Prolegomena to a typology of morphological features[*]
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1 Introduction

Morphosyntactic features characterize variations in morphological form which are correlated with different syntactic contexts. Morphological features, on the other hand, characterize variations in form which are independent of syntactic context. It is easy to imagine a language in which every morphosyntactic value had a unique realization. We might consider such a system of inflectional morphology to be canonical. Such a system would have no need for morphological features. The fact that we find so many instances that deviate from this canonical situation (allomorphy and syncretism), means that additional machinery is required. It is to meet this need that various sorts of morphological features have been proposed. For example, we may find items of the same class which realize just the same morphosyntactic values but with rather different phonological material. On this basis we recognise different inflectional classes.

If we need to accept such inflectional classes, we do not expect to find rules of the type:

*verbs which conjugate according to inflectional class II take a preceding direct object; others take a following direct object

This intuition is made explicit in the principle of 'morphology-free syntax' (Zwicky 1996: 301). We explore this widely held principle in a case study (§2). A consequence of the principle is that we must distinguish features concerned with purely morphological phenomena (such as inflectional class) from morphosyntactic features (§3). Since morphological features have been often assumed but little studied, we offer an outline typology (§4). We then consider how morphological features may be distinguished (§5), and review the case for distinguishing them as a separate type of feature (§6). It is worth stating here, in advance of the conclusion, that there have been various attempts to avoid the use of morphological features. Those which have relied instead on phonology have proved unsuccessful. More recent attempts have been vague suggestions, lacking a

working version which can be assessed. Whatever the outcome of these suggestions, the phenomena modelled using morphological features have to be addressed in any serious theory of inflectional morphology. A key point is that we find cross-cutting subregularities (as with inflectional classes and prosodic classes which do not coincide). The speaker's knowledge of these subregularities, as shown for instance in the assignment of new items, has to be modelled in some way, whether through the use of morphological features, or through some equivalent notion.

2 Illustrative case study

It has been claimed that in Serbian/Croatian/Bosnian, gender resolution can operate in part according to the inflectional class (rather than the gender) of the nouns heading the conjuncts (Gudkov 1965: 174). It is worth reviewing this example since the data are interesting and fairly convincing, the claim made was reasonable and was repeated in different places in the literature, so that there is the initial sense that the analysis is reasonable and yet it cannot be right.

Serbian/Croatian/Bosnian has four major inflectional classes for nouns, each comprising at least a few thousand nouns. They cover seven cases and two numbers, though with numerous syncretisms (see Browne 1993: 319-323).[1] There are three genders: masculine, feminine and neuter. Assignment is first by the semantic criterion, namely that for sex-differentiables, males are masculine (*muž* 'husband' and *sluga* 'manservant) and females are feminine (*žena* 'woman, wife' and *mati* 'mother'). For the huge majority of the residue, nouns belonging to the same inflectional class as *prozor* 'window' are masculine; those in two classes, the *duša* 'soul' type and the *kost* 'bone' type, are feminine, and those of the *jezero* 'lake' type are neuter. From an analytical perspective, the gender of the nouns is determined by the agreements they take (thus *duša* 'soul' and *kost* 'bone' take the same forms of agreement targets). Conversely, the requirement to establish the gender of the nouns is in order to set up adequate rules of syntax.

The particular issue of interest is gender resolution. When noun phrases are conjoined, the basic rules are:[2]
1. if all conjuncts are feminine, the resolved form is feminine;
2. in all other instances the resolved form is masculine.

Thus the masculine is used if we have feminine conjoined with neuter, or even for neuter conjoined with neuter. Examination of texts and work with consultants has produced large numbers of instances confirming the rules as stated above. However, Gudkov

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[1] These inflectional classes are similar in overall outline to those of Russian to be discussed in §4.1.1 below.

[2] Subsequent research showed that the picture is actually more complex (see references at the end of §2), but these rules are an appropriate context for the original analysis to be discussed. Similar rules are found in the most closely related language, namely Slovene (Lenček 1972).

