Markedness and Blocking in German Declensional Paradigms

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1 Introduction

The loss of regular case endings in modern German has led to highly syncretic noun paradigms that neutralise many of the distinctions retained in more conservative determiner and adjective paradigms. Genitive and dative are, for all intents and purposes, the only cases marked in noun paradigms. Strong nonfeminine nouns have a genitive singular in *-s*. Strong nouns whose plural ends in a schwa or a liquid have a dative plural in *-n*. No noun paradigm contains a distinctive accusative. Noun paradigms may thus contain at most four distinct forms: a basic stem, such as *Mann* 'man', a genitive singular, *Mannes*, a general plural, *Männer*, and a dative plural, *Männern*.

The simplest description of German noun paradigms would likewise recognise at most four entries, one corresponding to each distinct form. The genitive singular and dative plural entries would be assigned the appropriate number and gender features. However, the analysis of basic stems and general plurals presents an interesting descriptive challenge, since neither form can be assigned a case value in isolation. A basic stem is associated with a case-neutral singular interpretation if, as in the case of *Frau* 'woman', its paradigm lacks a genitive singular. Yet if, as in the case of *Mann*, the stem is opposed by a genitive singular, it acquires a nongenitive interpretation. General plurals exhibit a similarly complementarity. The general plural *Frauen* is not opposed by a distinctive dative plural and thus maintains its case-neutrality. In contrast, the existence of dative *Männern* determines a nondative interpretation of general plural *Männer*.

This paper proposes an essentially Jakobsonian account of this complementarity. Following Jakobson 1932, 1936, the lexical entries of basic stems and general plurals are literally unspecified for case features. In the absence of case-marked opponents, the entries for *Frau* and *Frauen* sanction case-neutral structures in a syntagmatic context. Although the entries for *Mann* and *Männer* are also unspecified for case, negative case values are inferred on the syntagmatic structures that they sanction, reflecting the opposition of case values on the marked entries *Mannes* and *Männern*. A similar mechanism determines the interpretation of unmarked adjective and determiner forms.

Section 2 elaborates the approach outlined above, and applies it to some representative declensional paradigms. Section 3 provides a more comprehensive description of the major noun classes in German. Section 4 concludes with a brief discussion of some alternative approaches.

2 Paradigmatic Complementarity

The simple declensional paradigms of modern German illustrate how the interpretation of unmarked forms complements the interpretations of marked forms. The present section provides a brief overview of some illustrative patterns and outlines the feature analyses and analytical principles that determine the interpretation and distribution of lexically unmarked forms.

2.1 Noun Paradigms

The forms of FRAU 'woman' in (1a) illustrate the simple structure of weak feminine paradigms, which contain distinct singular and plural forms. Since case is not contrastive in (1a), the entries contain only distinctive number values in (1b). Moreover, only the plural value is specified, since the singular interpretation of *Frau* can be deduced from the opposition of plural *Frauen*.

(1) a.

	SING	PLU
NOM	Frau	Frauen
ACC	Frau	Frauen
GEN	Frau	Frauen
DAT	Frau	Frauen

b.

PHON	*Frau*	*Frauen*
FEM	+	+
PLU		+

c.

PHON	*Frau*	*Frauen*
FEM	+	+
PLU	−	+

We can clarify the relevant notion of 'deduction' by distinguishing the lexical *entries* that define an inflectional paradigm from the structures or *realisations* that the entries sanction in a syntagmatic context. In the present case the entries in (1b) determine the realisations in (1c). A general characterisation of entries, realisations and the principles that mediate between them is provided in §2.2. However, the difference between the features in the entries in (1b) and those in the realisations in (1c) may be attributed to the 'blocking' principle in (2).

(2) PARADIGMATIC BLOCKING PRINCIPLE
A structure *S* that satisfies the constraints in an entry *E* is a *realisation* of *E* iff
S is a least structure that conflicts with each more specific entry in *E*'s paradigm.

The singular value inferred on the realisation of *Frau* in (1c) satisfies (2) by inducing a conflict with the plural value of the more specific entry *Frauen* in (1b). Since no entry is more specific than *Frauen*, the realisation of *Frauen* in (1c) simply preserves the features of the entry in (1b). Shading inferred values, as in (1c), allows entries and realisations to be represented in the same matrix, since the entries in (1b) are defined by the unshaded cells in (1c).

The paradigm of HAND 'hand' in (3a) illustrates the structure of strong feminine paradigms. As in (1a), there are no case distinctions in the singular in (3a), so that the realisation of unmarked *Hand* in (3b) has the same features as the realisation of *Frau* in (1c). Yet unlike (1a), (3a) contains a dative plural form, *Händen*, which determines the 'nondative' interpretation of plural *Hände*.

(3) a.

	SING	PLU
NOM	Hand	Hände
ACC	Hand	Hände
GEN	Hand	Hände
DAT	Hand	Händen

b.

PHON	*Hand*	*Hände*	*Händen*
FEM	+	+	+
PLU	−	+	+
DAT		−	+

Just as a 'nonplural' value is inferred in the mapping from entries to realisations in (1), the 'nondative' interpretation of *Hände* is deduced in (3b) from the opposition of dative *Händen*.

The paradigm of strong masculine MANN 'man' in (4a) adds a genitive singular form.

