *gun* ‘sago pounder’ (plural *gunabys*), appears to be class 12 (or 13) from the singular stem, but class 1 from the plural. These classes assign different genders, so the default gender is assigned as a result of this clash. Brown (1998) similarly applies the notion of exceptional case default to Polish in order to explain the switch between masculine gender and masculine personal gender where certain nouns denoting male persons cease to have masculine personal agreements in the plural. (See Corbett & Fraser 2000 for more on the notion of default as applied to gender systems.)

One thing that Arapesh, Polish, and Russian have in common is that where the gender cannot be assigned by the semantics it is assigned according to morphological class (DECLENSION as used for Indo-European languages is one type of morphological class). There is therefore directional assignment from morphological class to gender. It is a theoretical possibility that nouns could be assigned to morphological classes on the basis of their semantics but that these semantics differed from the semantics of gender assignment. With both Polish and Russian we find that the semantic assignment to

declension is based on similar semantics as for gender: males are typically assigned to declension I, females to declension II. Nouns like Russian *djadja* ‘uncle’ tell us that the assignment systems for declension and gender are independent but overlapping. The noun in question is assigned gender according to its semantics, but overrides the semantic assignment to morphological class. For Arapesh there is one gender assignment rule that combines semantic and phonological information (Fraser & Corbett 1997:36–38), namely, that a noun whose stem ends in /n/ and denotes a male is assigned to class 13, even though assignment to morphological class in Arapesh is normally based on the phonology of the stem.

The Mayali system differs from the Arapesh, Polish, and Russian systems in a number of important ways. First, we claim that the system of gender assignment is semantic only and that there is no assignment of gender according to membership of morphological class or phonology of the stem. Second, we will show that assignment to morphological class is also semantic. Third, certain semantic categories are unique to the morphological class assignment system, preeminently the animate/inanimate distinction. Fourth, in many cases the same assignment principles are used for both gender and morphological class, and in such cases there is directional assignment from gender to morphological class; this is the opposite of the systems mentioned above.¹¹

As we show in §§5.3–5.4, exceptions to the system of gender assignment involve a resort to the exceptional case default, namely masculine. We can contrast this part of the gender assignment system with the morphological class assignment system. Because each noun is assigned to a gender, the semantics underlying the system of gender assignment can always be used in the exceptional case for morphological class assignment. In contrast, morphological class in Mayali cannot always be used in gender assignment, because of the existence of the morphological class with no overt marking.

3. SEMANTICS OF GENDER

3.1. SEMANTIC CATEGORIES IN THE GENDER SYSTEM. The basic contents of each of the four gender categories in Kunwinjku are shown in Table 3. Those in square brackets represent categories that have migrated from the neuter into the vegetable gender for younger speakers of Kunwinjku. Gun-djeihmi gender categories are comparable to Kunwinjku, except that all nouns that are neuter in Kunwinjku have passed into the vegetable gender. Items in bold regularly have noncongruent morphological class (see §4.1).

We now take each of these categories in turn. The discussion is organized by gender, but departs from this where particular contrasts are relevant (e.g. between masculine and vegetable for terms for honey). Note that only humans, some spirits, and macropods (kangaroos and wallabies) have sex-differentiated lexemes, that is, lexical items whose meaning includes the sex of the referent. We reserve discussion of the principles governing gender choice in nonhuman animates until §3.2.

MASCULINE

All male humans take masculine agreement, e.g. *na-mekke* †*bininj* ‘that man’, *na-mekke* †*yawurrinj na-kimuk* ‘that big youth’. Unless specified as feminine, spirits of various types (malignant sky spirits, ghosts of dead humans, or the mischievous *mimih* spirits said to inhabit the many rock crevices of the region) are always masculine.

¹¹ We suggest that the particular direction we find here can arise only where gender assignment is predominantly semantic. That is, assignment to morphological class based on gender is possible if the language overwhelmingly assigns nouns to gender by semantic criteria, but would not be possible where formal assignment to gender has a major role. For another case see the discussion of Ojibwa in Corbett 1991:64–65.

MASCULINE	VEGETABLE
Male higher animates	Plants and their products, including life-form terms
Overall default for animates	Sexual and excretory body parts
Some lower animates	Song, ceremony and custom
Rain	Fire (both bush and domestic)
Compass points	Food, vegetable and otherwise
Some items used in painting	Some types of honey
Trade items, esp. Macassan and European	Boats, planes, and cars
Some types of honey	[Drink, water, well]
	[Camp nexus]
	[Landscape features with water associations]
FEMININE	NEUTER
Female higher animates	Most parts of animals and plants
Some lower animates	Some parts of the landscape
Sun	Weather and sea
	Time measures
	Languages and speech
	Country; placed-based social categories

TABLE 3. Overview of semantic categories in gender assignment.

Nonhumans that are lexically specified as male (e.g. †*kalkberd na-kimuk* ‘big male.wal-laroo’) will always take masculine agreement; those that are sex-neutral but are significant enough to humans to allow biological sex to be encoded when desired, such as *djarrang* ‘horse’ or *ngal-wanjdjuk* ‘emu’, have the option of taking it (see §3.3). In other words, sex-based gender agreement is obligatory with humans but optional with other higher animates.

For vertebrate animates below humans there is a mixture of masculine and feminine members in virtually all biological categories (e.g. reptiles, birds, fish); within each such group, the division is fairly evenly balanced and undoubtedly contains many arbitrary elements. But there are a few general principles that partially save us from having to encode the gender of each item individually; see §3.2.

In the domain of native bees and honey, there is a single term for each bee species and the honey it produces. *Lorlbbarn*, for example, refers both to a particular type of honey found in tree trunks and to the bee that makes it.¹² (The biological taxonomy of these insects has yet to be properly investigated and many still lack Linnean names, though it appears that most are trigona species.) The ten or so honey terms are evenly split between the masculine and vegetable genders; the masculine items tend to have phalluslike entry tubes (sometimes described in Aboriginal English as ‘boy-one sug-*arbag*’), as with the *na-biwo* type.

As the default animate category, the masculine extends to most nonvertebrates, the main exception being certain crustaceans (see below). But flies, ants, beetles, and so on

¹² Interestingly, the usual grammar of part-whole relationships is reversed in the case of bees, in that the organism is treated as a part of its product. Cf. *man-dadjek karlkidno* [tree.species nectar-its] ‘the nectar of the *Grevillea pterydifolia*’, but *na-biwo bodno* [honey.type bee-its] ‘the bee of the *nabiwo* honey’. Although an anonymous referee suggests an alternative view, that the possessive relationship here is associative rather than paronymic, we regard this as unlikely since there are no other cases of the suffix *-no* expressing a mere associative relationship (which would be expressed by a free oblique pronoun). Note further that in Ndjébbana, a non-Gunwinyguan language just to the north, the term for ‘(native) bee’ is (*djábbarma*) (*n*-)malála ‘(honey) (its-)bee’ (Coleman 1993).

are all masculine: †*bon na-bang* ‘stinging fire.ant’, †*deddel na-bang* ‘stinging black.ant’, †*djak na-bang* ‘stinging meat.ant’, *na-mekke* †*bidkinjenbidkinjen* ‘that firefly’.

Items used in painting or decoration are split between masculine (probably because of their association with the predominantly male activities of painting and ritual) and vegetable (due to the source of most of them as plant products), as in the following extract in which *kun-kurlba* ‘blood (color)’ is masculine, while *karlba* ‘yellow (ochre)’ and *kun-burlerri* ‘black’ are vegetable. Because gender agreement always defaults to the masculine with the demonstrative *na-wu* we cannot conclude anything about the head nouns *kun-rodjbe* ‘red (ochre)’ and *delek* ‘white clay’ from this passage, although other contexts not shown here demonstrate that they can take proper masculine agreement. For at least some of these nouns, there is contextual variation in gender assignment: *delek* takes vegetable agreement in contexts when it is not associated with art (for example, when discussing how it is eaten as a cure for dysentery), whereas in discussions of painting it takes masculine agreement.

- (8) **na-wu kun-rodjbe** kore Kinga, **nakka kun-kurlba**
 MA-DEM IV-red.ochre LOC CROC MA-DEM IV-blood
 ngalengarre Likanaya. Dja **karlba makka** kun-balem
 her [name] and yellow VE.DEM IV-fat
 ngalengarre. Dja **kun-burlerri makka** ngad kun-kurlah,
 her and IV-black VE.DEM we IV-skin
 dja **na-wu delek**, wanjh nuye kun-duk.
 and MA-DEM white.clay then his IV-sperm

‘The red color in the crocodile is the blood from Likanaya. The yellow is her fat, the black is our skin, and the white color is sperm.’ [KS 56]

Rain or rainwater, *man-djewk*, takes masculine agreement despite its vegetable prefix, e.g. *na-djalkimuk man-djewk* ‘just (a) big rain’. The four compass points are all masculine, *na-ni* †*kakbi* ‘there in the north’.

FE MININE

Feminine is the most semantically coherent of the four genders. All female humans, and spirits whose female status is focused on, are feminine, e.g. *ngal-ekke* †*daluk* ‘that woman’. So are higher animate terms that are lexically female, e.g. †*karndalbburru ngal-balem* ‘fat female.antilopine.wallaroo’. Roughly half of the terms in other animate vertebrate classes are feminine and all the members of some invertebrate classes, for example crustaceans.

Finally, ‘sun’ is feminine, despite having a class IV prefix in some dialects (*kundung*), though it has a class II prefix in others (e.g. Dulerayek *ngal-benbe*); in the mother-in-law register it is attested with both II and IV prefixes (*ngal-djarala* and *kun-djarala*). This is part of a general tendency for ‘sun’ to be feminine in Australian languages (see Harvey 1997).

VE GETABLE

The semantic focus of the vegetable gender is plants (*man-ekke* †*man-dubang* ‘that ironwood.tree’, *man-u* †*karrbarda* ‘that cheeky.yam’); note that this applies even when, as life-form terms, they take the class IV prefix (see §4.1 below), †*kun-dulk man-bu* ‘that tree’. This gender extends to a number of items transformed from plants in various ways, what might be called ‘the great chain of hydrocarbons’.

- Their products (*man-ihmanu* †*birrkala* ‘that boomerang’, *ma-kkamanu* †*payp* ‘that pipe’).

- Vegetable foods, and tobacco, *man-bu* †*man-me dja* †*bakki* ‘this vegetable.food and tobacco’.
- Excreta, whose visible contents, at least after a few days in the sun, are predominantly plant fiber, e.g. *manekke* †*kurduk* ‘that turd’.
- Some types of honey (transformed nectar), †*man-kung man-mekbe* ‘that honey’.
- Boats and vehicles (the original boats being made of bark or hollowed wood), *man-ekke Macassan* †*kabbala* ‘that Macassan boat’ and *man-bu* †*man-welyi* ‘that plane’.
- Fire (burnt wood), *man-ekke* †*kunak* ‘that fire, light’, *man-kare* †*kunak* ‘old fire’, †*kun-rerrng man-ekke* ‘that firewood’, †*kun-djahkorl man-yahwurd dja man-kimuk* ‘large and small firesticks’.
- Also in this category, though the link to the plant nexus is not clear, are most sexual body parts, †*man-berd man-kimuk* ‘big penis’ (perhaps mediated by the widespread metaphor of sex as eating); roads (flattened or cut scrub), †*man-bolh man-mekbe* ‘that track’, and terms for song, ceremony, and custom, such as *man-bu* †*Ubarr* ‘that Ubarr ceremony’, *ma-kka yawkyawk* †*man-karre* ‘that young.girls’ law’, and *man-ekke* †*kun-djak* ‘that sickness (in a context where it is being attributed to sorcery)’.

Among some speakers of Kunwinjku there is an extension of the vegetable gender into the semantic domain of the neuter (see below).