(1965) found examples of masculine being used as the resolved form, even though all the conjuncts were headed by feminine nouns. His examples were mainly of this type:

(1)   Vređa-l-i   su   ga   nebrig-a   i
        Offend-PST-PL.M   AUX.3PL   3SG.ACC   carelessness(F)-SG   and
                lakomislenost   Tahir-beg-ov-a.
                capriciousness(F)[SG]   Tahir-beg-POSS-F.SG
        'Tahir-beg's carelessness and capriciousness offended him.'
                        (Andrić, *Travnička Hronika;* cited in Corbett 1991: 301)

Both conjuncts are headed by nouns which are feminine, yet there is masculine agreement. However, one of them (*lakomislenost* 'capriciousness') is of the smaller inflectional class of feminines, the *kost* 'bone' type, and according to Gudkov it is this which allowed for masculine agreement (we also find many similar examples with feminine agreement, as we would have expected). In (1) the inflectional types are mixed. Gudkov also found an example, with just nouns of the *kost* 'bone' type, again with masculine agreement (and we have found further such examples). Gudkov suggested that if all the conjuncts are feminine, and they include one headed by a noun of the *kost* 'bone' type, then masculine agreement is possible. Such a finding is somewhat unsettling, since it implies that a syntactic rule can refer to the inflectional class of items. Rather than referring to the nouns' gender, as a normal agreement rule should, we have an alleged case of a rule referring to inflectional class.

Gudkov himself added another piece to the jigsaw. In a later paper (Gudkov 1974: 61) he pointed out that even if all conjuncts are headed by nouns of the *-a* declension (the *duša* 'soul' type), there are occasional instances of masculine agreement:

(2)   štul-a   i   štak-a   bi-l-i   su   sve   što
        wooden.leg(F)-SG and crutch(F)-SG be.PST-PL.M AUX.3PL all   that
                je   tadašnja   medicina   mogla da mu   pruži.
                AUX.3SG   of.that.time medicine   could   that 3SG.DAT offer
        'A wooden leg and a crutch were all that medical science of that time could offer
        him.'   (M. Popović*, Vuk St. Karađić*)

Such examples are rare, but they occur, as this example of ours also shows:
 (3)   Žustrin-a   sa   koj-om   je   pisao   i   lakoć-a
        Speed(F)-SG   with   which-F.SG.INS   AUX.3SG   write-PST.3SG.M and ease(F)-SG
                sa   koj-om   je   nalazi-o   reč-i   i
                with   which-F.SG.INS   AUX.3SG   find-PST.3SG.M   word-PL and
                poređenj-a   zagreja-l-i   su   ga,   i
                comparison-PL warmed-PST-M.PL AUX.3PL 3SG.M.ACC   and
                konzul oseti   nešto   kao   olakšanje.
                consul   feel[AOR.3SG] something like   relief
        'The speed with which he wrote and the ease with which he found words and
        comparisons encouraged him, and the consul felt a kind of relief.'
                                                        (Andrić, *Travnička Hronika)*

The next important piece of evidence is that in all the examples with feminine conjuncts but masculine agreement, the noun phrases denote inanimates. None of the examples we have found, in texts or in the literature on the topic, have masculine agreement with feminine nouns denoting persons. Thus the condition is a semantic one: if all conjuncts refer to females, the feminine must be used; if not, both masculine and feminine agreement are possible if all conjuncts are headed by feminine nouns.

We are still not clear of the problem of morphology intruding into syntax. We must still consider why the majority of examples with feminine conjuncts and masculine agreements involve a noun of the *kost* 'bone' type. A solution was offered in Corbett (1991: 302-303). The inflectional class of noun inflecting like *kost* 'bone' includes a substantial number of abstract nouns, and very few animates. In real examples of conjoined noun phrases the vast majority have conjuncts which are consistent in semantic terms: they are all animate or all inanimate. Putting these two points together, it follows that when a feminine noun of the *kost* 'bone' type is one of the conjuncts then other conjuncts will normally be inanimate too. For such situations the use of the feminine agreement form will have no semantic justification (unlike its use with animate conjuncts which denote females). It appears that the gender resolution rules of Serbian/Croatian/Bosnian are increasingly determined by semantic considerations. For further discussion of resolution in Serbian/Croatian/Bosnian see Leko (1986: 220-243), Wechsler and Zlatić (2003: 171-195) and Corbett (2006: 262). Thus what is relevant is the semantic distribution of the nouns over the inflectional classes. There is no need for a syntactic rule to refer to the inflectional class of the nouns. [3] And for most readers that will come as a relief. [4]

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[3] For more discussion of this particular distinction, namely morphosyntactic gender versus morphological inflectional class, see Aronoff (1994: 61-87).