(4) a.

	SING	PLU
NOM	Mann	Männer
ACC	Mann	Männer
GEN	Mannes	Männer
DAT	Mann	Männern

b.

PHON	*Mann*	*Mannes*	*Männer*	*Männern*
MASC	+	+	+	+
PLU	−	−	+	+
GEN	−	+		
DAT			−	+

As in (1b) and (3b), the unmarked entry in (4b) is interpreted as nonplural. Like (3b), the basic plural entry is interpreted as 'nondative'. Yet unlike the feminine paradigms in (1) and (3), genitive singular *Mannes* determines a 'nongenitive' interpretation of unmarked *Mann* in (4b).

The contrasting realisations of unmarked and plural entries in (1), (3) and (4) illustrate how marked features in a paradigm restrict the interpretation of underspecified entries. The most general and uniform analysis of the entries for unmarked *Frau*, *Hand* and *Mann* would assign them only inherent gender features. The singular interpretation of these forms can be attributed to the opposition of a plural form. The fact that *Frau* and *Hand*, but not *Mann*, may satisfy genitive case requirements follows from the independent existence of a genitive form of MANN and the absence of a corresponding form of FRAU or HAND. Similarly, the most general analysis of the entries for *Frauen*, *Hände* and *Männer* would just specify a plural value. The fact that *Frauen* but not *Hände* or *Männer* may satisfy dative plural requirements follows from the existence of a dative plural form of MANN and HAND and the absence of a corresponding form of FRAU.

As a final illustration, the weak masculine paradigm for DOZENT 'lecturer' in (5a) provides an instructive contrast with the paradigm of weak feminine FRAU in (1a).

(5) a.

	SINGULAR	PLURAL
NOM	Dozent	Dozenten
ACC	Dozenten	Dozenten
GEN	Dozenten	Dozenten
DAT	Dozenten	Dozenten

b.

PHON	*Dozent*	*Dozenten*	*Dozenten*
MASC	+	+	+
PLU	–	+	
GOV	–		+

Although (5a) and (1a) each contain two distinct forms, the case and number values realised by *Dozenten* in (5a) cannot be assigned to a single nondisjunctive entry. The analyses in (5b) accordingly recognise two marked entries: a case-neutral plural entry and a number-neutral entry that is compatible with the GOV(ERNED) cases accusative, genitive and dative.

As in previous cases, the operative contrast between *Frau* and *Dozent* does not involve their lexical entries, but rather the features inferred on the structures they sanction in a syntagmatic environment. Before extending this approach to a larger class of declensions, it will be useful to review the largely traditional view of morphosyntactic features implicit in the analyses above.

2.2 Componential Analysis

Following the descriptive tradition that extends from Jakobson 1932 and Jakobson 1936 to current exponents such as Anderson 1992, morphosyntactic properties are analysed in terms of binary features with marked and unmarked values. The analyses of Number and Gender in (6) associate the traditional properties in the leftmost column with values for binary agreement features. The analysis in (6a) follows Jakobson in designating plural forms as marked in a binary number system. Singular forms are defined, in opposition, as bearing unmarked values for [PLU]. The analysis in (6b) likewise identifies neuter as the unmarked gender, and masculine and feminine as marked.[1]

(6) a.

Number	PLU
plural	+
singular	–

b.

Gender	MASC	FEM
Masculine	+	–
Feminine	–	+
Neuter	–	–

[1]This analysis departs from the category-specificy analysis of gender proposed by Jakobson. Jakobson (1932:7) and Jakobson (1960:141) clearly identifies neuter as the marked gender for Russian nouns. However Jakobson (1960:142) goes on to identify neuter as the unmarked gender within the verbal agreement system.

The case analysis in (7) accommodates the case distinctions within nominal paradigms. The marked oblique cases are represented by the features GEN(ITIVE) and DAT(IVE), essentially as in Matthews 1991, Anderson 1992 and Aronoff 1994. The GOV feature characterises the governed cases, permitting a description of weak masculine paradigms like (5b).

(7)

Case	OBL	GOV	GEN	DAT
Nominative	–	–	–	–
Accusative	–	+	–	–
Genitive	+	+	+	–
Dative	+	+	–	+

The traditional 'direct' and 'oblique' cases are defined in (7) in terms of the feature OBL(IQUE).[2] As in Jakobson 1936, nominative is the unmarked case. The marginal status of accusative is likewise reflected in the fact that (7) provides no means of defining the nonaccusative cases, in contrast to the nonnominative ([GOV +]), nongenitive ([GEN −]) and nondative ([DAT −]) cases.

2.3 Determiner and Adjective Paradigms

The forms of the definite article DAS and the pronominal forms of ALT 'old' are given in (8).

(8) a.

	SING			PLU
	MASC	NEUT	FEM	
NOM	der	das	die	die
ACC	den	das	die	die
GEN	des	des	der	der
DAT	dem	dem	der	den

b.