NE UTER

Neuter gender is focused on parts, places, and categories linked to them. The major subcategories are:

- Most body parts (all except sexual and excretory), †*kun-kodj/†kun-denge kun-kimuk* ‘big head/foot’, †*kun-djak kun-dulmuk/kun-warre* ‘heavy/bad pain’, also in contexts of edibility, e.g. *kun-ih* †*kun-kanj* ‘this meat(= muscle)’. This can include ‘devils’, when viewed as the spirit part of a (dead) person, *kun-u* †*na-marnde* ‘that devil’. When viewed as freestanding entities, on the other hand, ‘devils’ take masculine agreement in accordance with the rules for masculine agreement given above.
- Most parts of the landscape, *kun-i* †*mabele kun-warre* ‘this bad muddy.ground’, *kun-ih* †*kun-red* ‘this place’, *kun-i ngurridjowkke* ‘that [place where] you cross’ (in this example the head is supplied pragmatically), †*kun-ngarlk kun-kuyeng* ‘that high cliff’.
- Most phenomena of weather and the sea, †*kun-mayorrk kun-kimuk* ‘big wind’, †*mabularr kun-warre* ‘bad white.sea’.
- Time measures, †*kun-kodjke kun-kudji* ‘one night’ (literally ‘one sleep’), †*kumunun kun-u* ‘that night’.
- Parts of plants, †*kun-marlaworr kun-kudji* ‘one leaf’.
- Language, and other place-based social institutions, *kun-buyika* ‘another (moiety design)’, †*kun-wok kun-buyika* ‘another language’, *kun-ingkunu* †*kun-wok* ‘this story/language’, *kun-kudji* †*Balanda*¹³ ‘only English’, *kun-u* †*djurra kadberre* ‘this book of ours’. It is worth pointing out that in the regional ideology, languages, clans, and the moieties and designs associated with them are all directly linked to tracts of country in the landscape (see Merlan 1982).
- Linked to the above category, abstract nouns more generally, such as *kun-rayek* †*kun-ngudj ngardduk* ‘my hard efforts’, and †*kun-rak kun-warre* ‘wrong marriage’ (i.e. between people of the wrong category; note the metonymic extension of *kun-rak* ‘fire’ to ‘marriage’ here, based on the image of the couple sleeping by the one fire,

¹³ *Balanda* is a loan from Malay (ultimately from ‘Hollander’) into North Australian languages, and designates Europeans or their language.

and compare it with the vegetable gender used with *kun-rak* when this literally means ‘fire’).

Among many speakers of Kunwinjku (including some quite old people), and among all younger speakers, there has been a migration of certain subcategories out of the neuter gender into the vegetable. These subcategories can be seen as extensions of foci that fall into the vegetable gender for all speakers. They include:

- Landscape features having to do with water (metonymically linked to the food-fire nexus), *man-ekke* †*man-kabo* ‘that creek’, *ma-hni* †*man-labbarl* ‘that billabong’, †*bokary* *man-ekke* ‘that dug.well’, †*kun-kurlk man-bu* ‘that soft ground’, †*kun-kih man-ekke* ‘that mud’.
- Other types of non-flesh food, and drink; note that the closest to a food generic, *man-me*, has vegetable food as its semantic focus: *man-mekbe* †*man-manjmak* ‘that sweet.food’, *man-bu Saki* †*kun-bang* ‘that Saki drink’.
- Items in the ‘camp’ semantic domain, extending along to parts of the humanized landscape used as dwellings, e.g. rocks in the context of rock caves, *man-bu* †*kun-wardle* ‘that rock’, as well as implements used in camp or when gathering vegetable foods, *man-ih* †*kun-kaninj* †*kun-madj* ‘that firestick and swag’. The extension to the ‘camp’ nexus is probably motivated by the original vegetable class membership of ‘fire’ (see above), while that to vegetable-gathering implements is motivated by metonymic association.
- Some body parts, †*kun-djen man-kuyeng* ‘long tongue’, *man-bu* †*kun-murrng kunj* ‘those kangaroo bones’. It is not clear if there is any semantic commonality to the body parts which do this, though many such crossovers may be contextual, †*kun-djen man-kuyeng* ‘long (veg.) tongue’ was used in the context of describing how a being uses its long tongue to lick honey out of a nest.

3.2. MASCULINE VS. FEMININE FOR ANIMATE NOUNS. We now return to the problem of whether animate nouns are masculine or feminine, which is the largest domain of unpredictability in the system.

For humans the system is clear: masculine if male (*na-mekke* †*marrkidjbu* ‘that sorcerer’), feminine if female (*ngal-kudji* †*daluk* ‘one woman’), though with young babies the gender will often not be focused on and will default to masculine, and once females are in the plural they receive masculine agreement under the plural rule (see §1.4 above). Beings such as deities and malignant spirits behave similarly, although their sex is not always obvious and in such cases masculine agreement is the default.

For most macropods the basic lexical field is a ‘male:female:child’ triplet, for example *karndakidj* ‘male antilopine wallaroo’, *karndayh* ‘female antilopine wallaroo’, *djum-buk* ‘juvenile antilopine wallaroo’ (these are the terms in the Kuninjku dialect). Some species have a fourth term for referring to a particularly large male adult specimen; in this case, for example, there is the term *kalaba* ‘large male antilopine wallaroo’. Within such sets, the female term (*karndayh*) is feminine, while the remainder are masculine. In §3.4 we treat the masculine gender as being an option for any item that is underspecified. This also means that it can function as the exceptional case default for any noun.

For other animates the lexicon virtually never distinguishes sex, so that *dalkken*, for example, is a dingo of either sex, *nganabbarru* a buffalo of either sex, and *kuluban* a flying-fox of either sex. All such animates have a conventionalized gender that is either masculine or feminine, †*karnamarr na-kimuk* ‘large red-tailed.black.cockatoo’ (masculine), †*ngarradj ngal-kimuk* ‘large white.cockatoo’ (feminine). If the animate is

sufficiently large or otherwise salient that its actual biological sex is of interest, it is possible to override the conventionalized gender by using modifiers appropriate to the biological sex; this is discussed in §3.3. Elsewhere, modifiers are chosen simply on the basis of the arbitrarily specified grammatical gender. We still lack a good ethnozoological study of how Mayali speakers conceptualize the sex of animals, beyond the obvious situations in which a pregnant or egg-rich animal is opened up. When investigating the gender membership of the barramundi, for example, Evans asked a senior male informant what he thought of the western scientific view that barramundis start out male and become female as they get older, and was simply told ‘sounds like bullshit to me’.¹⁴ The noun denoting barramundi is assigned to the masculine gender.

MASCULINE	FEMININE
<i>kalarrwirdwird</i> ‘white ibis; straw-necked ibis’	<i>ngal-kurndurr</i> ‘white egret’
<i>karnamarr</i> ‘red-tailed black cockatoo’	<i>ngarradj</i> ‘white cockatoo’
<i>djikirridjdjikirridj</i> ‘willy wagtail’	<i>kaldurk</i> ‘kookaburra’
<i>mukmuk</i> ‘tawny frogmouth; boobook; barn owl’	<i>djornhdjorndok</i> ‘Indian turtledove’
<i>na-mu</i> ‘black-snake’	<i>maddjurn</i> ‘black-headed python’
<i>djenbedjek</i> ‘mulga snake’	<i>djokbinj</i> ‘brown Rock python’
<i>kurukadji</i> ‘brown snake’	<i>berek</i> ‘death adder’
<i>barndol</i> ‘carpet snake’ (though a python)	<i>kedjebe</i> ‘file snake’ (women mostly collect)
<i>na-waran</i> ‘Oenpelli python’	<i>borlokko</i> ‘yellow-bellied water snake’
<i>wamba</i> ‘shark’	<i>kurrukabal</i> ‘long tom’
<i>nedwud</i> ‘freshwater groper’	<i>man-makkawarri</i> ‘catfish’
<i>na-marnkorl</i> ‘barramundi’	<i>kuwalili</i> ‘mullet’
<i>dangwalah</i> ‘pearl perch, bass’	<i>madjabbar</i> ‘rough-scaled mullet’
<i>karlarrk</i> ‘bream’	<i>madukarl</i> ‘large long tom’

TABLE 4. Gender in some bird, reptile, and fish terms.

Table 4 exemplifies the split in gender between masculine and feminine for a sample of birds, snakes, and fish.¹⁵ It is doubtful whether clear general principles can be formulated to predict the gender membership of nouns in these semantic fields. In the case of birds, for example, Hale (1959:132) suggests the distinction is one between ‘large or well-known’ (masc.) vs. ‘small’ (fem.), but this is not always easy to apply nor always true. For example, emu and brolga are both large and well-known, but feminine, while the willy-wagtail is small but masculine. The question of whether it is masculine because it is well-known illustrates the difficulty of applying these criteria rigorously. Certainly there are principles that apply in particular cases; with *ngakngak* ‘pied butcherbird’, for example, its masculine gender is probably due to its role in

¹⁴ The sexual development of barramundi (lates calcarifer), also known as the sea bass or giant perch, is complex. It is a protandrous hermaphrodite species; most individuals are male for the first seven or so years of their life, then become females; there are also a few primary females in the population, a small number of synchronous hermaphrodites in the Gulf of Carpentaria populations, and it is possible some males do not undergo sex inversion. One consequence of this is that virtually all large fish are females. See Moore 1979, 1982 and Garrett 1986 for details.

¹⁵ For most of the natural species names given in this paper, we do not give complete biological identifications. For the reader who wishes more information we suggest the following references: Evans 1991 for Gun-djeihmi and Garde 1997 for Kuninjku (both orthographically reliable and incorporating many Linnean identifications), Chaloupka & Giuliani 1984, Russell-Smith 1985, and Smyth & Von Sturmer 1981, all thorough in terms of botanical identifications but less reliable linguistically, and, as general field guides to flora and fauna, Brock 1988 on plants, Grant 1982 on fish, Simpson & Day 1984 on birds, Strahan 1983 on mammals, and Cogger 1983 on reptiles.

certain male ceremonies, but such cases are a distinct minority. There is reason to treat feminine as the normal case default gender for the domain of birds. Apart from the large number of nouns for birds that are assigned feminine gender, a significant piece of evidence suggesting that this is the default gender for birds comes from the Gundjeihmi dialect, where a feminine prefix is used on the interrogative ‘what’ applied to a bird of unknown type.

(9) Al-njamed ngal-dehni?

FE-what FE-that

‘What (bird) is that?’

For the snakes, Heath (1984) has suggested that pythons are assigned to the feminine class in Nunggubuyu because of the sexual symbolism of swallowing, and certainly the majority of Mayali python terms are feminine, but there are also exceptions, such as the carpet python and Oenpelli python, both masculine. For the fish we have no explanations at all. Again, we account for the exceptionality of a particular noun within a domain resorting to masculine, if we accept that masculine is the overall exceptional case default for any noun.

There are other isolated cases, such as the echidna (feminine) and flying foxes (masculine), where the Mayali gender rules form part of widespread trends throughout Australia, perhaps based on symbolizations of salient external facts, namely the oozing milk from female echidnas (the only monotremes in Arnhem Land), and the prominent circumcized-looking penises of male flying foxes. Again, though, these form only a minority of cases.

3.3. BIOLOGICAL SEX. Semantic assignment rules of the familiar type, whereby nouns denoting males are masculine and those denoting females are feminine, apply only to the nouns denoting sex differentiables. But there are only certain entities for which speakers are interested in their sex. Different languages vary in where they draw the line. Often where the sex is evident, or important to humans (as for the breeding of animals) such nouns will have gender according to sex. Thus we are interested in the sex of other humans and of higher animals but not of small animals, fish, spiders, and so on. So also in Mayali, the sex of humans, of various types of kangaroos, and so on, is reflected in the gender system. Sometimes there are distinct words for the male and female (*barrk* ‘male black wallaroo’ vs. *djukerre* ‘female black wallaroo’), sometimes the root is the same and the morphological class marker differs (*na-kohbanj* ‘old man’, *ngal-kohbanj* ‘old woman’). The important point is that for all of these the biological sex and the gender correspond.

Below the threshold of sex differentiability, nouns may still be masculine or feminine, but this need not match biological sex. Thus *benuk* ‘plains turkey’ is masculine in gender, whether the bird referred to is biologically male or female. Occasionally, however, the sex of a non-sex-differentiable may become important; this is likely in instances near to the threshold, where we find variability in agreement. For instance, *al-wanjdjuk* ‘emu’ is feminine, and this is normally so irrespective of sex. But consider example 10:

(10) al-wanjdjuk gabani-larlmarr-en, al-wanjdjuk al-bininjgobeng

II-emu 3du-divorce-NP II-emu II-spouse

ga-ma-ng na-buyiga bininj al-wanjdjuk

3/3-get-NP MA-other male II-emu

‘When emus divorce, the wife emu marries another male emu.’

Here the sex is of particular importance, and we find a masculine agreement *na-buyiga* ‘other’. We shall treat this as pragmatically determined, and not a gender accounted for by the assignment rules. Unlike the other cases we are considering, this is an instance where gender varies according to the importance the speaker attaches to the biological fact: the gender matching the sex MAY be used, and need not be used consistently.

The converse of nouns like *al-wanjujuk* ‘emu’ is nouns like *na-garndegin* ‘dingo’, masculine in gender, but occasionally feminine if the biological sex is treated as of special importance by the speaker, as in 11.

- (11) *na-garndegin na-rangem/ al-daluk*
 I-dingo MA-male FE-female
 ‘male/female dingo’

Such cases require another layer of assignment, a pragmatic layer, and are not dealt with here.

3.4. FRAGMENT. We gave examples in §3.1 and §3.2 of the different semantics of gender assignment and will now show how to represent the semantics of gender within the Network Morphology framework. Recall (§2.1) that we claimed that the network of information is made up of parallel hierarchies. The semantic hierarchy distributes facts about the semantics of particular lexical items. Such semantic hierarchies are familiar from work on inheritance. Our assumptions about the ordering of semantic distinctions are not based on taxonomies from biological science, but folk taxonomies of the salient distinctions for speakers of the language in question.