[4] Booij (2005) discusses some problematic instances from Dutch where a particular syntactic construction appears to select for a particular form. One example involves a family of constructions which appear to select not simply the plural, but particular plural morphology. Dutch has two plural noun endings, -s and -en, whose distribution is phonologically determined (nouns with final stress take -en, otherwise -s). Plural numerals are also found, with the same plural allomorphy, e.g. *drie-en* 'threes', *zeven-s* 'sevens'. Now, there are certain constructions involving numerals which require that the numeral end in -en, e.g. *wij drie-en* 'we three'. This would be problematic for the notion of morphology-free syntax were it the case that only numerals with an -en plural could participate in these constructions, since the only criterion for inclusion would be a morphological one. However, even numerals which normally have an -s plural have an -en form available for use in these constructions, e.g. *wij zeven-en* 'we seven'. The -s form and -en form are used in mutually exclusive syntactic contexts; that is, they are morphosyntactically distinct, which we might express by the labels 'plural 1' and 'plural 2'. (Or in Booij's terms, they participate in distinct constructional idioms.) In that case, syntax is kept morphology free: 'plural 1' is realized by the phonologically conditioned allomorphs -en and -s, 'plural 2' is realized by -en; all numerals can freely participate in contexts that require either value.

3   Morphological features

A key and relatively uncontroversial element of linguistic analysis is the use of features, the elements into which linguistic units can be broken down. In almost all theories of syntax there is reference to features such as person, number and gender. And similarly, theories of inflectional morphology regularly call on features. If we are to preserve morphology-free syntax, we must recognize purely morphological features, distinct from morphosyntactic features. While there is a history of work on morphosyntactic features, resulting in some limited consensus on their makeup and structure, morphological features are poorly studied. They are typically invoked in an ad hoc fashion, with little attention to their interrelationships. Building on work on stress patterns in Network Morphology and on stems in Paradigm Function Morphology, we take initial steps towards a typology of these morphological features.

4   Types of morphological feature

At this stage of enquiry, our goal is to propose a first typology of morphological features. This can be examined for completeness and for the internal logic. We attempt to be as theory-neutral as possible, but our background assumptions are that inflectional morphology is most adequately analysed in terms of inferential-realizational theories (Stump 2001: 1-30). In particular, we find that default inheritance is a powerful tool for understanding the relation between larger and smaller generalizations on the one hand and lexical entries on the other, and so we work within the Network Morphology framework (see Corbett & Fraser 1993, Evans, Brown & Corbett 2002, Baerman, Brown & Corbett 2005, and references there). Our typology recognizes four types of feature, which we discuss in turn.

4.1   Inflectional class features

The example discussed above involves an **inflectional class** feature. Such features partition the vocabulary items according the way in which they realize feature specifications. They may in turn be of different types, and the important point is that they may cross-classify. To illustrate, we consider two different inflectional class features, showing in particular how they interact.

4.1.1   Inflectional class features: affixal

Let us consider in more detail a system similar to the one above. Like Serbian/Croatian/Bosnian, Russian has four main noun paradigms. These cover almost all the inflecting nouns; see Corbett (1982: 202-211) for full justification. Examples can be found in (4):

(4)   The major noun paradigms of Russian

		I	II	III	IV
SG	NOMINATIVE	zakon	gazet-a	kost´	vin-o
	ACCUSATIVE	zakon	gazet-u	kost´	vin-o
	GENITIVE	zakon-a	gazet-y	kost-i	vin-a
	DATIVE	zakon-u	gazet-e	kost-i	vin-u
	INSTRUMENTAL	zakon-om	gazet-oj	kost´-ju	vin-om
	LOCATIVE	zakon-e	gazet-e	kost-i	vin-e
PL	NOMINATIVE	zakon-y	gazet-y	kost-i	vin-a
	ACCUSATIVE	zakon-y	gazet-y	kost-i	vin-a
	GENITIVE	zakon-ov	gazet	kost-ej	vin
	DATIVE	zakon-am	gazet-am	kostj-am	vin-am
	INSTRUMENTAL	zakon-ami	gazet-ami	kostj-ami	vin-ami
	LOCATIVE	zakon-ax	gazet-ax	kostj-ax	vin-ax
		'law'	'newspaper'	'bone'	'wine'

We give the forms in transliteration of the standard orthography, which is largely phonemic. Palatalization of the preceding consonant is indicated by both ´ and j.

There are very substantial numbers of nouns which decline according to the models given. There are also some smaller subclasses, which behave almost according to the model, and can be defined by a specific deviation. For example, there is a subclass of class I where the genitive plural takes the form of the bare stem, for instance, *sapog* 'boot' genitive plural also *sapog*. There are some twenty nouns which are sufficiently irregular to fall outside these main classes (details in Corbett 1982).