	SING			PLU
	MASC	NEUT	FEM	
NOM	alter	altes	alte	alte
ACC	alten	altes	alte	alte
GEN	alten	alten	alter	alter
DAT	altem	altem	alter	alten

The six distinct forms in the fifteen cells in (8a) and (8b) can be assigned to anywhere between six and fifteen entries. The present account recognises the ten forms of the definite article in (9), corresponding to the ten *Kongruenzklassen* proposed in Vater (1979:35), and adopted in the *Duden* (Drowdowski (1995:307)). The absence of unshaded values in the entry of the unmarked form *das* in (9) indicates that *das* is literally unspecified, as in Wunderlich 1997. As in noun paradigms, the values inferred on the realisation of *das* ultimately reflect the opposition of marked opponents.

The [OBL −] value presents a slightly indirect deduction. Given the case analysis in (7), this value is implied by the negative [GEN] and [DAT] values inferred on *das* in (9).

(9)

PHON	*das*	*des*	*dem*	*der*	*den*	*die*	*der*	*die*	*der*	*den*
MASC	–			+	+					
FEM	–	–	–	–	–	+	+			
PLU	–	–	–	–	–	–	–	+	+	+
OBL	–	+	+	–	–	–	+	–	+	+
GOV		+	+	–	+		+		+	+
GEN	–	+	–							–
DAT	–	–	+						–	+

[2]Feature decompositions of nominative-accusative systems often introduce a feature which, like Jakobson's 'directional' or 'ascriptive' feature, cross-classifies direct and oblique cases. The analyses in Bierwisch 1967, Williams 1981 and Bayer and Johnson 1995 illustrate this strategy. However, since this additional structure is not motivated by any systematic neutralisation of direct and oblique cases in German, it is not incorporated in (7). Isolated dative/accusative forms, such as 1pl *uns* and 2pl *euch*, can be characterised as [GOV +, GEN −].

The paradigm corresponding to (8b) is given in (10). This paradigm differs from the definite article paradigm in (9) in containing an oblique form in *-n* rather than a genitive in *-s*.

(10)

PHON	*altes*	*alten*	*altem*	*alter*	*alten*	*alte*	*alter*	*alte*	*alter*	*alten*
MASC	−			+	+					
FEM	−	−	−	−	−	+	+			
PLU	−	−	−	−	−	−	−	+	+	+
OBL	−	+	+	−	−	−	+	−	+	+
GOV		+	+	−	+		+		+	+
DAT		−	+						−	+

However, the realisations of the entries for *kein* in (11) provide an instructive contrast.

(11)

	SING			PLU
	MASC	NEUT	FEM	
NOM	kein	kein	keine	keine
ACC	keinen	kein	keine	keine
GEN	keines	keines	keiner	keiner
DAT	keinem	keinem	keiner	keinen

While the entries for *das*, *altes* and *kein* are all unspecified for gender, the realisations of *das* and *altes* are unambigously nonmasculine, reflecting the opposition of masculine *der* and *alter*. Yet the negative article paradigm in (8b) is minimally less differentiated than either (8a) or (11), as it lacks a distinctive masculine nominative form in *-er*. Thus whereas masculine *der* and *alter* determine a [MASC −] value on *das* and *altes* in (9) and (10), the sole masculine opponent of *kein* in (12) is *keinen*, which is also accusative. Hence the opposition of *keinen* in (12) determines two realisations of *kein*. One is nonmasculine, whereas the other is nongoverned. The features shared by these realisations are attributable to the opposition of other marked entries in (12).

(12)

PHON	*kein*		*keines*	*keinem*	*keinen*	*keine*	*keiner*	*keine*	*keiner*	*keinen*
MASC		−			+					
FEM	−	−	−	−	−	+	+			
PLU	−	−	−	−	−	−	−	+	+	+
OBL	−	−	+	+	−	−	+	−	+	+
GOV	−		+	+	+		+		+	+
GEN	−	−	+	−						−
DAT	−	−	−	+					−	+

2.4 Morphosyntactic Representations

The realisations in (9) and (12) bring out the important point that only negative values are inferred in the mapping from entries to their syntagmatic realisations. This asymmetry is attributable to a general requirement that all marked values must be present in lexical entries, as in models of Radical Underspecification (Archangeli 1988) or Minimalist Morphology (Wunderlich 1995:95).

This requirement will allow the blocking condition in (2) to infer negative values, but not positive values, in the mapping from entries to structures. To clarify the application of (2), let us combine the description-based perspective of LFG (Kaplan and Bresnan 1982) and HPSG (Pollard and Sag

1994) with a traditional conception of entries and structures. Adapting Anderson 1992 and Aronoff 1994, lexical entries may be represented as pairs (ϕ, F), where ϕ is a phonological form (rendered orthographically) and F is a set of grammatical constraints. Structures are 'bundles' of feature-value pairs that satisfy these constraints, corresponding to the morphosyntactic representations (MSRs) of Anderson 1992. Individual feature bundles are represented as attribute-value matrices, while entire paradigms are concisely represented by matrices like (9) and (12).[3]

Minimally structured MSRs abstract away from inessential variation in feature geometry and determine correspondingly simple notions of 'wellformedness', 'relative informativeness' and 'compatibility'.[4] The principal wellformedness condition on an MSR is the requirement that each feature must be assigned a unique value. Underspecification also determines a relative specificity relation between MSRs. Following GPSG accounts, the marked value '+' and the unmarked value '−' are designated as *boolean* values. Then (13) defines a simple *subsumption* relation for MSRs.