For our purposes the semantic ‘component’, or hierarchy, gives as output sentences of a simplified English interlanguage, such as ‘entity which__is animate and bird stop’, where the last element indicates that this is all that our theory says about the semantics of the item. The top node in the semantic hierarchy is the node ENTITY which is given in 12.¹⁶

- (12) ENTITY:
 ⟨sem⟩ = = stop [1]
 ⟨sem cat⟩ = = entity which__is “⟨sem type⟩” [2]
 ⟨sem type⟩ = = inanimate “⟨sem subtype⟩”. [3]

The first fact [1] means that if we wish to know information about a particular extension of the path ⟨sem⟩ which is not defined elsewhere, then the theory will yield the value ‘stop’. Fact [2] says that a noun’s semantic category is that of an entity which is of a certain type. According to fact [3] this type is by default inanimate. If the class to which a particular item belongs does not state otherwise, then the item in question is inanimate. As the extension ⟨sem subtype⟩ is not defined at the node ENTITY it can be seen that the value for subtype in fact [3] will default to ‘stop’. Hence, all we can assume by default about an entity is that it is an ‘entity which__is inanimate stop’. In the normal case, it is output like this that is evaluated in gender assignment.

In Figure 4 the animate portion of the semantic hierarchy is represented diagrammatically.

We have already shown the DATR representation of the top node in Fig. 4, ENTITY. The node below it, ANIMATE, overrides the statement about the semantic type ⟨sem

¹⁶ The numbers in square brackets are used to pick out particular facts for exposition. They are not part of the DATR formalism and do not constitute part of the representation of the theory outlined here.

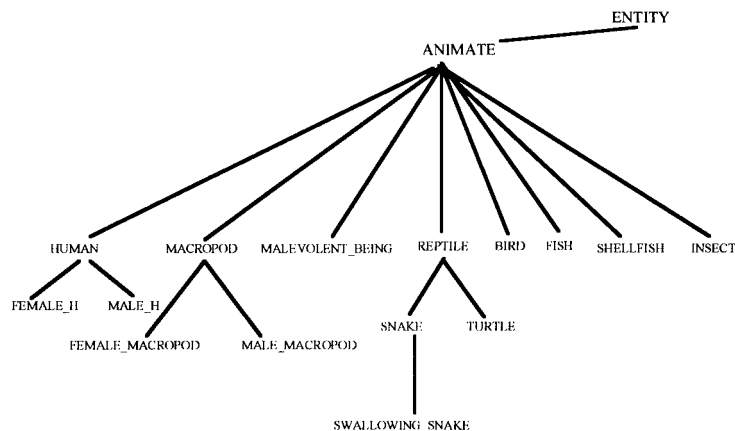


FIGURE 4. Animate portion of semantic hierarchy.

type) and states that the corresponding value is animate.¹⁷ Therefore the semantic category of any lexical item which inherits its semantics from the ANIMATE node is ‘entity which__is animate’. If we move to the nodes below the animate level, they specify values for the semantic subtype, namely ‘human’, ‘malevolent__being’ and so on. In the case of HUMAN and MACROPOD it is also stated that there is a subsubtype where the biological sex is specified. The nodes SNAKE and TURTLE, which inherit from REPTILE, specify the subsubtypes snake and turtle respectively, and the node SWALLOWING__SNAKE states a subsubsubtype.

A final requirement for the animate portion is the representation of biological sex. As shown in §3.3, for nouns whose denotatum is on the threshold of sex-differentiability the different agreement is accounted for by a pragmatic layer, rather than assignment to the particular lexical item in question. On the other hand, biological sex may be the most salient point about the denotatum of a particular lexical item and is therefore part of the meaning specific to the item in question, rather than the context of discourse. It is an important part of the semantics of the Mayali noun *djukerre* ‘female black wallaroo’ that the biological sex is female. In principle, an animate noun may, but need not, be distinguished for biological sex. In 13 we give the lexical entry for *djukerre* ‘female black wallaroo’ as an example.

(13) *Djukerre*:

⟨ ⟩ = = NOUN

⟨sem gloss⟩ = = female black wallaroo

⟨root⟩ = = *djukerre*

⟨sem⟩ = = FEMALE__MACROPOD.

This noun inherits from the semantic hierarchy the information that it is a macropod and female. Of course, certain lexical items may be ambiguous for biological sex. The usual option then depends on the particular domain within the animates. This fits in with the intuition that with sex-differentiable animates those which are biologically

¹⁷ The inanimate portion of the hierarchy is not given in Fig. 4. In the DATR representation, nodes representing the semantics of inanimate entities inherit directly from the ENTITY node, apart from those representing body parts, where there is additional structure because of the differentiation between types of body part, see §3.1.

female are assigned to the feminine gender and others (male and young) are assigned to the masculine. This can be seen in the male:female:child triplets in §3.2, where nouns denoting young are assigned to the masculine gender.

So far we have seen that there is a semantic hierarchy that is a component of the whole network of lexical information. This hierarchy outputs information on the semantics of a class to which a lexical item belongs. This output is the value paired with the path ⟨sem cat⟩. Returning to the example *marrkidjbu* ‘sorcerer’ (5), repeated here as 14, we see that this item inherits all information about extensions of the path ⟨sem⟩, with the exception of ⟨sem gloss⟩, from the node HUMAN which is part of the semantic hierarchy represented in Fig. 4.

(14) Marrkidjbu:

⟨⟩ = = NOUN
 ⟨sem gloss⟩ = = sorcerer
 ⟨root⟩ = = marrkidjbu
 ⟨sem⟩ = = HUMAN.

If a query is made about the semantic category ⟨sem cat⟩ of the noun *marrkidjbu*, the theory will yield the value ‘entity which__is animate and human and stop’.

Gender assignment involves determining a value for syntactic gender on the basis of the output of the semantic component. The NOUN node (7) from which all noun lexical entries inherit was given in 7; we repeat the relevant part of 7, namely, the assignment of gender, as 15.¹⁸

(15) NOUN:

⟨⟩ = = NOMINAL
 ⟨syn cat⟩ = = noun
 ⟨syn gender⟩ = = GENDER:⟨‘⟨sem cat⟩’⟩
 ...

[1]

Recall that the lexical item *marrkidjbu* ‘sorcerer’ inherits all extensions of the empty path from the node NOUN, unless they are already specified. In 14 *marrkidjbu* does not specify a value for ⟨syn gender⟩ and therefore inherits it from the node NOUN in 15. The fact labeled [1] in 15 states that the value for syntactic gender is determined by evaluating the output of the semantic component and then treating this output as a path to be paired with a value at the node GENDER. The node GENDER states which genders are paired with which semantic categories. Some of the facts to be found at the node GENDER are given in 16.

(16) GENDER:

⟨⟩ = = masculine [1]
 ⟨entity which__is animate⟩ = =
 GENDER__FROM__SEX:⟨‘⟨sem sex⟩’⟩ [2]
 ⟨entity which__is animate and bird⟩ = = feminine [3]
 ⟨entity which__is inanimate⟩ = = vegetable [4]
 ⟨entity which__is inanimate and body__part⟩ = = neuter [5]
 ...

If the output of the semantic component for *marrkidjbu* ‘sorcerer’ is evaluated and treated as a path to be paired with a value in 16, then the most specific matching path for *marrkidjbu* is the left-hand of fact [2] in 16. This says that the syntactic gender value for animate entities requires an evaluation of the sex of the item in question and the use of the appropriate value as an attribute in a path at the node GENDER__

¹⁸ The ellipses in example nodes indicate that there are other facts which are not given here.

FROM__SEX. At the node GENDER__FROM__SEX, given here in 17, there are two facts.

(17) GENDER__FROM__SEX:

⟨ ⟩ = = GENDER [1]

⟨female⟩ = = feminine. [2]

Fact [2] states that if the lexical item has a female denotatum it will have feminine gender. Fact [1] states that if anything has a denotatum that is not otherwise specified as female, then the value for syntactic gender can be found by looking back at the node GENDER. As *marrkidjbu* does not specify a value for sex, the most specific matching path in 17 is that on the left-hand side of fact [1], which refers back to the node GENDER. At the node GENDER in 16 we see that the most specific matching path is the maximally underspecified path in fact [1]. In other words, because *marrkidjbu* is not specified as female, it receives the default gender, masculine. It should be noted that evaluation of biological sex occurs only if the item in question has an animate denotatum, as stipulated by fact [2] in 16.

A further example of straightforward gender assignment is *kurrkurldanj* ‘scrub fowl’. Here the output of the semantic component says that it is an ‘entity which__is animate and bird’. This attribute combination placed in a path in 16 straightforwardly matches with the path in fact [3] of 16 to assign the noun *kurrkurldanj* feminine gender (illustrated in our case study of birds in §5.4). The noun *karrbarda* ‘hairy yam’, as it inherits information about its semantics from the node PLANT (which belongs to the same hierarchy as the nodes in Fig. 4), has the output of the semantic component state that it is an ‘entity which__is inanimate and plant’. The most specific matching path at the node GENDER is that to be found in fact [4] in 16 and *karrbarda* is consequently assigned vegetable gender. Note that it is enough for this item to be inanimate for it to be assigned vegetable gender by default. The body part item *kun-kodj* ‘head’ is assigned the semantic category ‘entity which__is inanimate and body__part’. This attribute combination placed in a path in 16 is an extension of the path in fact [4], but it matches exactly with the path in fact [5], and *kun-kodj* is therefore assigned neuter gender.

We have been talking here of the normal case default expected for the domain in question and have exemplified our Network Morphology treatment of gender assignment with straightforward examples. In §5.2, where we discuss the different types of default, we have recourse to the difference in specificity of gender assignment which we have outlined here.

4. SEMANTICS OF MORPHOLOGICAL CLASS. We now turn to the semantics of morphological class, which is parallel in many ways to the gender system (§1.3), but with a larger set of possibilities (through the existence of a zero class), and with some semantic principles specific to morphological class. There is an important difference between gender assignment and morphological class assignment. Since gender is a partially covert category, the gender assignment rules based on semantic principles are extremely useful.¹⁹ Given the availability of these principles, morphological class assignment is

¹⁹ An anonymous *Language* referee takes issue with this, on the grounds that ‘in the normal context in which nouns are used (and I assume learned) it will be reflected in the overt forms of syntagmatically associated words’. But in fact this is not the case—the frequency with which gender-sensitive modifiers combine with their heads is much lower than in, for example, Italian or German. First, it is very common for a noun to occur without any modifiers at all—in a trial count of four lexical items in the text collection in Evans 2002 the proportion of bare nouns was as follows: *ngurrurdu* ‘emu’: 3 out of 8; *ginga* ‘crocodile’: 6 out of 7; *djirndih* ‘quail’: 4 out of 7; *ragul* ‘red-eyed pigeon’: 2 out of 2. Second, many of the modifiers that nouns do combine with fail to give information that would specify the gender, for the reasons given in §1.3: certain demonstratives (e.g. *na-wu*), quantifiers and plural contexts fail to show the controlling gender.

able to take advantage of them too. However, since morphological class is an overt category (nouns are heard with the morphological class prefix attached, except when they are incorporated, see example 1), there is a greater possibility for overriding the shared principles of assignment.

4.1. ASSIGNMENT TO MORPHOLOGICAL CLASS. Morphological class, unlike gender, plays a prominent part in the derivation of new lexical items, since many doublets and triplets exist in which only the morphological class overtly marks a difference in meaning. Some examples follow; what appears to be the most basic meaning is given first. Note that derivations may proceed in a number of directions, for example from prefixed to zero class in 25 and 26, but from zero to prefixed in 27 and 28.

