

Distributed Morphology:: Decomposed Inflection Class Features 1

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Lit.: Alexiadou & Müller (2005)

Question

What is the status of class features in languages with fusional noun inflection (Russian, Greek, German)?

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- 6 A pre-syntactic approach to class-driven inflectional morphology respects both the Legibility Condition and the Inclusiveness Condition; inner- or post-syntactic approaches violate at least one of these conditions.

Types of Syncretism

Observation:

The noun inflection systems of Russian, Greek, and German exhibit massive syncretism (i.e., identity of two forms with a different morpho-syntactic function), both within an inflection class (**intra-paradigmatic syncretism**), and across inflection classes (**trans-paradigmatic syncretism**).

Paradigms:

Paradigms are epiphenomena; they do not exist as genuine entities that, e.g., constraints may refer to (see Harley & Noyer (1999), Bobaljik (2002), among many others).

Syncretism is Everywhere

(1) Syncretism Ubiquity Hypothesis:

Assume that identity of form implies identity of function unless there is evidence to the contrary.

(Null hypothesis for child and linguist.)

Assumption:

There is less evidence against systematic syncretism than is sometimes made out (Carstairs (1987), Zwicky (1991), Williams (1994)). However, we will not try to derive syncretism across numbers.

Caveat

Throughout, we focus on the core systems of noun inflection in Russian, Greek, and German. We disregard minor inflection classes, minor cases, stem alternations, stress patterns, lexical idiosyncrasies, etc. These issues are ultimately important in comprehensive morphological accounts; but they arguably do not significantly contribute to the issue of class features.

Noun Inflection in Russian: Class I

References:

Jakobson (1962a), Jakobson (1962b), Neidle (1988), Corbett & Fraser (1993), Fraser & Corbett (1994), Halle (1994), Franks (1995), Stump (2001).

T₁: Inflection class I, Sg.: masc

	zavod _m ('factory')	student _m ('student')	tovarišč _m ('comrade')
nom	∅	∅	∅
acc	∅	a	a
dat	u	u	u
gen	a	a	a
inst	om	om	em
loc	e	e	e

Noun Inflection in Russian: Class II

T₂: Inflection class II, Sg.: fem, masc

	<i>komnat</i> _f ('room')	<i>učitel'nic</i> _f ('fem. teacher')	<i>nedel'</i> _f ('week')	<i>muščin</i> _m ('man')
nom	a	a	ja	a
acc	u	u	ju	u
dat	e	e	e	e
gen	y	y	i	y
inst	oj(u)	ej(u)	ej(u)	oj(u)
loc	e	e	e	e

Noun Inflection in Russian: Class III

T₃: Inflection class III, Sg.: fem

	tetrad' _f ('notebook')	myš' _f ('mouse')	doč' _f ('daughter')
nom	∅	∅	∅
acc	∅	∅	∅
dat	i	i	(er)i
gen	i	i	(er)i
inst	ju	ju	(er')ju
loc	i	i	(er)i

Noun Inflection in Russian: Class IV

T₄: Inflection class IV, Sg.: neut

	mest _n ('place')	jablok _n ('apple')	syščestv _n ('being')
nom	o	o	o
acc	o	o	o
dat	u	u	u
gen	a	a	a
inst	om	om	em
loc	e	e	e

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- (iii) Semantic features on the stem do not suffice to predict inflection class (e.g., N_[*anim*] can be IV).

Conclusion:

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- (iii) Semantic features on the stem do not suffice to predict inflection class (e.g., N_[*anim*] can be IV).

Conclusion:

Class features are needed.

Analysis

T₅: Syncretism within and across inflection classes in Russian

	I _m	II _{f,m}	III _f	IV _n
nom	∅	a	∅	o
acc	∅/a	u	∅	o
dat	u	e	i	u
gen	a	i	i	a
inst	om	oj	ju	om
loc	e	e	i	e

Decomposition of Case Features

Intra-paradigmatic syncretism can be accounted for by decomposing privative case features into more primitive, binary case features that are cross-classified (yielding natural classes of cases). These primitive features are semantics-based in Jakobson (1962a), Jakobson (1962b), Neidle (1988), Franks (1995)), and syntax-based in Bierwisch (1967), Wiese (1999), Müller (2002); we adopt the latter view.