(13) MORPHOSYNTACTIC SUBSUMPTION

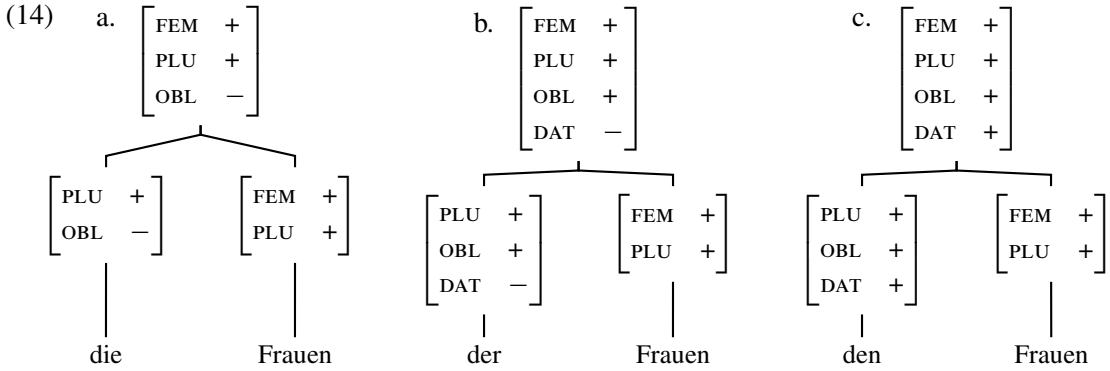
i. A boolean value subsumes only an identical boolean value.

ii. An MSR Q subsumes R iff the value of each feature in Q subsumes its value in R.

The base clause in (13i) imposes an identity requirement on boolean values. The recursive clause in (13ii) then extends subsumption relations to MSRs. Extension is the dual of subsumption: an MSR R *extends* Q iff Q subsumes R. The compatibility relation relevant for simple feature bundles then corresponds to the notion of 'nondistinctness' in Chomsky 1965. A pair of MSRs Q and R are compatible if they do not assign conflicting values to the same feature, or, to put the same thing more constructively, if there is an MSR that extends both Q and R. Compatibility relations that use subsumption relations to 'pool' features on a mother may thus express the same consistency requirement as a simple version of unification. However, unlike standard unification operations, a subsumption relation does not alter its inputs and thereby avoids the 'side effects' which, as Ingria 1990 has shown, limit the usefulness of symmetrically destructive operations.

The interaction of underspecification, blocking and subsumption is illustrated in (14).

(14)



Each of the article structures in (14) represents a plural realisation from (9). Whereas *die* and *der* bear negative features determined by the blocking condition, the features of *den* and *Frauen* are unaffected. The concord constraint in (15) then associates a unique feature analysis with each of the NPs in (14) by pooling the inflectional features of each article with those of *Frauen*.

(15) CONCORD

The inflectional features of a NP extend the inflectional features of its daughters.

[3] Nominal paradigms can also be represented as trees, as in Blevins 1995 or Wunderlich 1997, though there is not always a clear basis for determining the branching structure of determiner and adjective paradigms.

[4] More general formalisations of these notions are proposed in the feature-based approaches in Shieber 1986.

The analyses of *die* and *der* show how oppositions within an inflectional paradigm 'resolve' underspecification in the mapping from lexical representations to syntagmatic analyses. Although the realisation of an entry may remain partially underspecified, the complementary distribution of inflectional features within the declensional system of German largely ensures that underspecification is resolved locally in a syntagmatic context. In the present case, each of the noun phrases is specified for number, gender and case, though none of its daughters is specified for each feature.

As in Andrews 1982, 1990 , and Blevins 1995, the principle in (2) regulates the competition between inflected forms of a lexeme by constraining the mapping from entries to structures. Inflectional blocking relations thus determine the wellformedness of the structures that *realise* an entry in a syntagmatic context. Whereas most previous proposals impose wellformedness conditions on full syntactic analyses containing underspecified structures, (2) directly constrains the preterminals sanctioned by an underspecified entry. Consequently (2) is intrinsically lexical, and, in particular, does not interact with constraints that regulate subcategorisation, concord, or other 'external' valence demands. The effects of blocking can therefore be 'cached out' in advance, as shown by the paradigms that represent entries and realisations in §2.1–§2.3.

3 German Noun Paradigms

This section now presents a more comprehensive description of the German declensional system, beginning with noun declensions. Plural formations are the principal locus of allomorphy within this system. However, there is compelling cross-disciplinary evidence that this variation largely reflects *stem* rather than *affixal* allomorphy. In particular, a range of recent linguistic and psycholinguistic studies suggest that plurals in *-s* are the only productive inflectional forms.[5]

The rule that defines plurals in *-s* applies to the the class of 'untypical' nouns (Marcus *et al.* 1995, Wunderlich 1999), including modern loans, names, acronyms and conversions, and defined plurals such as *Autos* 'cars', *LKWs* 'trucks' and *wenns* 'ifs'. Although some studies treat all other plural forms as stored, there is suggestive evidence that weak feminine plurals in *-n* are productive derivational formations. Wunderlich 1999 notes that not all feminine plurals in *-n* can be stored, given that deverbal feminine nouns in *-ung* and deadjectival feminine nouns in *heit*/*keit* have plurals in *-n*. Moreover, Penke and Krause 1999 present evidence that aphasics distinguish feminine plurals in *-n* from strong plural formations, which are stored as stem entries.