- (18) *na-kohbanj* ‘old man’; *ngal-kohbanj* ‘old woman’
- (19) *na-ngordo* ‘male leper’; *ngal-ngordo* ‘female leper’; *kun-ngordo* ‘leprosy’
- (20) *kun-winjku* ‘Kunwinjku language’; *na-winjku* ‘Kunwinjku-speaking people’
- (21) *kun-marrirn* ‘Marrirn clan’; *na-marrirn* ‘male of Marrirn clan’; *ngal-marrirn* ‘female of Marrirn clan’
- (22) *kun-berd* ‘tail’; *man-berd* ‘penis’
- (23) *kun-kodj* ‘head’; *man-kodj* ‘head of tuber; head of gorge’
- (24) *kun-berl* ‘wing’; *man-berl* ‘branch; tributary stream; middle part of lower penis removed during subincision’
- (25) *kun-mim* ‘eye’; *man-mim* ‘seed, fruit’; *mim* ‘breathing hole of animal buried in sand or mud’
- (26) *kun-djamun* ‘ceremonial discipline’; *man-djamun* ‘tabooed food; private parts’; *djamun* ‘policeman’
- (27) *yabok* ‘sister’; *ngal-yabok* ‘the one who is my child, and your sister’
- (28) *dabu* ‘egg’; *man-dabu* ‘bee eggs’

Note also that by no means all semantic extensions are accompanied by a change in morphological class membership. Particularly in the case of SIGN METONYMIES (Evans 1997c), in which a term for one species is extended to another with which it is found in a predictable spatial or temporal association, the morphological class marker tends to remain unchanged, e.g. *ngal-yurr* ‘Leichhardt’s grasshopper; herb species eaten by Leichhardt’s grasshopper’, *man-yawok* ‘cheeky yam; grasshopper species [Katydid] that calls out at the time when one should gather cheeky yams’.²⁰

The semantics associated with the four nonzero morphological classes, at least, should already be familiar, paralleling as it does the semantics of the congruent genders (recall Table 3): *na-* (morphological class I) with males, and pluralities (groups, like the *Na-winjku* ‘Kunwinjku speakers’), *ngal-* (II) with females, *man-* (III) with plants, their products, bees, and with sexual body parts, and *kun-* (IV) with body parts, abstracts, social categories, and languages. The extension of the *man-* prefix in 24 into landscape

For the nouns mentioned above, such ‘uninformative’ modifiers did not occur frequently, but were found for one of the three times *djirndih* combined with a modifier (*nawu* in this case); a further case with *nagudji* ‘one’ is also insensitive to gender in a more sporadic way. That leaves the following proportions of mentions in which the gender is recoverable from the modifier: *ngurrurdu* ‘emu’: 5 out of 8; *ginga* ‘crocodile’: 1 out of 6; *ragul* ‘red-eyed pigeon’: 0 out of 2; and *djirndih* ‘quail’: 2 (max.) out of 8, giving 8 examples out of 24 overall, or a third of tokens, in which gender would be recoverable from the phrase. These figures are from narrative discourse; whether children learning the language are given more structured exposure is an interesting question deserving of further research.

²⁰ It is likely, though, that the morphological class in such cases is a guide to the original meaning; for example there is dialectal evidence that the ‘yam’ meaning is original to *man-yawok*, which would coincide with the *man-* prefix: the extension to grasshopper is only found in one dialect, while the yam meaning is more widespread.

areas also entered the discussion of gender in §3.1. In connection with landscape zones associated with water in 23 we see it extended more generally, perhaps through the association of certain landscape features with plant growth, namely the heavily vegetated heads of gorges. For the zero morphological class (V) it is impossible to give any coherent semantic content, since this class contains representatives of virtually every semantic category, including humans (sister), parts (egg), and parts of the landscape (breathing hole); see further the examples in Table 5.

Most semantic categories represented in the gender system, in fact, also motivate some members of the corresponding morphological class (see Evans 1997a, 2002, for lists); exceptions are the rain and compass terms, of masculine gender but morphological class III (rain) or morphological class V (compass). But there are also some specific categories restricted to the morphological class system and not relevant to the gender system. Most important are

(a) the assignment of life-form terms for plants, such as *kun-dulk* ‘tree’, *kun-dalk* ‘grass’ and *kun-kod* ‘paperbark tree’ to class IV, while their hypernyms, *man-dubang* ‘ironwood tree’, *man-karrardalk* ‘triodia grass’ and *man-korrko* ‘very large paperbark tree species, *Melaleuca argentea*’, are all in class III.

(b) the assignment of manner adverbials to the *man*-class, e.g. *man-bele* ‘running white, running clear’ (cf. *kun-bele* ‘whiteness’), *man-balok* ‘quickly, hastily, in a temporary or improvised way’.

(c) many objects made of plants are in the *kun*-class, even though all such objects take vegetable or masculine agreement; examples are *kun-wabban* ‘axe handle’, *kun-yarl* ‘string’, *kun-dirdde* ‘shoulder bag’.

(d) there is a distinction, with regard to morphological class but not to gender, between domestic fires, which are in the *kun*-class, and bushfires or hunting fires, which are in the *man*-class: cf. *kun-rak* ‘fire’, *kun-yerrng* ‘firewood’; *man-wurrk*, *man-wurlh* ‘large bushfire or grass fire’. This may be based on the fact that domestic fires are always made from dead wood (*kun*-class) separated from the growing plant, whereas bushfires also take in live plants (*man*-class).

(e) the zero morphological class (V) has no distinctive semantic content, and contains elements from virtually every semantic category in the system (see Evans 1997a for examples.)

However, there is one obvious statistical property of the members of the zero morphological class. Animates, unless they belong to a contrast set such as those exemplified in 18 or 19—a set where male and female entities are distinguished on the basis of the morphological class prefix—have a strong tendency to belong to the zero class, whereas for inanimates the reverse is true.

For human terms, around 90 percent are unprefixes once one excludes terms in contrast sets; for mammals, the ratio is comparable; for reptiles, around 70 percent are unprefixes; for birds, around 85 percent; for artefacts, around 73 percent (though many of these are loans; once Macassan and English loans are excluded the ratio drops to around 60 percent); for plants, only 30 percent are unprefixes (a disproportionate number being terms for waterlilies), and for body parts, virtually all body parts proper are prefixed, the only unprefixes being extruded parts like ‘shit’ and ‘egg’, and the term for ‘body’ itself, *kuk*. In other words, there is a very high correlation between animacy and zero morphological class, such that animates (and implements) are most likely to be unprefixes, while inanimates such as plants, language names and body parts are most likely to be prefixed.

Many zero-class nouns are loans, from English, Macassan, or from other languages of Australia. Most loaned nouns do not acquire prefixes, though they will be assigned a gender in accordance with the semantic principles given in §3, for example the assignment of vegetable gender to the Macassan loan *kabbala* ‘large.boat’.²¹ Vegetable-gender loanwords, however, sometimes accrete a *man-*, e.g. *man-rud* ‘road’, from *rud* < Eng.*road*.

<p style="text-align: center;">I</p> <p>Some male higher animates Some lower animates Some types of honey</p>	<p style="text-align: center;">III</p> <p>Plants and their products Sexual and excretory body parts Song, ceremony and custom Fire (bushfires) Food, vegetable and otherwise Some types of honey Boats, planes and other vehicles Manner adverbials Landscape features with water or plant associations</p>
<p style="text-align: center;">II</p> <p>Some female higher animates Some lower animates Sun (some varieties)</p>	<p style="text-align: center;">IV</p> <p>Most parts of animals and plants Life form terms for plants Some objects made from plants Some parts of the landscape Fire (domestic fires) Weather and sea Time measures Languages and speech Country; place-based social categories</p>

TABLE 5. Main semantic groupings in the four overt morphological classes.

Table 5 summarizes the content of the morphological class categories. Categories corresponding to those relevant to gender are in normal type, and those confined to the morphological class system are in bold.

4.2. FRAGMENT. In this section we give a Network Morphology representation of the assignment of morphological class on the basis of the semantics and see that the semantic distinctions made use of by the morphological class system are not the same as for the gender system.

In §2.1 we introduced the NOUN node as part of the hierarchy of lexemes. All noun lexical entries inherit from this node. In ex. 15 we saw that the NOUN node contained a fact which required the evaluation of semantic category of a lexical item to assign gender. Similarly, the semantic category of a lexical item must be evaluated to assign morphological class. The NOUN node is given again in 29, with additional facts [1]–[4].

(29) NOUN:

⟨ ⟩ = = NOMINAL
 ⟨syn cat⟩ = = noun
 ⟨syn gender⟩ = = GENDER:⟨ ‘‘⟨sem cat⟩’’ ⟩
 ⟨mor prefix⟩ = = MOR__NOMINAL:⟨mor ‘‘⟨morphological__class⟩’’ ⟩
 ⟨morphological__class⟩ = =

²¹ For discussion of Macassan loanwords in Western Arnhem Land languages, including Mayali, see Evans 1992, 1997d.

```

MORPHOLOGICAL__CLASS:< (eval__morphological__class)> [1]
<eval__morphological__class> = = “<prag register>” “<sem cat>” [2]
<congruence> = = CLASS__FROM__GENDER:< “<syn gender>”> [3]
<prag register> = = o__l. [4]

```

Morphological class assignment differs from gender assignment (see §6), not only in the level of its semantic sensitivity but also in that the register has an effect (the registers are ordinary language, abbreviated o.l., or kun-kurrng mother-in-law, abbreviated k.k.). Fact [1] in 29 states that morphological class evaluation is determined at a node MORPHOLOGICAL__CLASS, and that it involves placing the evaluated values into a path there. Fact [2] in 29 states that both the (pragmatic) register and the semantic category have to be determined. In [3] it is stated that congruence involves the evaluation of gender, and we see from fact [4] that the default register is the ordinary language (o__l). As shown in §5.1, there are fewer semantic distinctions in morphological class assignment than in gender assignment, and this is connected with the fact that morphological class assignment basically partitions nouns using the animacy distinction, with the addition of certain other contrasts peculiar to morphological class, such as domestic fire. In fact, this is one of our reasons for claiming that congruence of morphological class and gender results from morphological class being partially assigned on the basis of gender, because of the fact that the most important distinction in morphological class assignment is that between animates and inanimates. The MORPHOLOGICAL__CLASS node is given in 30.

```

(30) MORPHOLOGICAL__CLASS:
    <> = = EXCHANGE: (“<eval__morphological__class>”) [1]
    <kunkurrng> = = “<congruence>”
    <kunkurrng entity which__is animate and human> = =
        <o__l entity which__is animate and human>
    <o__l entity which__is inanimate> = = “<congruence>” [2]
    <o__l entity which__is inanimate and
        pertaining__to__domestic__fire> = = iv
    <o__l entity which__is animate> = = v. [3]

```

Fact [1] is used for the DEFAULT EXCHANGE, which we discuss in §5.1, where the exceptional case default assigns the opposite from the normal case default (class V instead of congruence, or congruence instead of class V). As the underspecified option (the left-hand path is the empty path), fact [1] represents the last resort within the assignment rules for any noun. Normally, morphological class is assigned on the basis of facts [2] and [3], because all nouns can be partitioned into those which have either an animate or inanimate denotatum. Facts [2] and [3] represent the first choices (normal case defaults) for inanimates and animates respectively. The normal case for inanimates is to have a morphological class prefix which is congruent with the gender prefix occurring on agreement targets. Recall from fact [3] in 29 that congruence involves the evaluation of the assigned syntactic gender and its conversion to the appropriate morphological class at the node CLASS__FROM__GENDER. This node is given in 31.

```

(31) CLASS__FROM__GENDER:
    <masculine> = = i
    <feminine> = = ii
    <vegetable> = = iii
    <neuter> = = iv.

```

The assignment of congruent morphological classes for genders in 31 involves an asymmetry in which class assignment may rely on the semantic principles of gender assignment, but not the other way around. We discuss this in detail in §5. Our results show that we very rarely need to specify gender lexically, and where animates ‘misbehave’, they assign morphological class on the basis of the congruent gender. In sum, the normal case default for inanimates is to be assigned congruent gender and morphological class. For example, the inanimate noun *kun-kodj* ‘head’ is assigned neuter gender, because it denotes a body part (§3.4). The lexical entry for the noun *kun-denge* is given in 32.

- (32) Kundenge:
 ⟨⟩ = = NOUN
 ⟨sem gloss⟩ = = foot
 ⟨root⟩ = = denge
 ⟨sem⟩ = = BODY__PART.

In 32 *Kundenge* inherits the value assignment for morphological class from the node NOUN, given in 30. Fact [1] in 29 requires the evaluation of noun morphological class to be placed in a path at the node NOUN in 30, and fact [2] in 29 states that this involves evaluation of the register (which is by default ordinary language) and of the semantics. As the noun in 32 does not specify its register, it is an ordinary-language noun. The output of the semantic component states that *kun-denge* is an ‘entity which__is inanimate and body__part’. The most specific path with which this output matches is the path at fact [2] in 30, as body parts are a more specific type of inanimate entity (and no morphological class assignment for body parts is explicitly given at the node MORPHOLOGICAL__CLASS). The next step is for the gender which has been assigned to *kun-denge* to be used to assign morphological class, by using the congruence principle of fact [3] in 29 to insert the value for gender in a path at the node CLASS__FROM__GENDER and read off the corresponding morphological class, which for neuter gender is class IV. The noun *kun-denge* is therefore assigned to morphological class IV.

In contrast with inanimates, the normal case default is for animate nouns to be assigned to class V, irrespective of gender. As part of the pattern of default exchange (§5.1) animates may take as their exceptional case default for morphological class the normal case default of inanimates, namely morphological class congruent with gender. For instance, the animate noun *na-marnde* ‘devil’ has the exceptional case default for morphological class. In contrast, the noun *djukerre* ‘female black wallaroo’, has the normal case default. For this noun the output of the semantic component, as we saw in §3.4, is ‘entity which__is animate and macropod’. Evaluated into a path, this output matches with fact [3] in 30 which states that *djukerre* is assigned to class V, because it is animate.