(2) **Decomposition of cases in Russian:** $[\pm\text{subject}]$, $[\pm\text{governed}]$, $[\pm\text{oblique}]$

nominative: $[+\text{subj}, -\text{gov}, -\text{obl}]$
 accusative: $[-\text{subj}, +\text{gov}, -\text{obl}]$
 dative: $[-\text{subj}, +\text{gov}, +\text{obl}]$
 genitive: $[+\text{subj}, +\text{gov}, +\text{obl}]$
 instrumental: $[+\text{subj}, -\text{gov}, +\text{obl}]$
 locative: $[-\text{subj}, -\text{gov}, +\text{obl}]$

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dative: $[-\text{subj}, +\text{gov}, +\text{obl}]$ **ergative?** $\rightarrow [+ \text{subj}, + \text{gov}, - \text{obl}]$

genitive: $[+\text{subj}, +\text{gov}, +\text{obl}]$

instrumental: $[+\text{subj}, -\text{gov}, +\text{obl}]$

locative: $[-\text{subj}, -\text{gov}, +\text{obl}]$

Trans-Paradigmatic Syncretism

Trans-paradigmatic syncretism can be accounted in the same way by decomposing privative class features into more primitive, binary class features that are cross-classified (yielding natural classes of inflection classes); see Halle (1992) on Latvian noun inflection ([\pm marginal], [\pm marked] in addition to the “standard” class features A, B); Nesset (1994) on Russian noun inflection ([\pm nom-end] and [a/i igen-end]); Oltra Massuet (1999) on verbal inflection in Catalan; Müller (2005) on Icelandic noun inflection; Trommer (2005) on Amharic verbs. (For natural classes of Russian noun inflection classes without feature decomposition, see McCreight & Chvany (1991), Wiese (2003).)

Inflection Class Decomposition for Russian

(3) Decomposition of inflection classes in Russian: $[\pm\alpha]$, $[\pm\gamma]$

I: $[+\alpha, -\gamma]$	zavod _m ('factory')
II: $[-\alpha, +\gamma]$	komnat _f ('room'), muščin _m ('man')
III: $[-\alpha, -\gamma]$	tetrad' _f ('notebook')
IV: $[+\alpha, +\gamma]$	mest _n ('place')

Vocabulary Items (Singular)

(4) Inflection markers (singular):

- | | |
|---------------------|---|
| 1. /oj/: | {[+N],[$-\alpha$],[$+\gamma$],[+subj,-gov,+obl]} |
| 2. /ju/: | {[+N],[$-\alpha$],[$-\gamma$],[+subj,-gov,+obl]} |
| 3. /om/: | {[+N],[<u>+</u> α],[+subj,-gov,+obl]} |
| 4. /e/: | {[+ <u>N</u>],[$-\alpha$],[$+\gamma$],[$-\text{subj}$],[+obl]} |
| 5. /e/: | {[+N],[<u>+</u> α],[$-\text{subj}$,-gov,+obl]} |
| 6. /o/: | {[+N],[<u>+</u> α],[$+\gamma$],[$-\text{obl}$]} |
| 7. / \emptyset /: | {[+N],[<u>-\gamma</u>],[$-\text{obl}$]} |
| 8. /i/: | {[+N],[<u>-\alpha</u>],[+obl]} |
| 9. /u/: | {[+N],[$-\text{subj}$],[+gov]} |
| 10. /a/: | {[+N]} |

Inflection markers may bear underspecified case and class features that encode natural classes of cases and inflection classes, respectively. Underspecified class information is underlined in inflection marker specifications.

Syntax/Morphology Interface

Assumption:

Noun stems enter morphology with fully specified case, number, gender, and class features. They must combine with an inflection marker. Choice of inflection marker follows the Subset Principle (Kiparsky (1973), Lumsden (1992), Williams (1994), Halle (1997), Noyer (1992), Stump (2001), Zifonun (2002)).

Subset Principle

(5) Subset Principle:

An inflection marker I is merged with a noun stem N iff (i) and (ii) hold:

(i) The morpho-syntactic features of I are a subset of the morpho-syntactic features of N .

(ii) I is the most specific marker that satisfies (i).

(6) Specificity of inflection markers:

An inflection marker I_i is more specific than an inflection marker I_j iff there is a set of features \mathbb{F} such that (i) and (ii) hold.