The table shows part of the array of data that an account the inflectional morphology of Russian must cover. However, the traditional layout of the table is misleading in one respect. While the full paradigm of each noun requires access to its inflectional class feature, many of the forms of a given noun can be inferred from elsewhere in the system. This is shown clearly in Network Morphology accounts, which take full advantage of default inheritance (for instance, Corbett & Fraser 1993). Thus for *zakon*, the fact that the dative, instrumental and locative plurals are in turn *zakonam*, *zakonami* and *zakonax* is not of course specific to that inflectional class, it is information shared by inflected nouns of Russian.[5] In fact, the amount of information that needs to be specified for inflectional class I is just that the nominative singular is the bare stem, and that the genitive plural consists of the stem plus the inflection –*ov*; all the remaining forms can be inferred from elsewhere. In such an analysis the inflectional class feature functions as a hook to link the individual lexical entry into an inheritance network.[6]

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[5] There are a very few nouns which are exceptional in the instrumental plural.
[6] Note that defining an inflectional class may need reference in turn to lower level morphological features, e.g. to indicate a pattern of syncretism.

4.1.2 Inflectional class features: prosodic

Patterns of stress alternation may be seen as parallel paradigms, hierarchically organized, which have default relations to inflectional paradigms (Brown, Corbett, Fraser, Hippisley & Timberlake 1996). Such a view requires us to recognize **prosodic** features as a subtype of inflectional class features. These features again take whole lexemes in their scope. They may also refer to lower level morphological features. Since they are much less familiar than affixal class features, we shall give them somewhat greater attention.

Russian nouns show an interesting set of stress patterns. We follow here the account in Brown, Corbett, Fraser, Hippisley & Timberlake (1996), which also includes reference to many of the earlier sources, notably Zaliznjak (1967). There are four main stress patterns, which we label A-D. We give three inflectional forms as diagnostics.

(5)   Pattern A: stress on the stem throughout:

NOMINATIVE SINGULAR	DATIVE SINGULAR	DATIVE PLURAL	gloss
zakón (I)	zakónu	zakónam	'law'
gazéta (II)	gazéte	gazétam	'newspaper'
tetrád´ (III)	tetrádi	tetrádjam	'exercise book'
káčestvo (IV)	káčestvu	káčestvam	'quality'

For all of these nouns, the stress is on the stem (different possible syllables) throughout the paradigm. Note that this pattern includes examples from each of the affixal inflectional classes. (The affixal inflectional class is indicated in parentheses; if an item is not a fully regular member of the inflectional class, this is indicated with a prime, thus I´ means a member of a subclass of inflectional class I.)

Stress may also be on the inflection throughout:

(6)   Pattern B: stress on the ending throughout:

NOMINATIVE SINGULAR	DATIVE SINGULAR	DATIVE PLURAL	gloss
karandáš (I)[7]	karandašú	karandašám	'pencil'
čertá (II)	čerté	čertám	'characteristic'
veščestvó (IV)	veščestvú	veščestvám	'substance'[8]

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[7] The genitive plural is *karandášej*, but this results from a general regularity for certain stem-types in the genitive plural so we have not indicated this as an irregularity.

[8] There are arguably a few nouns like *voš´* 'louse' belonging to inflectional class III, which could be counted as having stress pattern B. These nouns have a fleeting vowel, and this appears under stress in the instrumental singular (*vóš´ju*) to give a complex picture.

There is a general principle that if stress "should" fall on the inflection, but there is no inflection, then stress will fall on the last syllable of the stem. This is seen in the nominative singular form *karandáš* 'pencil'.

There are two major patterns of mobile stress. In the pattern C, we find initial stress in the singular and ending stress in the plural:

(7) Pattern C: stress on the initial in the singular and on the ending in the plural:

NOMINATIVE SINGULAR	DATIVE SINGULAR	DATIVE PLURAL	gloss
véčer (I)	véčeru	večerám	'evening'
zérkalo (IV)	zérkalu	zerkalám	'mirror'

The other such pattern shown an alternation between stress on the ending and on the last syllable of the stem:

(8)   Pattern D: stress on the ending in the singular and in predesinential position in the plural:

NOMINATIVE SINGULAR	DATIVE SINGULAR	DATIVE PLURAL	gloss
rožók (Iˊ)[9]	rožkú	rόžkam	'little (animal) horn'
dyrá (II)	dyré	dýram	'hole'
kolesó (IV)	kolesú	kolësam	'wheel'

Note that *ë* indicates both a particular vowel quality and the position of the stress. The nature of this pattern is quite clear with the bi-syllabic stem *koles-* 'wheel'; the monosyllabic stems can economically be treated as members of this pattern too.