The derivational character of weak feminine plurals in *-n* is reflected in the fact that they, unlike inflectional plurals in *-s*, may occur in compounds and other derived formations. Thus a form like *Frauen* 'women' may occur in compounds like *Frauen+zeitschrift* 'womens' magazine' or *Frauen+chor* 'female choir'. Despite the fact that [*s*] may occur within compounds in German, "[c]ompounds such as **Auto+s+versicherung* 'car insurance' or **LKW+s+gebühr* 'truck fee' do not exist" (Wiese 1996:146). The conventional view that derivation feeds inflection accounts for this contrast, if plurals in *-s* are inflectional, while plurals in *-n* are derivational formations.[6]

3.1 Feminine Nouns

The general declensional classes recognised in standard references such as the *Duden* (Drowdowski (1995:233-234)) are conventionally defined with reference to plural and genitive singular

[5] See, e.g., Köpcke 1988, Clahsen *et al.* 1992, 1997, Clahsen (to appear), Marcus *et al.* 1995 and Penke 1998.

[6] This distinction between inflection and derivation corresponds closely to the proposal of Wiese (1996:139), which classifies plurals in *-s* as level 3 formations, and plurals in *-n* as level 2 formations.

forms. The paradigms in (16) exemplify the feminine classes in the *Duden*, and a feminine example of a nativised latinate paradigm discussed in Wurzel 1989 and Carstairs 1987.[7]

(16)

CLASS	VII	VIII	IX	X	XIII
SINGULAR					
NOM	Hand	Mutter	Frau	Oma	Firma
ACC	Hand	Mutter	Frau	Oma	Firma
DAT	Hand	Mutter	Frau	Oma	Firma
GEN	Hand	Mutter	Frau	Oma	Firma
PLURAL					
NOM	Hände	Mütter	Frauen	Omas	Firmen
ACC	Hände	Mütter	Frauen	Omas	Firmen
GEN	Hände	Mütter	Frauen	Omas	Firmen
DAT	Händen	Müttern	Frauen	Omas	Firmen
GLOSS	'hand'	'mother'	'woman'	'granny'	'firm'

The paradigms in (16) exhibit considerable formal overlap of the sort traditionally termed *syncretism*. Much of this overlap reflects overarticulated descriptions that associate forms with combinations of features, without regard to whether each combination is *distinctive* in a paradigm. A more faithful representation of the distinctive oppositions within these paradigms is thus obtained in (17) by collapsing syncretic entries that neutralise one or more distinctive feature.

(17)

CLASS	VII	VIII	IX	X	XIII
SINGULAR					
NOM ACC DAT GEN	Hand	Mutter	Frau	Oma	Firma
PLURAL					
NOM ACC GEN	Hände	Mütter	Frauen	Omas	Firmen
DAT	Händen	Müttern			

The consolidation in (17) eliminates all syncretism from the paradigms in (16) and highlights two general properties. First, no singular feminine noun declines for case. Second, dative plural forms are restricted to strong nouns whose plurals end in schwa, *-l* or *-r* (or, alternatively, which do not end in *-n* or *-s*). These generalisations are incorporated in the paradigms below.

The paradigms in (17) instantiate just two declensional patterns. Class VIII nouns (comprising the lexemes MUTTER and TOCHTER) pattern with class VII noun HAND in (3). The underspecified paradigm in (18a) thus specifies the same features as (3b). For concision, such entries are again represented, along with their realisations, in consolidated matrices like (18b).

[7] Classes I–X follow the *Duden* classification. Class XI is assigned to the *Sonderfall* NAME, and XII and XIII to classes XIV and XV in Carstairs (1987:235). Further correspondences to Carstairs' classes are discussed below.

(18) a.

PHON	*Mutter*	*Mütter*	*Müttern*
FEM	+	+	+
PLU		+	+
DAT			+

b.

PHON	*Mutter*	*Mütter*	*Müttern*
FEM	+	+	+
PLU	−	+	+
DAT		−	+

Following Wurzel 1970, Carstairs 1987, Wiese 1996 and Neef 1998 among others, plurals with no suffixal exponent like *Mütter* are treated as variants of plurals in schwa (orthographic *-e*) like *Hände*. It does not matter for present purposes whether the final schwa is assumed to be deleted from *Müttere* in accordance with a morphotactic constraint, or added to *Händ* to satisfy a prosodic requirement, since this alternation is in any case effectively frozen in the German lexicon.

The class X and XIII nouns FIRMA and OMA likewise exhibit the same paradigm structure as the class IX noun FRAU in (1b). These paradigms are distinguished solely by their plural exponents. Plural *Frauen* is formed by affixing the putatively productive derivational suffix *-en* to the basic stem *Frau*. The stored plural *Firmen* of the nativised loan FIRMA differs in that it does not preserve the final stem vowel of the basic stem *Firma*. Plural *Omas* illustrates the productive inflectional plural formation that applies to hypocoristics, acronyms, loans, nonce words and proper names. The syntagmatic realisations of these entries are again displayed in (19).

(19) a.

PHON	*Firma*	*Firmen*
FEM	+	+
PLU	−	+

b.