(i) I_i bears more features in \mathbb{F} than I_j does.

(ii) There is no higher-ranked set of features \mathbb{F}' such that I_i and I_j have a different number of features in \mathbb{F}' .

(7) Hierarchy of features:

Number \gg Class \gg Case

Competition

T₆: The interaction of inflection markers in the singular in Russian

	I: [+α, -γ]	II: [-α, +γ]	III: [-α, -γ]	IV: [+α, +γ]
nom: [+subj, -gov, -obl]	/∅/' (/a/ ¹⁰)	/a/ ¹⁰	/∅/' (/a/ ¹⁰)	/o/ ⁶ (/a/ ¹⁰)
acc: [-subj, +gov, -obl]	/∅/' (/u/ ⁹ , /a/ ¹⁰)	/u/ ⁹ (/a/ ¹⁰)	/∅/' (/u/ ⁹ , /a/ ¹⁰)	/o/ ⁶ (/u/ ⁹ , /a/ ¹⁰)
dat: [-subj, +gov, +obl]	/u/ ⁹ (/a/ ¹⁰)	/e/ ⁴ (/i/ ⁸ , /u/ ⁹ , /a/ ¹⁰)	/i/ ⁸ (/u/ ⁹ , /a/ ¹⁰)	/u/ ⁹ (/a/ ¹⁰)
gen: [+subj, +gov, +obl]	/a/ ¹⁰	/i/ ⁸ (/a/ ¹⁰)	/i/ ⁸ (/a/ ¹⁰)	/a/ ¹⁰
inst: [+subj, -gov, +obl]	/om/ ³ (/a/ ¹⁰)	/oj/ ¹ (/i/ ⁸ , /a/ ¹⁰)	/ju/ ² (/i/ ⁸ , /a/ ¹⁰)	/om/ ³ (/a/ ¹⁰)
loc: [-subj, -gov, +obl]	/e/ ⁵ (/a/ ¹⁰)	/e/ ⁴ (/i/ ⁸ , /a/ ¹⁰)	/i/ ⁸ (/a/ ¹⁰)	/e/ ⁵ (/a/ ¹⁰)

Vocabulary Items (Plural)

(8) Inflection markers (plural):

- | | |
|-----------|---|
| 1. /ax/: | { [+N], [+pl], [-subj, -gov, -+obl] } |
| 2. /ami/: | { [+N], [+pl], [+subj, -gov, +obl] } |
| 3. /am/: | { [+N], [+pl], [-subj, +gov, +obl] } |
| 4. /ov/: | { [+N], [+pl], [<u>-γ</u>], [+subj, +gov, +obl] } |
| 5. /∅/: | { [+N], [+pl], [<u>+γ</u>], [+subj, +gov, +obl] } |
| 6. /i/: | { [+N], [+pl], [<u>-(+α, +γ)</u>], [-obl] } |
| 7. /a/: | { [+N], [+pl], [-obl] } |

Competition

T₇: The interaction of inflection markers in the plural in Russian

	I: [+α, -γ]	II: [-α, +γ]	III: [-α, -γ]	IV: [+α, +γ]
nom: [+subj, -gov, -obl]	/i/ ⁶ (/a/ ⁷)	/i/ ⁶ (/a/ ⁷)	/i/ ⁶ (/a/ ⁷)	/a/ ¹
acc: [-subj, +gov, -obl]	/i/ ⁶ (/a/ ⁷)	/i/ ⁶ (/a/ ⁷)	/i/ ⁶ (/a/ ⁷)	/a/ ¹
dat: [-subj, +gov, +obl]	/am/ ³	/am/ ³	/am/ ³	/am/ ³
gen: [+subj, +gov, +obl]	/ov/ ⁴	/∅/ ⁵	/ov/ ⁴	/∅/ ⁵
inst: [+subj, -gov, +obl]	/ami/ ²	/ami/ ²	/ami/ ²	/ami/ ²
loc: [-subj, -gov, +obl]	/ax/ ¹	/ax/ ¹	/ax/ ¹	/ax/ ¹

Argument for Class Feature Decomposition

Singular vs. plural markers:

Plural markers do not fit into singular contexts, but singular markers compete in plural contexts. However, since singular markers do not have a number feature, they can never become the most specific markers for a given context.