Just as we find subclasses in affixal inflectional classes, so we find sub-patterns in stress patterns. All the sub-patterns involve stress which "should" be on the inflection, which is actually found on the initial syllable. This may affect the nominative plural, the accusative singular, or both. Logically we cannot find examples of these sub-patterns in pattern A. We do find them in pattern B: here is Bi, having final stress, except for the nominative plural (and accusative when identical to the nominative plural):

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[9] This noun has a so-called 'fleeting vowel' in the nominative singular, and also in the genitive plural, *rόžek*. The noun has other meanings, and a different stress pattern, which do not concern us here.

(9)   Sub-pattern Bi: as pattern B, but the nominative plural has initial stress:

NOMINATIVE SINGULAR	DATIVE SINGULAR	NOMINATIVE PLURAL	DATIVE PLURAL	gloss
kón´ (I)	konjú	kóni	konjám	'horse'
skovorodá (II)	skovorodé	skóvorody	skovorodám	'frying pan'
kryl´có (IV)	kryl´cú	krýl´ca	kryl´cám	'porch'

We also find a similar sub-pattern with pattern C:

(10)   Sub-pattern Ci: as pattern C, but the nominative plural has initial stress:

NOMINATIVE SINGULAR	DATIVE SINGULAR	NOMINATIVE PLURAL	DATIVE PLURAL	gloss
vólos (I´)	vólosu	vólosy	volosám	'hair'
dólja (II´)	dóle	dóli	doljám	'portion'
plóščad´ (III)	plóščadi	plóščadi	ploščadjám	'(city) square'
úxo (IV´)	úxu	úši	ušám	'ear'

The other type of sub-pattern involves the accusative singular (again being stressed on the intial syllable instead of on the ending). As before, this is not available for pattern A (since this does not have the stress on the ending in the accusative singular). It is found with pattern B:

(11)   Sub-pattern Bii: as pattern Bi, but the accusative singular has initial stress:

NOMINATIVE SINGULAR	ACCUSATIVE SINGULAR	DATIVE SINGULAR	NOMINATIVE PLURAL	DATIVE PLURAL	gloss
borodá (II)	bórodu	borodé	bórody	borodám	'beard'

Note that this subpattern has both the exceptional properties. We do not find examples in within pattern B of the accusative singular sub-regularity without the nominative plural being involved.

In pattern D, we cannot find the sub-regularity involving the nominative plural, since this form does not have inflectional stress in this pattern. We do, however, find the accusative sub-regularity:

(12)   Sub-pattern Di: as pattern D, but the accusative singular has initial stress:

NOMINATIVE SINGULAR	ACCUSATIVE SINGULAR	DATIVE SINGULAR	NOMINATIVE PLURAL	DATIVE PLURAL	gloss
cená (II)	cénu	cené	cény	cénam	'price'

The sub-patterns are more limited in the inflectional classes for which they are found than are the main patterns. In terms of nouns involved too, the main patterns cover the

overwhelming majority of nouns (for statistics see Brown, Corbett, Fraser, Hippisley & Timberlake 1996). The important point is that the same patterns can be found with nouns belonging to different inflectional classes, so that an economical account should treat stress separately.[10] And just as there is relatively little that needs to be specified for individual inflectional classes (since most material can be inherited from elsewhere), so the stress patterns and sub-patterns can be insightfully treated in terms of default inheritance, so that each involves rather little information; see Brown et al. (1996: 66-69) for a Network Morphology account. Finally, though different patterns are found with different inflectional classes, there are default linkages between the two, which are also handed in a Network Morphology framework in Brown et al. 1996: 69-79).[11]

4.2   Stem indexing features

A **stem indexing** feature picks out stems for particular sections of a paradigm. A key point is that the stem alternations may generalize over different inflectional classes. Different stems may be phonologically closer or more distant, but we can generalize over stems, irrespective of the phonological similarity. For example, Russian verbs have two main stems, which we could call I and II, or infinitive and present. Compare their function with two rather different verbs:

(13)   Stems and some of their functions in two Russian verbs

infinitive stem	infinitive	past tense (masculine singular)	present tense stem	1st singular present	gloss
plaka-	plakat´	plakal	plač-	plaču	'cry'
trebova-	trebovat´	treboval	trebuj-	trebuju	'require'

We need to be able to refer to the stems because they are used for the same functions across verb types. Thus the infinitive stem, for the majority of verbs, is used to form the past tense. Stems may involve consonantal alternations (see §4.5), which in turn generalize across the system (as is the case with *plakat´* 'cry'), or they may not be relatable in this way (as with *trebovat´* 'require'). The important point is that there are regularities which generalize across stems, irrespective of phonological similarity. For details of stem indexing in Russian see Brown (1998), and for another detailed case study of stem indexing see Stump (2001: 185-199).