PHON	*Oma*	*Omas*
FEM	+	+
PLU	−	+

The absence of a distinctive dative plural form of class IX and X and XIII nouns is often attributed to the simplification of unsyllabifiable /nn/ or /sn/ sequences (Pullum and Zwicky (1986:765), Carstairs (1987:251), Bittner (1994:68)). While this is presumably the correct diachronic analysis of the contrast between (18) and (19), this simplification can be 'anticipated' by specifying a conditioning environment for the dative plural rule or by barring string-vacuous inflectional rule application. The present account is compatible with either alternative, as a dative plural will be effectively 'shadowed' by the morphologically nondistinct plural entries in the paradigms in (19). We may thus assume the more concise alternative and exclude nondistinctive dative plurals.

3.2 Nonfeminine Nouns

Consider next the matrix in (20), which gives the masculine declensions listed in the *Duden*.

(20)

CLASS	I	II	III	IV	V	VI	XI
SINGULAR							
NOM	Tag	Apfel	Dorn	Mann	Opa	Dozent	Name
ACC	Tag	Apfel	Dorn	Mann	Opa	Dozenten	Namen
DAT	Tage	Apfel	Dorne	Manne	Opa	Dozenten	Namen
GEN	Tages	Apfels	Dornes	Mannes	Opas	Dozenten	Namens
PLURAL							
NOM	Tage	Äpfel	Dornen	Männer	Opas	Dozenten	Namen
ACC	Tage	Äpfel	Dornen	Männer	Opas	Dozenten	Namen
GEN	Tage	Äpfel	Dornen	Männer	Opas	Dozenten	Namen
DAT	Tagen	Äpfeln	Dornen	Männern	Opas	Dozenten	Namen
GLOSS	'day'	'apple'	'thorn'	'man'	'grampa'	'lecturer'	'name'

The matrix in (21) lists neuter counterparts of all but the sixth class in (20), along with a neuter representative of another latinate paradigm discussed in Wurzel 1989 and Carstairs 1987.

(21)

CLASS	I	II	III	IV	V	XI	XII
SINGULAR							
NOM	Jahr	Muster	Auge	Bild	Auto	Herz	Museum
ACC	Jahr	Muster	Auge	Bild	Auto	Herz	Museum
DAT	Jahre	Muster	Auge	Bilde	Auto	Herzen	Museum
GEN	Jahres	Musters	Auges	Bildes	Autos	Herzens	Museums
PLURAL							
NOM	Jahre	Muster	Augen	Bilder	Autos	Herzen	Museen
ACC	Jahre	Muster	Augen	Bilder	Autos	Herzen	Museen
GEN	Jahre	Muster	Augen	Bilder	Autos	Herzen	Museen
DAT	Jahren	Mustern	Augen	Bildern	Autos	Herzen	Museen
GLOSS	‘year’	‘pattern’	‘eye’	‘man’	‘owl’	‘heart’	‘museum’

Collapsing forms that neutralise one or more features in (20) and (21) yields (22) and (23).

The paradigms in (22) and (23) reinforce the association between dative plural and strong declensions, and identify genitive as the marked singular case for strong nonfeminine declensions. The remaining syncretism in (22) and (23) holds between singular and unumlauted plurals in class II, genitives and plurals in class V, and nonnominative singular forms of class VI and XI nouns.

(22)

GENDER	MASCULINE						
CLASS	I	II	III	IV	V	VI	XI
SINGULAR							
NOM	Tag	Apfel	Dorn	Mann	Opa	Dozent	Name
ACC						Dozenten	Namen
DAT							
GEN	Tages	Apfels	Dornes	Mannes	Opas		Namens
PLURAL							
NOM	Tage	Äpfel	Dornen	Männer	Opas	Dozenten	Namen
ACC							
GEN							
DAT	Tagen	Äpfeln		Männern			

(23)

GENDER	NEUTER						
CLASS	I	II	III	IV	V	XI	XII
SINGULAR							
NOM	Jahr	Muster	Auge	Bild	Auto	Herz	Museum
ACC							
DAT						Herzen	
GEN	Jahres	Musters	Auges	Bildes	Autos	Herzens	Museums
PLURAL							
NOM	Jahre	Muster	Augen	Bilder	Autos	Herzen	Museen
ACC							
GEN							
DAT	Jahren	Mustern		Bildern			

Strong nonfeminine plurals in schwa show additional stem allomorphy. Whereas umlaut (where phonologically possible) is a predictable feature of strong feminine plurals, the corresponding nonfeminine plurals fall into the declensional subclasses I and II. This variation is again appropriately assigned to the stored plural stems of strong nouns, given that the lack of umlaut in plurals like *Tage* in (22) does not carry over to other derivational formations like *täglich* 'daily'.

The paradigms of the class I noun TAG and class II noun *Fall* 'case' in (24) are thus congruent. The underspecified entries in (24) accordingly determine the same realisations. The realisations of unmarked *Tag* and *Fall* complement their genitive and plural opponents, while the realisations of plural *Tage* and *Fälle* complement their dative plural opponents.

(24) a.

PHON	*Tag*	*Tages*	*Tage*	*Tagen*
MASC	+	+	+	+
PLU	–	–	+	+
GEN	–	+		–
DAT			–	+

b.