General conclusion:

For each natural class of inflection classes created by class feature decomposition, there is a marker that refers to it.

(9) Inflection markers that refer to decomposed class features:

$[+\alpha]$ (I, IV) \rightarrow /om/ (Sg.), /e/ (Sg.)

$[-\alpha]$ (II, III) \rightarrow /i/ (Sg.)

$[+\gamma]$ (II, IV) \rightarrow / \emptyset / (Pl.)

$[-\gamma]$ (I, III) \rightarrow / \emptyset / (Sg.), /ov/ (Pl.)

Animacy, Version I

Note:

The system relies on two rules of referral (Zwicky (1985), Corbett & Fraser (1993), Stump (2001)) to account for accusative/genitive syncretism with animates.

- (10) a. A rule of referral for accusative/genitive syncretism in the singular:

$$I\{[+\alpha, -\gamma], [-\text{subj}, +\text{gov}, -\text{obl}]\} \rightarrow$$

$$I\{[+\alpha, -\gamma], [+ \text{subj}, +\text{gov}, +\text{obl}]\} / [+ \text{animate}] \underline{\quad}.$$

- b. A rule of referral for accusative/genitive syncretism in the plural:

$$I\{[+\text{pl}], [-\text{subj}, +\text{gov}, -\text{obl}]\} \rightarrow$$

$$I\{[+\text{pl}], [+ \text{subj}, +\text{gov}, +\text{obl}]\} / [+ \text{animate}] \underline{\quad}.$$

Animacy, Version IIa

Alternative:

To express this overarching regularity, an **impoverishment** rule can be adopted. Impoverishment rules manipulate syntactic feature specifications before vocabulary insertion applies (see Bonet 1991, Bobaljik 2002, and Frampton 2002, among others). Standardly, impoverishment is taken to **delete** features (as the name suggests), thereby forcing a retreat to the general case (i.e., insertion of less specific markers). However, this will not do in the case at hand: The plural markers /i/₆ and /a/₇ are less specific than the markers /ov/₄ and /∅/₅ (that they need to be replaced by in animate contexts). Therefore, one may follow Noyer (1998, 282) in assuming that impoverishment rules can also **change** features (or at least feature values).

Animacy, Version IIb

- (11) a. $[-\text{subj}, -\text{obl}] \rightarrow [+ \text{subj}, + \text{obl}] / [+ \alpha, -\gamma], [+ \text{anim}] ___$
 b. $[-\text{subj}, -\text{obl}] \rightarrow [+ \text{subj}, + \text{obl}] / [+ \text{pl}], [+ \text{anim}] ___$

These rules turn a syntactic accusative context into a morphological genitive context (leaving the shared feature [+gov] unaffected) and thus account for the animacy-driven presence of genitive markers in accusative environments in class I and in the plural.

Noun Inflection in Greek

References:

Mackridge (1985), Babiniotis (1986), Ruge (1986), Ralli (1994), Ralli (2002), Alexiadou (2004).

Assumption (Ralli (1994)):

There are eight inflection classes. (Traditional view: three classes)

Four Inflection Classes

T₈: Inflection classes I–IV

	I: masc <i>kip_m</i> ('garden')	I: fem <i>psif_f</i> ('vote')	II: masc <i>maxit(i)_m</i> ('fighter')	III: fem <i>avl(i)_f</i> ('yard')	IV: fem <i>pol(i)(e)_f</i> ('city')
nom/sg	os	os	s	∅	∅
acc/sg	o(n)	o(n)	∅	∅	∅
gen/sg	u	u	∅	s	s
voc/sg	e	e	∅	∅	∅
nom/pl	i	i	es	es	is
acc/pl	us	us	es	es	is
gen/pl	on	on	on	on	on
voc/pl	i	i	es	es	is

Four More Inflection Classes

T₉: Inflection classes V–VIII

	V: neut	VI: neut	VII: neut	VIII: neut
	vun _n ('mountain')	krat _n ('state')	spiti _n ('house')	soma(t) _n ('body')
nom/sg	o	os	∅	∅
acc/sg	o	os	∅	∅
gen/sg	u	us	u	os
voc/sg	o	os	∅	∅
nom/pl	a	i	a	a
acc/pl	a	i	a	a
gen/pl	on	on	on	on
voc/pl	a	i	a	a

Independently Motivated Features?