4.3   Syncretic index features

A syncretic index can be used to refer a form which does not correspond to a morphosyntactic value – specifically, where the form corresponds to a set of values

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[10] For analysis of the insecting dimensions of stem altenations, including stress, in Sanskrit, see Stump (2004).

[11] Note that inflectional classes can be based on prosody, with no distinguishing affixal material; an example, according to Finkel & Stump (2006), is the Nilo-Saharan language Ngiti. Their source is Kutsch Lojenga (1994: 455-511).

(syncretism). Consider the Livonian paradigms in (14). The first person singular and third person singular are identical for both present and preterite.

(14)   Livonian 'read' (Kettunen 1938: lx-lxii)

| | present | | preterite | |
	SG	PL	SG	PL
1	**lugub**	lu'ggəm	**lugiz**	lugizmə
2	lugud	lu'ggət	lugist	lugist(ə)
3	**lugub**	lu'ggəbəd	**lugiz**	lugist(ə)

We want to capture the fact that the combination 1SG/3SG is treated morphologically as a single unit on par with 2SG or 1PL. One way of doing this is to associate the combination with a syncretic index:

(15)   {1SG, 3SG} = X

This syncretic index 'X' then participates in inflectional rules in the same way as ordinary morphosyntactic values. Whenever inflectional rules refer to 'X', both 1SG and 3SG cells will be affected. This captures the generalization that the same pattern of syncretism is found across distinct parts of the paradigm.[12]

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[12] A referee points out another problem raised by syncretism, namely the status of morphosyntactic rules that seem to be sensitive to the availability of a non-syncretic form. A well-known example involves genitives in German, where certain constructions are only possible where the noun phrase has a distinct genitive form. Thus, an unmodified plural noun, whose case paradigm distinguishes between dative and non-dative, cannot serve as a genitive complement:

(i)   *Benachteiligung   Männer
         discrimination   men.PL.NOM/ACC/GEN
         'discrimination against men'   (Plank 1980: 296)

The addition of a modifier makes the phrase grammatical, as the modifier has a distinct genitive form:

(ii)   Benachteiligung   andersgläubig-er   Männer
         discrimination   heterodox-PL.GEN   men.PL.NOM/ACC/GEN
         'discrimination against heterodox men'   (Plank 1980: 296)

We are faced with two possible interpretations. One is to allow the syntactic rule to be sensitive to the formal properties of the noun phrase – in effect, to incorporate a morphological feature into a syntactic rule (Spencer ms). This would be a violation of the principle of morphology-free syntax. The other interpretation, as suggested in Schachtl (1989), would be to claim that the value 'genitive' is absent from bare nouns in German, and is rather a property of phrases with an overt modifier. On this interpretation, syntax is

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4.4 Morphophonological features

A morphophonological feature is one which identifies a morphological relationship, such as one dependent on umlaut or palatalization, which states that two elements stand in some (morphologically) paradigmatic relationship to each other, without specifying what conditions the alternation. While typically phonological in origin, it marks a relationship which is no longer a matter of productive phonology.

An illustration of morphophonological features comes from Polish. Consonants display two patterns of alternation (16), which we have labelled 'A' and 'B'.

(16)   Consonant alternations in Polish (based on Feldstein 2001: 25)

	plain	alternation A	alternation B
velars	k, g	*affricate* c [ ], dz [ ]	*alveopalatal* cz [ ], ż [ ]
	ch [x]	*palatal* ś [ ]	*alveopalatal* sz [ ]
others	r, ł [w]	*alveopalatal* rz [ ], l	
	p, b, f, w, m	*palatalized* p(i) [pʸ], b(i) [bʸ] f(i) [fʸ], w(i) [vʸ], m(i) [mʸ]	
	t, d, s, z, n	*palatal* ć [ ], dź [ ], ś [ ], ź [ ], ń [ ]	

Historically, the alternations were the result of phonologically-conditioned palatalization. Synchronically, though, the alternations are of various sorts, not necessarily characterizable as palatalization (e.g. *ł* [w] ~ *l*), and the conditioning environments cannot be defined in phonological terms. Both alternations occur in multiple morphological contexts, as shown in (17).