PHON	*Fall*	*Falles*	*Fälle*	*Fällen*
MASC	+	+	+	+
PLU	–	–	+	+
GEN	–	+		–
DAT			–	+

Class IV nouns like MANN in (4) differ from class I and II nouns — and pattern with strong feminine nouns — essentially in that they undergo umlaut wherever phonologically possible. Class I and II nouns with no suffixal exponent are again morphotactically conditioned variants. The minimal realisations of class II nouns like *Äpfel* in (25a) are thus congruent to those in (24).

However, the paradigm in (25b) presents a new pattern. The unacceptability of an inflectional plural form in *-s* would appear to implicate the existence of a stored plural entry which, due to the lack of umlaut or final schwa, preserves the basic stem form in (25b).

(25) a.

PHON	*Apfel*	*Apfels*	*Äpfel*	*Äpfeln*
FEM	–	–	–	–
MASC	+	+	+	+
PLU	–	–	+	+
GEN	–	+		
DAT			–	+

b.

PHON	*Onkel*	*Onkels*	*Onkel*	*Onkeln*
FEM	–	–	–	–
MASC	+	+	+	+
PLU	–	–	+	+
GEN	–	+		
DAT			–	+

So-called 'mixed' class III nouns like DORN in (26a), combine productively formed genitive singular in *-s* with a weak plural form in *-n*. The realisations of DORN are given in (26a). Class V nouns like OPA in (26b) combine a genitive in *-s* with a plural in *-s*.

(26) a.

PHON	*Dorn*	*Dornes*	*Dornen*
FEM	–	–	–
MASC	+	+	+
PLU	–	–	+
GEN	–	+	

b.

PHON	*Opa*	*Opas*	*Opas*
FEM	–	–	–
MASC	+	+	+
PLU	–	–	+
GEN	–	+	

The paradigms of class XI nouns like NAME can likewise be described as an extension of the paradigm for DOZENT, if following Wurzel 1970 and Carstairs 1987, final *n* in forms like *Namen* is classified as part of the stem. However, there appears to no clear consensus regarding class XI. Carstairs 1987 notes that grammatical descriptions vary considerably in which nouns they assign to this class. The current *Duden* also assimilates class XI nouns to nouns like WAGEN in (27).

> Doppelformen in Nominativ Singular weisen die [class XI, JPB] maskulinen Substantive auf, die den Genitiv Singular mit *-[n]s* und alle übrigen Kasus mit *-(e)n* bilden. Die älteren Bildungen ohne *-n* im Nominativ Singular gehören heute meist der gehobenen Sprache an, nur bei einigen ist die Form mit *-n* weniger gebräuchlich. [Drowdowski (1995:224)]

Assigning NAME and WAGEN the congruent paradigms in (27) is broadly consistent with the analysis of Carstairs 1987, who assigns NAME and WAGEN to the same general macroparadigm.

(27) a.

PHON	*Wagen*	*Wagen*	*Wagens*
MASC	+	+	+
PLU	−	−	+
GEN	−	+	

b.

PHON	*Name*	*Namen*	*Namens*
MASC	+	+	+
PLU	−	−	+
GEN	−	+	

Nevertheless, as pointed out by a reviewer, some individual class XI nouns, notably NAME and HASE 'hare', maintain the distinctions in (22). Psycholinguistic or corpus-based studies might thus, as the reviewer also suggests, help to determine the synchronic status of these patterns.

To conclude this discussion, (28) summarises the analysis assigned to the *Duden* classes.

(28)

PLURAL EXPONENT	FEM −					FEM +	
	MASC +			MASC −			
-e	Tag	Onkel	Name	Jahr	Muster		
	Tage	Onkel	Namen	Jahre	Muster		
-¨e	Fall	Apfel		Floß	Kloster	Hand	Mutter
	Fälle	Äpfel		Flösse	Klöster	Hände	Mütter
-¨er	Mann			Buch			
	Männer			Bücher			
-s	Opa			Auto		Oma	
	Opas			Autos		Omas	
-en	Dorn			Auge			
	Dornen			Augen			
	Dozent					Frau	
	Dozenten					Frauen	

If, following Carstairs 1987, we generalise over classes that are distinguished by stem allomorphy or by differences that are conditioned by inherent gender, we can group the forms in (28) into five declensional classes. There are four 'strong' classes, with plurals in *-e*, *-er*, *-s* and *-n*, and one 'weak' class with plurals in *-n* (recall that plurals with no exponent are morphotactically conditioned variants of plurals in *-e*). The number of general declension classes in (28) is thus close to the limit set by the Paradigm Economy Principle (PEP) of Carstairs 1983. This principle states in effect that the number of declensions in a language is bounded by the number of distinct affixal patterns realised by the most highly differentiated form. This index form is the plural form which we used to define the classes in (28). Since there are four distinct affixal patterns (*-e*, *-er*, *-s* and *-n*), the five classes recognised in (28) exceed by one the quota established by the PEP.

One means of reconciling (28) with the demands of the PEP would be to follow Wurzel 1970 in treating 'mixed' class III nouns like DORN and weak class VI nouns like DOZENT as inanimate and animate subclasses of a single declensional class. This proposal would also account for the lack of neuter counterparts of masculine class VII nouns, since neuters are canonically inanimate.