Observation:

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- (iii) Semantic features on the stem do not suffice to predict inflection class.

Analysis

T₁₀: Syncretism within and across inflection classes in Greek

	'2.decl.'	'1.decl.'			'3.decl.'			
	I _{m,f}	II _m	III _f	IV _f	V _n	VI _n	VII _n	VIII _n
nom/sg	os	s	∅	∅	o	os	∅	∅
acc/sg	o(n)	∅	∅	∅	o	os	∅	∅
gen/sg	u	∅	s	s	u	us	u	os
voc/sg	e	∅	∅	∅	o	os	∅	∅
nom/pl	i	es	es	is	a	i	a	a
acc/pl	us	es	es	is	a	i	a	a
gen/pl	on	on	on	on	on	on	on	on
voc/pl	i	es	es	is	a	i	a	a

Case Decomposition

(12) **Decomposition of cases in Greek:** $[\pm\text{governed}]$, $[\pm\text{oblique}]$
(, $[\pm\text{subject}]$)

nominative: $[-\text{gov}, -\text{obl}]$

accusative: $[\text{+gov}, -\text{obl}]$

genitive: $[\text{+gov}, \text{+obl}]$

(vocative: $[-\text{subj}, -\text{gov}, -\text{obl}]$)

Inflection Class Decomposition

(13) Decomposition of inflection classes in Greek: $[\pm\alpha]$, $[\pm\beta]$, $[\pm\gamma]$

I: $[+\alpha, +\beta, +\gamma]$	kip_m ('garden'), $psif_f$ ('vote')
V: $[+\alpha, +\beta, -\gamma]$	vun_n ('mountain')
VII: $[+\alpha, -\beta, +\gamma]$	$spiti_n$ ('house')
VIII: $[+\alpha, -\beta, -\gamma]$	$soma(t)_n$ ('body')
VI: $[-\alpha, +\beta, +\gamma]$	$krat_n$ ('state')
IV: $[-\alpha, -\beta, +\gamma]$	$pol(i)(e)_f$ ('city')
II: $[-\alpha, +\beta, -\gamma]$	$maxit(i)_m$ ('fighter')
III: $[-\alpha, -\beta, -\gamma]$	$avl(i)_f$ ('yard')

Vocabulary Items (Singular)

(14) Inflection markers (singular):

- | | |
|------------|---|
| 1. /o(n)/: | { [+N], [+α, +β, +γ], [+gov, -obl] } |
| 2. /os/: | { [+N], [+α, -β, -γ], [+gov, +obl] } |
| 3. /us/: | { [+N], [-α, +β, +γ], [+gov, +obl] } |
| 4. /o/: | { [+N], [+α, +β, -γ], [-obl] } |
| 5. /os/: | { [+N], [+β, +γ], [-obl] } |
| 6. /s/: | { [+N], [-α, <u>β</u>], [-gov, -obl] } |
| 7. /u/: | { [+N], [<u>α</u>], [+gov, +obl] } |
| 8. /∅/: | { [+N] } |

Variables over Feature Values

Note on \aleph -notation with /s/:

Assuming that variables ranging over feature values can show up in morpho-syntactic specifications of inflection markers, the two /s/ markers in II and III/IV emerge as one: \aleph ranges over \pm . The \aleph -notation (originally: α -notation) is introduced in Chomsky (1965), Chomsky & Halle (1968), and has been used in morphology in Noyer (1992) (but see Harley (1994)), Johnston (1996), and Wiese (2003). Without this notion, there would have to be two /s/ markers, one specified as $\{[+N],[-\alpha,+\beta],[-\text{gov},-\text{obl}]\}$, and one specified as $\{[+N],[-\alpha,-\beta],[+\text{gov},+\text{obl}]\}$. However, the \aleph -notion captures the gist of what is traditionally known as the “s-principle” (II uses /s/ where III/IV does not, and vice versa, see Ruge (1986)). (Also note that, other things being equal, markers with variables over features values count as less specific than markers without such variables.)