5. INTERACTIONS. We next consider how to account for the straightforward facts of gender and morphological class assignment and also accommodate situations where the default generalizations do not apply. In particular, we show that the systems of gender and morphological class are parallel and assigned according to differing semantics, but there is a partial requirement to assign morphological class according to gender (but not the other way around).

5.1. PARTIALLY PARALLEL SYSTEMS. The first point we note is that the systems of gender and morphological class are, at least partially, independent. The semantic specifications called on by the two systems are not identical: for instance, the most important

distinction in morphological class assignment is animacy, whereas, on the whole, gender assignment is not directly sensitive to the animacy distinction, but partitions the noun inventory on the basis of such categories as birds, turtles, swallowing snakes, and body parts, as well as biological sex in some cases. We are thus proposing partially parallel assignment systems:

semantics \rightarrow gender

semantics \rightarrow morphological class

It is then natural to ask whether we should predict morphological class from gender or vice versa. This would give two alternative possible systems. The first is to assign gender according to semantics and then from the gender assign the morphological class. The alternative is to assign the morphological class according to the semantics and from the morphological class compute the gender. Schematically:

(a) semantics \rightarrow gender \rightarrow morphological class

(b) semantics \rightarrow morphological class \rightarrow gender

Both alternatives are inadequate. The easier one to prove unworkable is the second. There are large numbers of nouns in class V (the class with no prefix). They can be assigned by several different semantic rules, or indeed by a general default. But knowing that a noun is in class V is of little help in predicting its gender. In fact a noun in class V can be of any gender, as shown by the examples in Table 6.

NOUN	GLOSS	GENDER
<i>benuk</i>	plains turkey	masculine
<i>ngarrbek</i>	echidna	feminine
<i>karrbarda</i>	hairy yam	vegetable
<i>kuk</i>	body	neuter

TABLE 6. Nouns in morphological class V.

Predicting morphological class from gender is a little more successful for reasons that will be discussed below, but it is not fully adequate. Nouns relating to fire, for instance, are in the vegetable gender, but this does not itself allow us to predict their morphological class, which can be III, IV, or V: (*m*)*an-wurlh* 'fire used to round up kangaroos' (vegetable gender, class III), *kun-yerrng* 'firewood' (vegetable gender, class IV) and *medjidj* 'matches' (vegetable gender, class V).²² Another good example is trees. The semantic gender assignment rule assigns these to the vegetable gender. But from that gender we cannot predict their class, which may be III or IV. In fact, we would claim, this results from a parallel semantic rule assigning class as follows: specific species of tree, such as (*m*)*an-berbern* 'ghost gum' are in class III, while *kun-dulk* 'tree' being a plant life-form term is assigned to class IV (compare *kun-dalk* 'grass', another life-form plant term).

The two schemes proposed above (a and b) are both inadequate: we cannot derive gender directly from morphological class nor morphological class directly from gender. But there are obvious overlaps. The semantics of assignment to gender, on the one hand, and morphological class, on the other, are linked (see §§3–4). We now focus on

²² Lest it be objected that *medjidj* is an unconvincing example of a class V word because as an English loanword it is unlikely to accrue a morphological class prefix, a further example of a class V fire word is *kunak* 'fire'. The *kun* here is historically a prefix (originally the form was *kun-rak*) but has been absorbed into the root (so the word is now \emptyset -*kunak*) and is not dropped when the word is incorporated, for example *kan-kunak-wo!* 'give me a light!', whereas true morphological class prefixes are dropped: cf. *kun-yerrng* 'firewood', *kan-yerrng-wo!* 'give me the firewood!'

these links and interactions from the perspective of what combinations are logically possible and what representational mechanisms we use to allow specifications for gender and morphological class to be made independently, while exploiting the many predictable relations to avoid overspecification.

Table 7 displays the grid of logically possible combinations between gender and morphological class. Many of the cells are empty or have just one or two highly restricted entries, and we shall consider these first. Vegetable agreement is not found with nouns belonging to the basically animate morphological classes I and II; neuter agreement is not found with classes I, II, or III; feminine agreement is not found with class III nouns, and with only one class IV noun (*kun-dung* ‘sun’, which is in any case class II in some dialects and in *kun-kurrng*). These gaps are due to the general principle that feminine gender will not be found with inanimates, nor the inanimate genders with nouns from the basically animate classes, and that the most marked gender (neuter) can occur only with nouns of the congruent class (IV) or the zero class (V).

Feminine agreement with class I nouns and masculine agreement with class II nouns occur in limited and syntactically specified contexts: crossover in either direction can arise when the biological sex of a particular referent does not coincide with its conventional gender (§3.3), and feminine nouns allow masculine agreement in plural contexts (§1.4).

Masculine agreement with class III nouns, apart from plural contexts, is confined to a few cases that need to be lexically specified: *man-djewk* ‘rain’, *man-kung* ‘honey’ (optional, so that it also allows vegetable agreement but may follow many other honey terms which are assigned to the masculine gender) and *man-djawok* ‘katydid grasshopper’ (as noted earlier, this is an example of a metonymic extension of a plant term to an animal associated with it, with retention of the vegetable morphological class but adoption of the default masculine gender).

The Table 7 cells with substantial populations fall into three categories:

(a) the four congruent cells, running diagonally through Table 7, in which the gender and morphological class match formally, e.g. *na-worneng* ‘joker at ceremony’ (masculine gender), *ngal-yod* ‘rainbow serpent’, who is mythologically female (feminine), *man-dubang* ‘ironwood tree’ (vegetable) and *kun-ngey* ‘name’ (neuter). Starting with the inanimates, for most types of referent (for example, plants and body parts), the default situation is to be in the appropriate cell. These examples illustrate the normal case for many, but not all, inanimates, and show that morphological class can be assigned on the basis of gender under these circumstances. For animates, though, this is the second rather than the first choice, since animates normally take no overt prefixation, going into morphological class V but with the semantically appropriate gender. For animates, then, going into the congruent cell is their second preference. In other words, simply by marking a lexical entry for such an entity as marked, one can predict with near certainty that it will go into the cell containing an overt morphological class congruent with its (semantically determined) gender. Hence, for those types of inanimate noun where there is no dissociation of morphological class and gender, morphological class can be assigned on the basis of gender. For animates, this is the exceptional case, an interesting pattern of irregularity, which we call DEFAULT EXCHANGE. The animates take as their exceptional case the normal case default for inanimates.

Note the value of this for the awkward class of nonhuman animates: although we have to make an additional lexical stipulation about the choice between masculine and feminine, I and II, we only have to do so on one dimension. A noun denoting a bird,

MORPHOLOGICAL CLASS

	I na-	II (ng)al-	III man-/((ng)an-	IV kun-	V zero class
Masculine na-	congruent	exceptions: biological sex [§3.3] plural contexts [§1.4]	a few lexically specified exceptions: <i>man-djewk</i> 'rain', <i>man-kung</i> 'honey', <i>man-djawok</i> 'katydid' [also plural contexts]	many cases many implement terms; <i>kun-waral</i> 'spirit' [also plural contexts]	many cases (commonest pattern for animate masculine nouns)
Feminine (ng)al-	exception: biological sex [§3.3]	congruent	unattested	one exception: <i>kun-dung</i> 'sun'	many cases (commonest pattern for animate feminine nouns)
Vegetable man-/((ng)an-	unattested ^a	unattested ^b	congruent	many categories	some cases (occasional pattern for vegetable nouns)
Neuter kun-	unattested ^c	unattested	unattested	congruent	some cases (occasional pattern for neuter nouns)

TABLE 7. Possible combinations of gender and morphological class.

Note: dark shaded areas are unattested; pale shaded areas attested with few lexemes under highly specified conditions.

^a We do not include the plant name *na-marndengabek* 'plant species whose leaves are said to resemble a devil's hair', which is vegetable gender and could be argued to have a *na-* prefix on the grounds that the *na-* prefix is part of the first compounding element (*na-marnde* 'devil') rather than being attached to the compound as a whole.

^b It is likely that the term *ngal-yurr*, when used in its botanical sense of 'Pityrodia jamesii; Cleome viscosa' rather than its entomological sense of 'Leichhardt's grasshopper', would take vegetable agreements; this is a rare example of a metonymic extension of an insect term (motivating the *ngal-* prefix) into the botanical domain.

^c Sole exception: *na-marnde* 'devil' is attested once with the demonstrative *kun-u* 'NE-that', presumably construed here as a body part (i.e. ghost, spirit).

for example, takes feminine as the normal case default for gender, and for one with a class II prefix, we need only specify the fact that the morphological class is marked; from this we determine that it must take the congruent class, i.e. II. As an animate it would take class V by default. We would need to specify further only if it had an overt prefix that was not congruent with its gender, a *na-* prefix, for example, with obligatory feminine agreement or vice versa. So far we have not found any such cases. The fact that there are no examples of this kind shows that, in the case where gender and morphological class interact, the direction of assignment is from gender to morphological class.

(b) the four cells for class V nouns (right column of Table 7), that is, nouns with no prefix and belonging to all four genders. For animates, which normally eschew overt prefixation, as well as for implement terms, these are the default cells: zero prefixation, plus the semantically appropriate gender. For most inanimates, which prefer overt pre-

fixation, these cells represent the second choice in a way that mirrors the congruent cells as the second choice for animates: by simply marking inanimate nouns as ‘marked’, one can predict that they go into class V, with gender determined by their semantics. Again, this is the pattern we have called default exchange where inanimates take as their exceptional case default the form which is the normal case default for animates.

(c) the two cells in which morphological class IV nouns belong to one of the two default genders (masculine or vegetable). For masculine class IV nouns, this can reflect either the use of masculine gender for many implement and painting terms, e.g. *kun-rodjbe* ‘red ochre’ (masculine), or dual principles of semantic assignment, as with *kun-waral* ‘spirit’, assigned to class IV by the body-part principle, and to masculine, because it is an animate.

For class IV nouns with vegetable gender, the situation is more complex. For many, their assignment results from the interplay of two semantic principles, one in the domain of gender and one in the domain of morphological class. Examples are the assignment of *kun-dulk* ‘tree’ to class IV by the plant life-form principle, and to the vegetable gender by the general plant principle, or the assignment of *kun-rak* ‘fire’ to class IV by the domestic-fire principle, and to the vegetable gender by the fact that it has inanimate reference. For others, there is a good deal of contextual variation and interspeaker variation, reflecting the gradual migration of class IV nouns into the vegetable gender. In a case where *kun-wardde* ‘rock’ manifests vegetable agreement, for example, this can be attributed to the extended principle, at least for some speakers, by which terms for camp and habitable places go in the vegetable gender, and a construal of a rock shelter as belonging to this semantic category, at least in some discourse settings. Although we do not have rigorous variational data on these nouns, it is likely that for some speakers it represents a particular contextual construal, while for others it has become lexically fixed as of vegetable gender. A similar situation holds for some body parts, such as ‘tongue’, discussed in §3.1.

To conclude this section we note the implications of this two-dimensional model, with its complex hierarchy of defaults, for how our semantic principles operate. Some semantic principles, such as the assignment of most plants, are identical for both gender and morphological class. Some are specific just to morphological class, for example, the rules of assigning life-form plants to morphological class IV, where the category of ‘plant life-form’ is relevant to morphological class but not to gender, or ‘domestic fire’, which operates just for morphological class. Many others, such as principles for assigning gender on the basis of sex, are most economically represented just for gender, with congruence rules and default specification taking care of whether marking actually shows up as a nonzero morphological class. The model we propose allows us to distribute the semantically based decisions in a number of ways, so that we can capture the interdependencies of the two systems without being forced to locate all semantic information in one or the other.

5.2. CONGRUENCE. The commonest type of overlap, as seen in the treatment of morphological class semantics in §4, involves inanimate nouns. Here the normal case default for an inanimate noun is that it has congruent morphological class and gender. For instance, the noun *man-kabo* ‘billabong’, as an item pertaining to water, is assigned vegetable gender, and consequently morphological class III (on the basis that it is vegetable gender), because it is inanimate. Similarly, *kun-denge* ‘foot’ is assigned neuter gender, because it is a body part, and as a consequence is assigned to morphological class IV (the congruent class), because it is an inanimate (§4.2). In sum, inanimate

nouns will be congruent, but it is the specifics of gender assignment that will determine the form that the congruence takes.

In addition to this basic type, there is a less expected type of congruence, in which animate nouns—as an exceptional case default—take a morphological class prefix congruent with their gender. In fact since the normal case default for animate nouns is the zero morphological class (V), which has no corresponding gender, the exceptional case default is the only way in which animate nouns can exhibit congruence. We shall examine a case of this in §5.4, where we work through the full set of logical possibilities, using the domain of birds as an example.

5.3. DEFAULTS AND SECOND CHOICE DEFAULTS. As seen in the discussion of congruence, the difference in choice of defaults arises from degrees of specificity, or layers of defaults. We may talk of a second choice or exceptional case default for both gender and morphological class. We have seen that the exceptional case default for gender for any noun is masculine and that the exceptional case default for morphological class depends on whether the noun in question is animate or inanimate.