However, as Carstairs (1987:244) notes, the close correlation between class and animacy is not exceptionless, as class VI contains, e.g., a few inanimate nouns like DIAMANT 'diamond'.

4 Conclusions

This section concludes by contrasting the present approach with some alternatives.

The account outlined above is broadly lexicalist in character, and thus compatible with different lexicalist approaches to morphology, such as Minimalist Morphology (Wunderlich 1995) or extended word and paradigm approaches (Anderson 1992). The use of a blocking principle to infer features on syntagmatic structures is also preserves the lexicalist orientation of constraint-based approaches to syntax. The values supplied in the mapping from entries to structures subsume the effects of a morphological blocking condition. Yet the locality of these alternatives differs. Blocking conditions of the sort proposed in Andrews 1982, 1990 and Blevins 1995 apply to a complete syntactic analysis *R* after "all unifications have been carried out" (Andrews (1990:519)).

In contrast, the realisations of an underspecified entry can be determined from the marked features of its paradigmatic opponents and 'cached', if desired, in an extended lexicon. The requirement that each realisation of a given entry must bear features that conflict with more specific entries in its paradigm ensures that the realisations of an underspecified entry cannot 'encroach' on the syntagmatic territory of more specific entries. The features that determine this conflict will interact monotonically with the other features in a syntactic representation, thereby delegating 'blocking' to the general mechanisms that regulate feature compatibility.

It must be acknowledged that the use of underspecification to collapse syncretic forms leaves considerable formal overlap in determiner and adjective paradigms. An underspecified description must recognise multiple entries for *die* and *der* in (9), *alte* and *alter* in (10) and *keine* and *keiner* in (12). This residual syncretism may reflect the fact that number is seldom neutralised in the declensional paradigms of German. However, it may also point to a intrinsic limitation of underspecification or to a deficiency in the use of underspecification in the current approach.

4.1 Readjustment and Impoverishment

It may be useful in this connection to contrast the family of proposals that employ some version of readjustment rule (Halle 1990, Halle and Marantz 1993) or impoverishment rule (Bonet 1991, Noyer 1992, Noyer 1998) to neutralise nondistinctive features in a syntactic context. These proposals raise a number of general issues deriving from their radically nonmonotonic view of syntactic combination, their reliance on abstract morphemes (Pullum and Zwicky 1991, Anderson 1992), and, in the case of readjustments, their imputation of directionality (Aronoff 1994).

However, it is the flow of information in these rules and the environments that condition their application that are of principal relevance in the present context. Rules that delete features in a syntactic representation effectively invert the process of syntagmatic realisation proposed above, as fully specified entries ultimately license underspecified syntagmatic analyses. The conditioning environments of these rules are also complementary, as they may refer to syntagmatic structure, but not — in the absence of some notion of lexical paradigm — to a paradigmatic context.

Whatever the utility of these assumptions in other domains, they provide no insight into any of the problems addressed above. There are no empirical grounds for assuming that a form like *das*, which neutralises nominative and accusative, is specified for either case at any level of analysis. As Ingria 1990 argues, coordinate structures, free relative clauses, and other environments that impose conflicting compatibility demands clearly show the neutrality of forms like *Frauen* 'woman' or *was*, the relative counterpart of *das*. The patterns summarised by Ingria could perhaps be described

by invoking readjustment or impoverishment rules in the nonnatural class of diagnostic contexts, though the claim that entries are fully specified would be largely deprived of empirical content.

The syntagmatic interpretation of readjustment rules is independently problematic, as Aronoff (1994:82) observes. However, even assuming a syntactic interpretation for such rules, they are evidently the wrong sort of device for describing the paradigmatic oppositions that determine the interpretation — and, derivatively, the distribution — of unmarked and underspecified forms in German. Thus the contrast between the wellformed dative plural *den Frauen* and the illformed dative plural **den Männer* can be attributed to the fact that *Männer* but not *Frauen* is opposed by a marked dative plural. Realisation or impoverishment rules must be sensitive to this difference in paradigm structure in order to neutralise case features on *Frauen* but not *Männer*.

4.2 Referral and Resolution

Whereas readjustment and impoverishment rules represent syntagmatic alternatives to the paradigmatic analysis presented above, referral rules of the sort proposed in Zwicky 1985 and Stump 1993 can be viewed as complementary devices for capturing systematic inflectional homophony.

Stump clearly articulates this division of labour between rules of exponence and rules of referral:

> certain instances of syncretism are best accounted for by rules of exponence rather than rules of referral. In particular, when the members of a set of syncretized forms constitute a coherent morphosyntactic class . . . one needn't resort to rules of referral to account for their syncretism. [Stump (1993:451)]

In the present context, rules of exponence (or 'realisation rules') define underspecified lexical entries. Referral rules then determine the formal identity of distinct entries that cannot be combined into a single neutral entry. The systematic syncretism between masculine accusative singulars such as *den*, *alten* and *keinen* and the homophonous dative plurals provides a clear illustration. On this view, entries are identified via underspecification, while forms are identified by referrals.[8]

[8] As a reviewer notes, it is not clear that advocates of referral rules would necessarily treat these cases as referrals. Mpreover, this hybrid conception is plainly incompatible with analyses like those of Cahill and Gazdar 1997, 1999 , which describes the declensional system of German in terms of a system of cascaded referral rules.

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