Competition

T₁₁: The interaction of inflection markers in the singular in Greek

	I: [+α+β+γ]	II: [-α+β-γ]	III: [-α-β-γ]	IV: [-α-β+γ]	V: [+α+β-γ]	VI: [-α+β+γ]	VII: [+α-β+γ]	VIII: [+α-β-γ]
nom/sg: [-gov,-obl], [-pl]	/os/ ⁵ (/∅/ ⁸)	/s/ ⁶ (/∅/ ⁸)	/∅/ ⁸	/∅/ ⁸	/o/ ⁴ (/∅/ ⁸)	/os/ ⁵ (/s/ ⁶ , /∅/ ⁸)	/∅/ ⁸	/∅/ ⁸
acc/sg: [+gov,-obl], [-pl]	/o(n)/ ¹ (/os/ ⁵ , /∅/ ⁸)	/∅/ ⁸	/∅/ ⁸	/∅/ ⁸	/o/ ⁴ (/∅/ ⁸)	/os/ ⁵ (/∅/ ⁸)	/∅/ ⁸	/∅/ ⁸
gen/sg: [+gov,+obl], [-pl]	/u/ ⁷ (/∅/ ⁸)	/∅/ ⁸	/s/ ⁶ (/∅/ ⁸)	/s/ ⁶ (/∅/ ⁸)	/u/ ⁷ (/∅/ ⁸)	/us/ ³ (/∅/ ⁸)	/u/ ⁷ (/∅/ ⁸)	/os/ ² (/u/ ⁷ , /∅/ ⁸)

Vocabulary Items (Plural)

(15) Inflection markers (plural):

- | | | |
|----|-------|--|
| 1. | /on/: | { [+N], [+pl], [+gov, +obl] } |
| 2. | /is/: | { [+N], [+pl], [- α , - β , + γ], [-obl] } |
| 3. | /us/: | { [+N], [+pl], [+ α , + β , + γ], [+gov, -obl] } |
| 4. | /es/: | { [+N], [+pl], [<u>-α, -γ</u>], [-obl] } |
| 5. | /i/ : | { [+N], [+pl], [<u>+β, +γ</u>], [-obl] } |
| 6. | /a/: | { [<u>+N</u>], [+pl], [-obl] } |

Competition

T₁₂: The interaction of inflection markers in the plural in Greek

	I: [+α+β+γ]	II: [-α+β-γ]	III: [-α-β-γ]	IV: [-α-β+γ]	V: [+α+β-γ]	VI: [-α+β+γ]	VII: [+α-β+γ]	VIII: [+α-β-γ]
nom/pl: [-gov,-obl], [+pl]	/i ⁵ (/a ⁶)	/es ⁴ (/a ⁶)	/es ⁴ (/a ⁶)	/is ² (/a ⁶)	/a ⁶	/i ⁵ (/a ⁶)	/a ⁶	/a ⁶
acc/pl: [+gov,-obl], [+pl]	/us ³ (/i ⁵ , /a ⁶)	/es ⁴ (/a ⁶)	/es ⁴ (/a ⁶)	/is ² (/a ⁶)	/a ⁶	/i ⁵ (/a ⁶)	/a ⁶	/a ⁶
gen/pl: [+gov,+obl], [+pl]	/on ¹	/on ¹	/on ¹	/on ¹	/on ¹	/on ¹	/on ¹	/on ¹

Noun Inflection in German

References:

Blevins (2000), Eisenberg (2000), Wiese (2000), Wiese (2001), Müller (2002), Sternefeld (2004).

Four Inflection Classes

T₁₃: Major inflection classes I–IV

	I: masc, neut Hund _m ('dog'), Schaf _n ('sheep')	II: masc Baum _m ('tree')	III: neut, masc Buch _n ('book'), Mann _m ('man')	IV: masc, neut Strahl _m ('ray') Auge _n ('eye')
nom/sg	∅	∅	∅	∅
acc/sg	∅	∅	∅	∅
dat/sg	∅	∅	∅	∅
gen/sg	(e)s	(e)s	(e)s	(e)s
nom/pl	(e)	"(e)	"er	(e)n
acc/pl	(e)	"(e)	"er	(e)n
dat/pl	(e)n	"(e)n	"ern	(e)n
gen/pl	(e)	"(e)	"er	(e)n

Four More Inflection Classes

T₁₄: Major inflection classes V–VIII

	V: masc ('weak') Planet _m ('planet')	VI: fem Ziege _f ('goat')	VII: fem Maus _f ('mouse')	VIII: fem Drangsal _f ('distress')
nom/sg	∅	∅	∅	∅
acc/sg	(e)n	∅	∅	∅
dat/sg	(e)n	∅	∅	∅
gen/sg	(e)n	∅	∅	∅
nom/pl	(e)n	(e)n	”(e)	(e)
acc/pl	(e)n	(e)n	”(e)	(e)
dat/pl	(e)n	(e)n	”(e)n	(e)n
gen/pl	(e)n	(e)n	”(e)	(e)

Independently Motivated Features?