A noun has a choice of possible combinations of these first and second choices for gender and morphological class. From Table 7 we see that masculine gender may occur with any morphological class. According to our analysis, this is because masculine is the exceptional case default for gender and should therefore be the option of last resort for any noun. Equally, as class V is the default for animates and the exceptional case default for inanimates, it occurs with all four genders. Finally, the choice of congruent morphological class for animates is the exceptional case default for that group.

5.4. CASE STUDY FRAGMENT. In §3.4 and §4.2 we showed how gender and morphological class are straightforwardly assigned in terms of the normal case default. We shall exemplify the interaction of exceptional case and normal case defaults for gender and morphological class by looking at the domain of birds. There are, in fact, four possibilities for nouns with bird referents and these can be accounted for by the appropriate combination of normal case and exceptional case default for class or gender (see Table 8).

	MORPHOLOGICAL CLASS <i>normal case default</i>	MORPHOLOGICAL CLASS <i>exceptional case default</i> (congruent)
gender <i>normal case default</i>	gender: FEMININE	gender: FEMININE
gender <i>exceptional case default</i>	morphological class: V	morphological class: II
	gender: MASCULINE	gender: MASCULINE
	morphological class: V	morphological class: I

TABLE 8. Interaction of defaults in the domain of birds.

The largest number of nouns in this domain will have the normal case default for both morphological class and gender. Our lexical entry for *kurrkurldanj* ‘scrub fowl’ is given in 33. As there is no mention of gender or morphological class in the lexical entry, this noun will be assigned the normal case default gender for birds, feminine, and the normal case default morphological class for animates, class V.

(33) *Kurrkurldanj*:

⟨ ⟩ = = NOUN
 ⟨sem gloss⟩ = = scrub fowl
 ⟨root⟩ = = *kurrkurldanj*
 ⟨sem⟩ = = BIRD.

[1]

Fact [1] in 33 tells us that *kurrkurdanj* inherits information about its semantic category from the BIRD node in the semantic hierarchy. The output of this semantic component states that it is an ‘entity which__is animate and bird’. This then matches with the appropriate path at the GENDER node to assign this noun feminine gender (see §3.4), as the lexical entry does not specify any information about gender itself. Our theory can then be tested to see which gender and morphological class it would predict in its outputs (the inferences which can be drawn from the theory). As *kurrkurdanj* ‘scrub fowl’ is an animate noun, it will be assigned to morphological class V (see §§4.1-4.2). This is illustrated by the outputs in 34 derived from the theory. The first line gives a noun phrase consisting of a noun and a modifier (included merely to show that the appropriate output for syntax can be generated). The head noun is given in square brackets and the modifier is the adjective *kimuk* ‘big’.

- (34) *Kurrkurdanj*:⟨syn / mod noun⟩ = [[*kurrkurdanj*] (ng) al__*kimuk*].
Kurrkurdanj:⟨syn gender⟩ = feminine.
Kurrkurdanj:⟨morphological__class⟩ = v.

The second possibility is for the noun to take the exceptional case default for morphological class while maintaining the normal case default for gender. The noun *ngalkordow* ‘brolga’ is assigned to morphological class II as follows: it takes the normal case default for gender (feminine for birds). But it takes the exceptional case default for morphological class, which makes it assign the congruent morphological class. For the feminine gender that is morphological class II. We give the lexical entry for *ngalkordow* in 35.

- (35) *Ngalkordow*:
 ⟨⟩ = = NOUN
 ⟨sem gloss⟩ = = brolga
 ⟨root⟩ = = kordow
 ⟨morphological__class⟩ = =
 MORPHOLOGICAL__CLASS:⟨exceptional__case__default⟩ [1]
 ⟨sem⟩ = = BIRD.

The exceptional case default is introduced in fact [1] in 35 as an attribute, representing directly the exceptional case default. The exceptional case default interrupts the works of the assignment system and the maximally underspecified option is the only one that can then be taken. The point about this exceptional case default attribute is that it is no more than a generalized exceptionality marker. The exceptional case default is assigned, because the exceptional case attribute is NOT recognized. As the attribute is not recognized, the maximally underspecified option at the node referred to must be the one used. Fraser & Corbett 1997 and Brown 1998 implemented the exceptional case default in a similar way, but any attribute that was unrecognizable to the fragment would have the same effect. The MORPHOLOGICAL__CLASS node (30) is repeated in (36).

- (36) MORPHOLOGICAL__CLASS:
 ⟨⟩ = = EXCHANGE:⟨“⟨eval__morphological__class⟩”⟩ [1]
 ⟨kunkurrng⟩ = = “⟨congruence⟩”
 ⟨kunkurrng entity which__is animate and human⟩ = =
 ⟨o__l entity which__is animate and human⟩
 ⟨o__l entity which__is inanimate⟩ = = “⟨congruence⟩” [2]
 ⟨o__l entity which__is inanimate and
 pertaining__to__domestic__fire⟩ = = iv
 ⟨o__l entity which__is animate⟩ = = v. [3]

The exceptional case default path can match only with the path in fact [1] because this path is the maximally underspecified one. The EXCHANGE node will assign the opposite value to the one the noun in question would normally receive. By opposite we mean class V opposed to congruence (which is determined by gender). As the item in question is animate and would normally be assigned to class V, it is instead treated as congruent and assigned to the class congruent with its gender, feminine. It is therefore assigned to class II. For the lexical entry in 35 we obtain the output in 37.

- (37) Ngalkordow:⟨syn / mod noun⟩ = [[(ng) al__kordow] (ng) al__kimuk].
 Ngalkordow:⟨syn gender⟩ = feminine.
 Ngalkordow:⟨morphological__class⟩ = ii.

The third possibility is for the noun to be assigned to the exceptional case default for gender, but still to maintain the normal case default for morphological class. Our lexical entry for the noun ‘plains turkey’, which is in class V, as expected, but is assigned to the masculine gender, is given in 38.

- (38) Benuk:
 ⟨⟩ = = NOUN
 ⟨sem gloss⟩ = = plains turkey
 ⟨root⟩ = = benuk
 ⟨syn gender⟩ = = GENDER:⟨exceptional__case__default⟩ [1]
 ⟨sem⟩ = = BIRD.

The exceptional case default for gender is implemented in a similar fashion to that for morphological class. The attribute in the right-hand path in fact [1] of 38 is not recognized at the node GENDER and masculine, the most underspecified option for gender, is assigned. As there is no lexical stipulation for morphological class, the noun *benuk* ‘plains turkey’ is still assigned to the normal case default for animate nouns, class V. The resulting theorems for 38 are given in 39.

- (39) Benuk:⟨syn / mod noun⟩ = [[benuk] na__kimuk].
 Benuk:⟨syn gender⟩ = masculine.
 Benuk:⟨morphological__class⟩ = v.

In the bird domain the fourth possibility is for a noun to have the exceptional case default for both morphological class and gender. Our final example of the extent to which gender and morphological class may interact is *na-djik* ‘tawny frog mouth’; its lexical entry is given in 40.

- (40) Nadjik:
 ⟨⟩ = = NOUN
 ⟨sem gloss⟩ = = tawny frog mouth
 ⟨root⟩ = = djik
 ⟨morphological__class⟩ = =
 MORPHOLOGICAL__CLASS:⟨exceptional__case__default⟩ [1]
 ⟨syn gender⟩ = = GENDER:⟨exceptional__case__default⟩ [2]
 ⟨sem⟩ = = BIRD.

Again, the output from the semantic component says that this noun denotes an ‘entity which__is animate and bird’. In this case, however, this component does not play a role in the assignment of the gender, because it is overridden by a more specific fact in the lexical entry, fact [2]. Here we state that the value is inherited directly from the node GENDER. At that node, the unrecognized attribute *exceptional__case__default* is compatible only with the empty path, which leads to the inheritance of the value

masculine as the general default. With *ngal-kordow* ‘broлга’ in 35 we have already seen that using the exceptional case default attribute for an animate noun ultimately leads to an evaluation of that noun’s gender (in order to assign congruent morphological class), and because *na-djik* has the exceptional case default gender, masculine, it will be assigned to morphological class I. The output for this noun is given in 41.

- (41) Nadjik:⟨syn / mod noun⟩ = [[na__djik] na__kimuk].
 Nadjik:⟨syn gender⟩ = masculine.
 Nadjik:⟨morphological__class⟩ = i.

In §3.2 we discussed the assignment of gender for animates below the normal threshold for sex differentiability and pointed out that there may be variation within a given domain. Our formal analysis here shows that it is possible to account for an example of such a domain, that of birds, without having recourse to direct stipulation of either morphological class or gender in the lexical entry. Some combination of the normal case default or exceptional case default accounts for the patterns found.

	MORPHOLOGICAL CLASS <i>normal case default</i> (Class V)	MORPHOLOGICAL CLASS <i>exceptional case default</i> (Congruent)	Σ
GENDER <i>normal case default</i> (feminine)	<i>kurrkurldanj</i> type N = 15	<i>ngal-kordow</i> type N = 1	N = 16
GENDER <i>exceptional case default</i> (masculine)	<i>benuk</i> type N = 7	<i>na-djik</i> type N = 2	N = 9
Σ	N = 22	N = 3	N = 25

TABLE 9. Bird-domain lexemes in each default combination.

Table 9 illustrates, for the total set of twenty-five bird entries in our sample lexicon, the distribution of numbers of lexemes across the four types discussed above. From this table the following generalizations are apparent:

(a) all 25 bird lexemes can be accounted for as one of the above four combinations. There are many other logically possible combinations (e.g. class IV prefix with vegetable agreement) but no such examples occur.

(b) birds overwhelmingly belong to morphological class V: 22 out of 25 (typical of animates as a whole).

(c) feminine is clearly the normal case default for the bird domain, 16 out of 25.

(d) there are only three instances of congruence, each arising from the exceptional case default for morphological class. (Recall that, by definition, class V nouns cannot be congruent, since all gender agreement is realized by an overt prefix).

(e) the *na-djik* type, in which both gender and morphological class are the exceptional case default, would be expected to be the least numerous. In fact, the *ngal-kordow* type, with the normal case default for gender but the exceptional case default for morphological class, turns out to be the least common (N = 1) in this sample, closely followed by the *na-djik* type (N = 2). But the number of these congruent types is too small for us to draw any reliable conclusion.

Note that, as a corollary of (d), only three out of the twenty-five entries would be compatible with a form-based assignment analysis in which nouns receive their gender on the basis of copying their morphological class prefix.

6. FURTHER EVIDENCE: MORPHOLOGICAL CLASSES IN THE KUN-KURRNG REGISTER.

The special kun-kurrng register (avoidance register) provides further evidence for the interconnectedness of gender and morphological class semantic rules.²³ This register is learned later in life (typically from adolescence) and essentially involves a second set of vocabulary items with the same grammar and phonology as the everyday language, or *kun-wokduminj*. Grammatical affixes are retained unchanged, as are closed-class words like pronouns and prepositions, but most lexical roots are replaced with special kun-kurrng equivalents. A typical mapping of ordinary language (first line) onto its kun-kurrng equivalent (second line) is illustrated in 42.

- (42) o.l. 'Kun-kanj yi-karrme?' 'Kayakki'.
 k.k. 'Kun-mulbbuy yi-walebonghme?' 'Kayakura'
 IV-meat 2-have_{NP} nothing
 'Do you have any meat?' 'Nothing'.

Verb roots with complex morphology, such as incorporated nominals, reproduce this literally in kun-kurrng. As in the everyday language, noun incorporation offers a clear way to isolate roots from their prefixes for those nouns that incorporate; examples are offered in 43 (again with the ordinary language on the first line, and the kun-kurrng on the second).

- (43) a. o.l. nga-kanj-ngu-n (cf. *kun-kanj* 'meat')
 k.k. nga-mulbbuy-yakwa-n (cf. *kun-mulbbuy* 'meat')
 1/3-meat-eat-NP
 'I eat meat'.
 b. o.l. nga-bo-ngu-n (here *bo* corresponds to the
 free nominal *kukku* 'water')
 k.k. nga-djulkkinj-yakwa-n (cf. *kun-djulkkinj* 'water')
 1/3-water-eat-NP
 'I drink'.
 c. o.l. nga-bid-kuykme-rre-n (cf. *kun-bid* 'hand')
 k.k. nga-kondam-kuykbonghme-rre-n (cf. *kun-kondam* 'hand')
 1-hand-spray.white.clay.from.mouth-RR-NP
 'I create white clay imprints of my hand by spraying from my
 mouth'.

The number of vocabulary items is high compared to that reported for other mother-in-law styles reported in Australia (e.g. Dixon 1971, Haviland 1979), with the result that many quite specific lexical items have exact kun-kurrng equivalents. Nonetheless, there are a number of examples of many-to-one mappings into hypernym sets of the type reported in Dixon 1971. There are also quite a few words (always nonverbs) that lack kun-kurrng equivalents; since the verbs are always distinct, sentences containing nondistinct nominal words are nonetheless marked as kun-kurrng by the verb lexeme. Table 10 gives examples of each of these types of mapping.