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sensitive to the morphosyntactic profile of forms, and not to morphological characteristics as such. This would preserve the priciple of morphology-free syntax, at the cost of admitting asymmetries in the morphosyntax of noun phrases (for which there is some evidence). This second interpretation involves seeing the genitive in the noun form in (i) not as syncretic, but rather as morphosyntactically defective, in effect glossing glossing the form as 'men.PL.NOM/ACC'.

(17)   Alternation contexts (Feldstein 2001: 26-31)

Alternation A: i.   *dative/locative singular of a-stem (or class II) nouns*
                     Pra**g**a (NOM) ~ Pra**dz**e (LOC) 'Prague'

                ii.   *virile (male human) plural of nouns and modifiers*
                     Norwe**g** (SG) ~ Norwe**dz**y (PL) 'Norwegian'[13]

Alternation B: i.   *vocative singular in -*e *(nouns)*
                     Bóg (NOM) ~ Boże (VOC) 'God'

                ii.   *I conjugation C-stem present (2/3 SG, 1/2 PL, imperative)*
                     pomogę (1SG) ~ pomoże (3SG), pomóż (IMP) 'help'

                iii. *I conjugation a-stem present (all values)*
                     łgać (INFIN) ~ łżę (1SG), łże (3SG) 'lie'

By treating 'alternation A' and 'alternation B' as morphophonological features, we are able to capture the fact that there are segmental alternations that are correlated with parts of the paradigm, but which are not exclusive to any particular morphosyntactic value.

5   Distinguishing morphological features

We need criteria to distinguish morphological features from morphosyntactic features.[14] If we cannot distinguish them, we could simply relabel any counter-examples to morphology-free syntax as morphosyntactic features. We cannot claim to have solved this issue. However, we can observe some typical patterns which recur cross-linguistically, as we answer four relevant questions, contrasting morphosyntactic and morphological features. We noted in the introduction that the need for morphological features is an indication of non-canonical inflectional systems.[15]

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[13] In this context, alveopalatal *sz* [ ] and *ż* [ ] alternate with palatal *ś* [ ] and *ź* [ ], e.g. *nasz* (SG) ~ *nasi* (PL) 'our' (Feldstein 2001: 28).

[14] See Matthews (1972: 162); Matthews uses 'morphosyntactic category' while we prefer 'morphosyntactic feature'.

[15] The canonical approach has been suggested as a way to make progress in some of the areas of language which prove difficult for typology (Corbett 2005, forthcoming a). The basic technique is to define carefully a theoretical space, and only then to situate the language phenomena within it. Converging definitions give us a canonical point, where we find the best, clearest, most indisputable examples (however rare such examples may be). In terms of inflection, a canonical system is one in which lexical material remains constant through a lexeme's paradigm, but the inflectional material is different; and when comparing cell by cell across lexemes, the lexical material is different but the inflectional material is the same (Corbett forthcoming b). According to this notion, having morphosyntactic features determining inflection is canonical, while any morphological feature is non-canonical.

5.1 Are they "direct"?

Zwicky (1992) draws a distinction between direct and indirect features. For him, direct features like number and tense have intrinsic content, they are directly associated with default semantics. Features like case and declension, he suggests, are not. Of course, it is not suggested that morphosyntactic features correspond exactly to semantics, only that they are 'associated directly with prototypical, or default, semantics'. Equally, there may be some link even for indirect features; for example, nouns denoting male humans in Russian usually belong to inflectional class I. However, this is different in kind and degree to the link found with direct features. This distinction does not provide a clear diagnostic for morphological features. It would appear that direct features are morphosyntactic, while indirect features may be morphosyntactic (as with case) or morphological (as with inflectional class).

5.2 Is there a fixed list of features?

This is an issue that has been little discussed, though often linguists imply a fixed list of morphosyntactic features (see Zwicky 1986: 988-989 for early discussion). It may be that we have not yet discovered them all, but it is reasonable, in our view, to assume that there is a set from which languages may draw. For morphological features, specified at the level of abstraction given above, we suggest that there is also a fixed list of possibilities.

5.3 Is there a fixed list of values?

For morphosyntactic features we suggest there is also a fixed list of possible values. For some features we are well on the way towards establishing that list. Thus the largest number systems have five values; however, not all systems with a particular number of values have exactly the same values, and there is more to be done to establish the list. On the other hand, the feature case can have a large number of values, and a plausible list is some way off.

For morphological feature values the picture is quite different. If we consider again the nominal system of Russian we see that there are certainly at least four values for the inflectional class feature (I-IV above). But as mentioned there are various smaller groupings that can be treated as subclasses. As we look at smaller and smaller subclasses (going lower and lower down an inheritance hierarchy) we reach the point where we are making specific points about individual lexical entries. For instance, though all inflecting Russian nouns have the instrumental in *–ami*, there is a handful of nouns, like *doč´* 'daughter', instrumental *dočer´mi*, which are exceptional. Whether this is treated as fact just about that lexical entry or as a property of a subclass seems not to be an issue of substance. Hence there is no point at which we could say that we have reached the limit of values of morphological features. And more generally, values like 'strong' and 'weak' have no cross-linguistic consistency. What counts as a strong verb in German is not the same as a strong verb in Tsakhur. We cannot give a fixed list with confidence for a particular language, and the less so for languages in general. Hence the criterion of having a fixed list of values does distinguish morphosyntactic from morphological features.

5.4   *Is there structuring within the feature?*

There is evidence for structuring of morphosyntactic features, though perhaps not sufficient to assume that all features automatically have branching structure (Baerman, Brown & Corbett 2005: 126-131). There is solid evidence from default use, facultative use and superclassing (Corbett 2006: 125). Within morphological features too there is evidence for subclasses within the main classes, as we saw in §4.1.

5.5   *Summary of distinctions*

We can now review the distinctions discussed in this section.

(18)   Summary of the distinctions drawn in §5

	morphosyntactic features	morphological features
Are they "direct"? (§5.1)	yes/no	no
Fixed list of features? (§5.2)	yes	yes
Fixed list of values? (§5.3)	yes	no
Structuring within feature? (§5.4)	yes	yes

The first and third criteria are those which appear of most obvious analytical value. However, (18) also offers a second line of attack on the problem of distinguishing morphosyntactic from morphological features. At first sight, the second criterion – fixed list of values – seems unhelpful, since this criterion holds for both types. And yet, if as we suggest there is fixed cross-linguistic list of the features of both types, this is useful step forward, for distinguishing between the features and so maintaining content for the principle of morphology-free syntax. Of course, such a list can be updated by the discovery of a new language with a new feature. But such a feature would require careful justification. The assumption must be that we know what the features are, and an analysis requiring some new feature should immediately attract scrutiny.

6   The need for morphological features

The concluding issue is whether we really **need** morphological features. An objection sometimes raised is that morphological features are somehow too abstract, and attempts are made to derive the same effects by reference to lexical listing. We would argue that this is a variant formalization of the same set of generalizations. The presence of a morphological feature in a lexical entry has two functions: (i) it expresses the fact that the inflection of the lexeme requires some specific piece of information, and (ii) it indexes the location of that specific inflectional information (for instance, in an inheritance hierarchy). Alternatively, one could list all the inflected forms in the lexical entry itself. But the links between lexical entries, e.g. which ones share the same pattern, must still be described somewhere in the grammar. Each network of shared morphological patterns corresponds to a morphological feature. The difference between the two approaches is simply in how the morphological patterns are indexed: through a morphological feature, or through an enriched lexical entry.

The general case for morphological features is made by the arguments justifying 'purely morphological' phenomena (Aronoff 1994). And work on heteroclites (Stump 2006) demonstrates the need for such features particularly clearly. But there is a more specific question for those of us whose morphological model uses hierarchically arranged defaults: is there even here a need for morphological features? These features may be thought of as the name of a node in the hierarchy which defines a class of morphological objects (those which inherit from it). The other side of the coin is that they are the hook in individual lexical entries, which specify the node in an inheritance hierarchy at which the lexical item attaches. From both points of view, these nodes indicate a clustering of properties. When we describe a system like the Russian inflectional system given in (4), we find that there is more than one fact that we need to specify for each class. The information is found grouped in this way, rather than being spread evenly across the network (see Corbett and Fraser 1993 for a formal account showing this). Moreover, the lexical items also cluster: the major classes given in (4) each include several thousand nouns, and the minor classes have relatively few members in comparison. It is this clustering, of the properties which define the morphological features and of the lexical items carrying them, which gives morphological features their cross-linguistic interest.

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