6.1. GENDER AND MORPHOLOGICAL CLASS ASSIGNMENT IN KUN-KURRNG. An important aspect of the semantic parallelisms between the everyday register and kun-kurrng is that there is an almost total match in the gender of kun-kurrng words and their everyday correspondents.

²³ Further information on kun-kurrng can be found in Hale 1959, Harris 1970, Manakgu & Djayhurrnga 1985, Garde 1996, Manakgu 1996, and Evans 2002. There are slight differences in kun-kurrng across dialects; the examples given in 36 and 37, plus Table 10, are drawn from the Kuninjku dialect.

ORDINARY LANGUAGE	KUN-KURRNG EQUIVALENT
One-to-one mapping	
<i>kamdakidj</i> ‘male antilopine wallaroo’	<i>kalngunjkorongko</i>
<i>karndayh</i> ‘female antilopine wallaroo’	<i>ngal-marndamarndayi</i>
<i>kalkberd</i> ‘male wallaroo’	<i>(na-)njamlurruk</i>
<i>wolerrk</i> ‘female wallaroo’	<i>ngal-warddedomrdi</i>
Many-to-one mapping	
<i>badbong</i> ‘short-eared rock wallaby’	<i>dolhwarr</i>
<i>djorrkkun</i> ‘rock possum’	<i>dolhwarr</i>
<i>nabarlek</i> ‘little rock wallaby’	<i>dolhwarr</i>
<i>kun-dayarr</i> ‘pandanus spiralis’	<i>kun-yariling</i>
<i>man-djimdjim</i> ‘pandanus acquaticus’	<i>kun-yariling</i>
<i>man-ngohngo</i> ‘pandanus basedowii’	<i>kun-yariling</i>
No distinct kun-kurrng term	
<i>djang</i> ‘dreaming site’	<i>djang</i>
<i>kabbal</i> ‘floodplain’	<i>kabbal</i>
<i>karlba</i> ‘yellow ochre’	<i>karlba</i>

TABLE 10. Types of mapping of everyday nominal vocabulary into kun-kurrng.

Moreover, virtually all everyday words with a nonzero morphological class marker have kun-kurrng equivalents with the same morphological class: some examples are ordinary language *ngal-kordow* ‘brolga’, kun-kurrng register *ngal-djingburduwalan*; ordinary language *ngal-dadmurrng* ‘saratoga fish [Kuninjku dialect]’, *ngal-kid* ‘saratoga fish [Kune dialect]’ (in other dialects the form is unprefixated: Dj, W *kuluybirr*), kun-kurrng register *ngal-kalngunkabarn*. As another example, consider the pattern mentioned in §4.1, by which most plant terms take the *man-* prefix, but life-form terms take *kun-*. This is reproduced in kun-kurrng. Compare the following:

	ORDINARY LANGUAGE	KUN-KURRNG
SPECIFIC TERMS	<i>man-boyberre</i> ‘white apple’	= <i>man-boyirra</i>
	<i>man-dudjmi</i> ‘green plum’	= <i>man-kodildil</i>
LIFE-FORM TERMS	<i>kun-dalk</i> ‘grass’	= <i>kun-djarnud</i>
	<i>kun-dulk</i> ‘tree’	= <i>kun-muluru</i>
	<i>kun-kod</i> ‘paperbark tree’	= <i>kun-bulbul</i> ²⁴

What is particularly interesting here, however, is the large number of kun-kurrng words that have a morphological class prefix congruent with the gender of everyday words that do not have a prefix. This pattern gives further support to the formal treatment proposed above since it can be accommodated by simple changes in the network: the main change is to state that the morphological class default is the value ‘congruence’ in the case of kun-kurrng. For example:

²⁴ The attentive reader will have noted the noncorrespondence of morphological class prefixes in Table 10 between two of the pandanus species terms (*man-djimdjim* and *man-ngohngo*) and their kun-kurrng equivalent *kun-yariling*. The reason for this appears to be as follows. Although it is essentially a species-level term, *kun-dayarr* ‘pandanus spiralis’ is clearly the prototype for the life-form category of pandanus plants, and is sometimes used in a loose way to refer to the other pandanus species as well, so that in effect it is polysemous between specific and life-form meanings. This seems to be why it has a class IV prefix in the Kuninjku dialect (though in some other dialects it has a class III prefix, as befits a species term, for example its Kunwinjku name *man-belk* and its Gun-djeihmi name *an-yakngarra*). It seems that the kun-kurrng equivalent for pandanus spiralis then takes the same prefix (class IV) as the prototype, namely *kun-dayarr*, and that since the lexeme is then extended semantically to the other pandanus species, these simply inherit the class IV prefix used for the prototype term.

(a) in the case of mammals with salient sex (such as the most important macropods), and whose everyday nouns govern gender according to their sex but belong to the zero morphological class, most have corresponding kun-kurrng forms with congruent morphological class. Examples are k.k. *na-kulngunj* ‘male black wallaroo’ = o.l. *barrk*; k.k. *na-njamlurruk* ‘male common wallaroo’ = o.l. *kalkberd*; k.k. *ngal-warddedjemng-orrm* ‘female black wallaroo’ = o.l. *djukkerre*; and k.k. *ngal-marndamarndayi* ‘female red kangaroo’ = o.l. *karndayh*; k.k. *ngal-warddardomrdi* ‘female wallaroo or euro’ = o.l. *wolerrk*.

(b) animals with conventional gender, but zero morphological class in at least some dialects, regularly take a congruent morphological class in kun-kurrng. Thus the masculine zero-class noun *dadbe* ‘king brown snake’ has the k.k. equivalent *na-djak-korrongko* (literally ‘I-pain-big’).

As a feminine example, the term for ‘olive python’, governing feminine agreement in all dialects (on the gender of pythons see §3.2), has a congruent II-prefixed ordinary language term in Gun-djeihmi (*al-ngururrkmanj*), but zero-class names in most dialects (e.g. W, I *manjdjururrk*); the kun-kurrng register form has a congruent II-class prefix regardless of dialect: *ngal-wirnyi*. Other unprefixed feminine ordinary language nouns that take a class II prefix in k.k. are *ngal-kadjeddjed*, corresponding to o.l. *ngarrbek* ‘echidna’, *ngal-ngarelyi*, corresponding to o.l. *komrdawh* ‘long-necked turtle’, and *ngal-djangara-kurlngunj* corresponding to o.l. *djurn* ‘black-headed python’.

Among fish, examples are the spangled grunter (k.k. *ngal-keblorrk*, but o.l. *burd* (W), *boddowk* (I)), and, as a I-class example, the eel-tailed catfish (k.k. *na-keryi*, o.l. *bikkurr* or *marrngunj*).

Crustacean terms, governing feminine agreement, but zero prefixed in ordinary language, take the congruent II class in the kun-kurrng, equivalents: k.k. *ngal-kayedyed* ‘prawn, yabby’, o.l. *ngalng*; k.k. *ngal-kundamenkorrongko* ‘mud crab’, o.l. *barnkabarra*. With other crustacean terms the congruent prefix surfaces in the ordinary language form: *ngaldjarlarrk* ‘salt water cockle shells’.

There are only a couple of disparities between ordinary-language gender and the nonzero classes that appear in kun-kurrng register. One honey term, *diyawarraldiwarra* ‘wild honey species’, which is masculine at least in the Manyallaluk Mayali dialect (e.g. *diwarra na-barnng* ‘stinging *diwarra*’), takes class II prefixes (*ngal-*) in k.k. *ngal-karrngmari* or *ngal-wadjamari*, though at this stage our data is from different dialects and we need to check the gender agreement of the Kuninjku form *diyawarra*. The kun-kurrng register word for ‘filesnake’ *ngal-djangarabunebune* has a congruent class-II prefix, though its ordinary equivalent in Gun-Djeihmi, *na-warndak*, has a class I prefix, and other equivalents in the dialect chain are unprefixed: W *kedjebe*, I *bekka*.

(c) most vegetable-gender nouns have congruent morphological class prefixes but few are in the zero class. Unlike the other lexical groups discussed so far, not all plant names have corresponding kun-kurrng terms, so we lack complete data on correspondences. However, in all cases where we know the kun-kurrng equivalents to zero-prefixed plant names, they take a congruent morphological class, for example o.l. *karrb-arda* ‘hairy yam’, k.k. *man-karremurdi*.

(d) within the class of human terms, kun-kurrng register terms resemble their ordinary language equivalents in being predominantly zero morphological class, whatever their gender, except in the case of contrast sets like o.l. *na-rangem* / k.k. *na-birdiddji* ‘male, boy’; o.l. *ngal-daluk*/k.k. *ngal-djubdjubken* ‘female’. We therefore allow the block on congruence to remain in place at the class node for these nouns in kun-kurrng as well, except in the case of nouns in contrast sets.

There is a very small number of nouns where the correspondences go the other way, that is, the ordinary-language forms have a congruent morphological class prefix while the kun-kurrng forms are zero-prefixed: I-prefixed ordinary language *na-barlek* ‘nabarlek rock wallaby’, but zero-class kun-kurrng register *dolhwarr* (significantly, a Dalabon loan) one of a score or so kun-kurrng register words that are borrowed from neighboring languages (and which, as shown in Table 10, correspond to other, unprefixed ordinary-language nouns as well).

More complex cases are kun-kurrng register *djingkorrk* ‘flying fox (generic)’, which is one of the rare cases of a kun-kurrng register hypernym, subsuming the two ordinary language terms *kuluban* ‘black flying fox’ (also generic for ‘flying fox’) (zero prefix) and *na-kayalak* ‘little red flying fox’ (I-prefix).

To summarize: kun-kurrng is characterized by more overt morphological marking, such that lexical items with zero prefixes in the ordinary language frequently have nonzero prefixes in kun-kurrng register, and these are congruent with the gender of the ordinary-language noun. The great consistency between ordinary language and kun-kurrng nouns confirms the operation of a single set of semantic principles across registers.

6.2. KUN-KURRNG FRAGMENT. Our implementation of the kun-kurrng system treats kun-kurrng entries as inheriting gender as well as other information from their ordinary-language equivalents. In 44 information about morphological class is added in which the evaluation of morphological class involves information about register (kun-kurrng or ordinary language). This is placed before the other semantic information. By default, congruence is what we expect for any kun-kurrng noun (fact [1] in 44), with the exception that kun-kurrng register nouns for humans behave like ordinary-language nouns for humans in not usually having a prefix (see point d in §6.1 and fact [2] below).

(44) MORPHOLOGICAL_CLASS:

⟨⟩ = EXCHANGE:⟨‘(eval__morphological__class)’⟩
 ⟨kunkurrng⟩ = ‘⟨congruence⟩’ [1]

⟨kunkurrng entity which__is animate and human⟩ = =
 ⟨o__l entity which__is animate and human⟩ [2]
 ⟨o__l entity which__is inanimate⟩ = ‘⟨congruence⟩’

The exceptional case default for kun-kurrng nouns is also set as congruence.

7. RESULTS. A major benefit of formal implementation is that we can check our claims on a portion of the actual lexicon and see how it fares, both with regular nouns and those that are less so. We can test the extent to which our analysis makes accurate generalizations about the language and also captures some of the less general facts. We tested the theory on 258 Mayali ordinary-language nouns.²⁵ We were not in a position to choose a rigorously representative sample, as agreement information is currently not available for every noun, but our selection has been guided by the Swadesh list and other lists of basic vocabulary.

Tables 11 and 12 contain the figures for exceptional case default and direct specification of morphological class and gender. Our analysis requires no lexical specification of morphological class for 70 percent of the nouns in the lexicon (Table 11). In the

²⁵ While our theory includes a kun-kurrng lexicon, which can be viewed at <http://www.surrey.ac.uk/LIS/SMG/mayali>, together with the derivable outputs, we do not as yet have enough agreement information to make claims about the success rate of our theory with respect to this register.

	MORPHOLOGICAL CLASS		
	NO SPECIFICATION (fully regular)	EXCEPTIONAL CASE DEFAULT	DIRECT SPECIFICATION
Proportion of 258 nouns in the lexicon	179 (70%)	63 (24%)	16 (6%)

TABLE 11. Regularity and morphological class.

case of gender, the percentage of fully regular nouns rises to 82 percent of the nouns in the lexicon (Table 12).

In each case, employing the notion of the exceptional case default allows us to account for the majority of the irregular nouns with minimal extra specification, capturing the fact that the exceptionality is largely predictable. The remainder, which have to be specified directly, amounts to only 6 percent of the nouns in the case of morphological class (Table 11) and 5 percent in the case of gender (Table 12).

	GENDER		
	NO SPECIFICATION (fully regular)	EXCEPTIONAL CASE DEFAULT	DIRECT SPECIFICATION
Proportion of 258 nouns in the lexicon	212 (82%)	33 (13%)	13 (5%)

TABLE 12. Regularity and gender.

The next point of interest is the position of what we call DOUBLES, that is, items that require some statement in their lexical entry about both morphological class and gender. There are 26 such items in total (constituting 10 percent of our overall corpus). Of these, 19 involve specification of the exceptional case default for both morphological class and gender; 6 specify the exceptional case for either morphological class or gender, and one is totally exceptional (the word for 'sun') in that we have to specify both morphological class IV and feminine gender directly. We summarize the information on doubles in Table 13.

'Doubles' out of 255 nouns in lexicon	Both exceptional case	Morphological class directly specified	Gender directly specified	Gender and morphological class directly specified
26	19	4	2	1

TABLE 13. Most irregular items in the lexicon.

Of the examples where morphological class is directly specified this involves twice specifying class IV and twice specifying class III. Of the two examples where gender is specified directly (with exceptional case morphological class) this involves specification of feminine gender for both examples. The word for 'sun' is the most problematic as it is the only item where one must specify both gender and morphological class directly.

8. CONCLUSION. Gender and morphological class in Mayali are especially significant, as they involve two overlapping, but separate systems of semantic assignment. Morphological class is primarily based on an animate-inanimate division, and gender involves, in addition to the masculine versus feminine opposition, different defaults for different broad categories of animal (such as feminine for birds), and other finer grained distinctions.

While the two assignment systems are partially separate, assignment to morphological class frequently depends on gender, with the result that many nouns show congruence between the two categories. Evidence for assignment from gender to morphological class also comes from the mother-in-law register, *kun-kurrng*, where overt marking of morphological class is much more frequently consonant with the assignment of gender. The direction in Mayali contrasts with the system in more familiar languages, such as Russian, where the reverse relation is found, namely from morphological class to gender for non-sex-differentiables.

Besides these major Mayali patterns, handled by the normal case defaults with the two respective systems, there is a second layer of predictability which can be handled by the notion of exceptional case default. A significant pattern here is what we have called default exchange, according to which the exceptional case default for inanimates switches to follow the normal case default for animates, whereas the exceptional case default for animates goes entirely the other way, switching to the normal case default for inanimates.

Our analysis, within the framework of Network Morphology, has the benefit of computational implementation to demonstrate that our claims are indeed tenable. Furthermore, our results show that we can account for the major part of the lexicon either in terms of the expected normal case default (for class or gender) or by the predictable exceptionality of the exceptional case default.

Distinguishing a system with two partially parallel and semantically based assignment systems from one mixing semantic and formal criteria is not a simple task, but one that must be undertaken if all cells in the typological possibility space are to be checked. The formal methods we have employed in this article allow us to do this, so demonstrating the value of implemented models in typological research.

REFERENCES

- ARONOFF, MARK. 1992. Noun classes in Arapesh. *Yearbook of Morphology* 1991. 21–32.
- ARONOFF, MARK. 1994. *Morphology by itself: Stems and inflectional classes*. Cambridge MA: MIT Press.
- ASHER, R. E. 1985. Tamil. (Croom Helm Descriptive Grammars.) London: Croom Helm.
- BAKER, BRETT. 2001. How referential is agreement? The interpretation of polysynthetic disagreement morphology in Ngalakgan. *Problems of polysynthesis*, ed. by Nicholas Evans and Hans-Jürgen Sasse. Berlin: Akademie Verlag.
- BROCK, JOHN. 1988. Top end native plants. Winnellie, Northern Territory: John Brock.
- BROWN, DUNSTAN. 1998. Defining ‘subgender’: Virile and devirilised nouns in Polish. *Lingua* 104.197–233.
- CAPELL, ARTHUR, and HEATHER HINCH. 1970. *Maung grammar, texts and vocabulary*. The Hague: Mouton.
- CARROLL, PETER. 1976. *Kunwinjku (Gunwinggu): A language of Western Arnhem Land*. Canberra: Australian National University master’s thesis.
- CHALOUPIKA, GEORGE, and PINA GIULIANI. 1984. *Gundulkabel Gundalg: Mayali Flora*. Northern Territory Museum of Arts and Sciences. Darwin.
- COGGER, HAROLD G. 1983. *Reptiles and amphibians of Australia*. French’s Forest: A. H. and A. W. Reed.
- COLEMAN, CAROLYN. 1993. *Comparative file: Insects, bugs and crawlies*. On file at Carolyn Coleman, Maningrida CEC machine, Operations North, Northern Territory Department of Education.
- CORBETT, GREVILLE G. 1991. *Gender*. Cambridge: Cambridge University Press.
- CORBETT, GREVILLE G., and NORMAN M. FRASER. 2000. Default genders. In: *Gender in grammar and cognition (Trends in Linguistics: Studies and Monographs 124.)*, ed. by Barbara Unterbeck, Matti Rissanen, Terttu Nevalainen, and Mirja Saari, 55–97. Berlin: Mouton de Gruyter.

- DIXON, R. M. W. 1971. A method of semantic description. *Semantics: An interdisciplinary reader in philosophy, linguistics and psychology*, ed. by Danny D. Steinberg and Leon A. Jakobovits, 436–71. Cambridge: Cambridge University Press.
- EVANS, NICHOLAS. 1991. Draft Mayali dictionary. [<http://coombs.anu.edu.au/Special Proj/ASEDA/ASEDA.html>]
- EVANS, NICHOLAS. 1992. Macassan loans in Top End languages. *Australian Journal of Linguistics* 12. 45–91.
- EVANS, NICHOLAS. 1995. The syntax and semantics of body parts in Gun-djeihmi. *The grammar of inalienability*, ed. by Hilary Chappell and William McGregor, 65–109. Berlin: Mouton de Gruyter.
- EVANS, NICHOLAS. 1997a. Head classes and agreement classes in the Mayali dialect chain. *Nominal classification in Aboriginal Australia*, ed. by Mark Harvey and Nicholas Reid, 105–46. Amsterdam: John Benjamins.
- EVANS, NICHOLAS. 1997b. Role or cast? Noun incorporation and complex predicates in Mayali. *Complex predicates*, ed. by Alex Alsina, Joan Bresnan, and Peter Sells, 397–430. Stanford: CSLI.
- EVANS, NICHOLAS. 1997c. Sign metonymies and the problem of flora-fauna polysemy in Australian linguistics. *Boundary rider. Essays in honour of Geoffrey O'Grady*, ed. by Darrell Tryon and Michael Walsh, 133–53. Canberra: Pacific Linguistics.
- EVANS, NICHOLAS. 1997d. Macassan loans and linguistic stratigraphy among the Iwaidjan languages. *Archaeology and linguistics: Global perspectives on ancient Australia*, ed. by Patrick McConvell and Nicholas Evans, 237–59. Melbourne: Oxford University Press.
- EVANS, NICHOLAS. 2002. A pan-dialectal grammar of Biniŋ Gun-wok: Mayali, Kunwinjku and Kune. Canberra: Pacific Linguistics, in press.
- EVANS, NICHOLAS; DUNSTAN BROWN; and GREVILLE G. CORBETT. 1998. Emu divorce: A unified account of gender and noun class assignment in Mayali. *Chicago Linguistic Society* 34. 147–72.
- EVANS, ROGER, and GERALD GAZDAR. 1989a. Inference in DATR. *Proceedings of the fourth conference of the European Chapter of the Association for Computational Linguistics*, Manchester, England, 66–71.
- EVANS, ROGER, and GERALD GAZDAR. 1989b. The semantics of DATR. *Proceedings of the seventh conference of the Society for the Study of Artificial Intelligence and Simulation of Behaviour*, ed. by A. G. Cohn, 79–87. London: Pitman/Morgan Kaufmann.
- EVANS, ROGER, and GERALD GAZDAR. 1996. DATR: A language for lexical knowledge representation. *Computational Linguistics* 22.167–216.
- FORTUNE, REO F. 1942. *Arapesh*. Publications of the American Ethnological Society 19. New York: Augustin.
- FRASER, NORMAN M., and GREVILLE G. CORBETT. 1995. Gender, animacy and declensional class assignment: A unified account for Russian. *Yearbook of Morphology* 1994. 123–50.
- FRASER, NORMAN M., and GREVILLE G. CORBETT. 1997. Defaults in Arapesh. *Lingua* 103. 25–57.
- GARDE, MURRAY. 1996. 'Saying nothing': The language of joking relationships in Aboriginal Australia. Darwin: Northern Territory University graduate diploma thesis.
- GARDE, MURRAY. 1997. Kuninjku dictionary. [<http://coombs.anu.edu.au/Special Proj/ASEDA/ASEDA.html>]
- GARRETT, R. N. 1986. Reproduction in Queensland barramundi (*Lates calcarifer*). *Management of wild and cultured sea bass/barramundi (Lates calcarifer)*, ed. by J. W. Copland and D. L. Grey, 38–43. Darwin: Australian Centre for International Agricultural Research.
- GRANT, E. M. 1982. *Guide to fishes*. Brisbane: Queensland Government.
- HALE, KENNETH. 1959. *Gunwinjku field notes*. Australian Institute for Aboriginal and Torres Strait Islander Studies: Canberra. ms.
- HARRIS, JOY KINSLOW. 1970. Gunkurrng, a mother-in-law language. *Pacific Linguistics studies in honour of Arthur Capell*, ed. by Stephen Wurm and Don Laycock, 783–89. Canberra: Pacific Linguistics.

- HARVEY, MARK. 1997. Nominal classification and gender in Aboriginal Australia. Nominal classification in Aboriginal Australia, ed. by Mark Harvey and Nicholas Reid. 17–62. Amsterdam: John Benjamins.
- HAVILAND, JOHN. 1979. Guugu-Yimidhirr brother-in-law language. *Language in Society* 8.365–93.
- HEATH, JEFFREY. 1984. Functional grammar of Nunggubuyu. Canberra: AIAS.
- KELLER, BILL. 1995. DATR theories and DATR models. Proceedings of the 33rd annual meeting of the Association for Computational Linguistics, Cambridge MA, 55–62.
- MANAKGU, ANDREW. 1996. Kunbalak. Stories for Kunwinjku young people in mother-in-law language, ordinary Kunwinjku and English. Kunbarllanjja (Oenpelli): Kunwinjku Language Centre.
- MANAKGU, HOPIE, and ESTHER DJAYHGURRNGA. 1985. Kunkurrng dja Kundebe. N.T.: Batchelor College, Batchelor, Northern Territory, Australia. ms.
- MERLAN, FRANCESCA. 1982. Land, language and social identity in Aboriginal Australia. *Mankind* 13.133–48.
- MERLAN, FRANCESCA. 1983. Ngalakan grammar, texts and vocabulary. Canberra: Pacific Linguistics.
- MOORE, RAYMOND. 1979. Natural sex inversion in the giant perch (*Lates calcarifer*). *Australian Journal of Marine and Freshwater Research* 30.801–13.
- MOORE, RAYMOND. 1982. Spawning and early life history of barramundi, *Lates calcarifer* (Bloch), in Papua New Guinea. *Australian Journal of Marine and Freshwater Research* 33.671–82.
- OATES, LYNETTE F. 1964. A tentative description of the Gunwinggu language (of Western Arnhem Land). Sydney: Oceania Linguistic Monographs.
- PENSALFINI, ROB. 2000. Optional disagreement and the case for feature hierarchies. *Chicago Linguistic Society* 35.343–353.
- RUSSELL-SMITH, JEREMY. 1985. Studies in the jungle: People, fire and monsoon forest. Archaeological research in Kakadu National Park, ed. by Rhys Jones, 242–267. Canberra: ANPWS Special Publication No. 13.
- SIMPSON, KEN, and NICOLAS DAY. 1984. Field guide to the birds of Australia. South Yarra, Victoria: Viking O'Neil.
- SMYTH, D. M., and JOHN R. VON STURMER. 1981. The use of plants by the Aboriginal people in the Oenpelli region of Western Arnhem Land. Canberra: Australian Institute of Aboriginal Studies, ms.
- SRIDHAR, SHIKARIPUR N. 1990. Kannada. London: Routledge. (Descriptive Grammars series)
- STRAHAN, RON (ed.) 1983. The Australian museum complete book of Australian mammals. Sydney: Angus and Robertson.
- WEINREICH, URIEL. 1954. Is a structural dialectology possible? *Word* 10.388–400.

Evans
 Dept. of Linguistics and Applied Linguistics
 University of Melbourne
 Victoria 3010
 Australia
 [n.evans@linguistics.unimelb.edu.au]

[Received 28 August 1999;
 revision received 1 March 2001;
 accepted 13 September 2001]

Brown/Corbett
 Surrey Morphology Group
 Linguistic and International Studies
 University of Surrey
 Guildford, Surrey GU2 7XH
 UK
 [d.brown@surrey.ac.uk]
 [g.corbett@surrey.ac.uk]