Note:

- (i) On this view, /s/-plurals do not belong to the core system of German noun inflection.
- (ii) "x means that x has a floating Umlaut feature.

Observation:

- (i) Gender features on the stem do not suffice to predict inflection class (N_[*masc*] can be I, II, IV, or V; N_[*fem*] can be VI, VII, or VIII; N_[*neut*] can be I or III).

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- (ii) Phonological features on the stem do not suffice to predict inflection class.
- (iii) Semantic features on the stem do not suffice to predict inflection class (e.g., not all members of V (weak masculines) are N_[*anim*], and not all masculine N_[*anim*] stems are in V.)

Analysis

T₁₅: Syncretism within and across inflection classes in German

	I _{m,n}	II _m	III _{n,m}	IV _{m,n}	V _m	VI _f	VII _f	VIII _f
nom/sg	∅	∅	∅	∅	∅	∅	∅	∅
acc/sg	∅	∅	∅	∅	(e)n	∅	∅	∅
dat/sg	∅	∅	∅	∅	(e)n	∅	∅	∅
gen/sg	(e)s	(e)s	(e)s	(e)s	(e)n	∅	∅	∅
nom/pl	(e) "	(e) "er	(e)n	(e)n	(e)n	(e)n	"(e)	(e)
acc/pl	(e) "	(e) "er	(e)n	(e)n	(e)n	(e)n	"(e)	(e)
dat/pl	(e)n	"(e)n	"ern	(e)n	(e)n	(e)n	"(e)n	(e)n
gen/pl	(e) "	(e) "er	(e)n	(e)n	(e)n	(e)n	"(e)	(e)

Case Decomposition

(16) **Decomposition of cases in German:** [\pm subject], [\pm governed], [\pm oblique]

nominative: [+subj, -gov, -obl]

accusative: [-subj, +gov, -obl]

dative: [-subj, +gov, +obl]

genitive: [+subj, +gov, +obl]

Inflection Class Decomposition

- (17) **Decomposition of inflection classes in German:** $[\pm\alpha]$, $[\pm\beta]$, $[\pm\gamma]$
- | | | |
|-------|------------------------------|---|
| I: | $[+\alpha, -\beta, +\gamma]$ | Hund _m ('dog'), Schaf _n ('sheep') |
| II: | $[+\alpha, -\beta, -\gamma]$ | Baum _m ('tree'), Nagel _m ('nail') |
| III: | $[+\alpha, +\beta, +\gamma]$ | Buch _n ('book'), Kalb _n ('calf'), Mann _m ('man') |
| IV: | $[+\alpha, +\beta, -\gamma]$ | Strahl _m ('ray'), Auge _n ('eye') |
| V: | $[-\alpha, +\beta, +\gamma]$ | Planet _m ('planet'), Bote _m ('messenger') |
| VI: | $[-\alpha, +\beta, -\gamma]$ | Ziege _f ('goat') |
| VII: | $[-\alpha, -\beta, -\gamma]$ | Maus _f ('mouse') |
| VIII: | $[-\alpha, -\beta, +\gamma]$ | Drangsal _f ('distress'), Finsternis _f ('darkness') |

Vocabulary Items (Singular) and Their Competition

(18) Inflection markers (singular):

1. /(e)n/: $\{ [+N], [-\alpha, +\beta, +\gamma], [+gov] \}$
2. /(e)s/: $\{ [+N], [+\alpha], [+subj, +gov, +obl] \}$
3. / \emptyset /: $\{ [+N] \}$

T₁₆: The interaction of inflection markers in the singular in German

	I: [[$+\alpha-\beta+\gamma$]]	II: [[$+\alpha-\beta-\gamma$]]	III: [[$+\alpha+\beta+\gamma$]]	IV: [[$+\alpha+\beta-\gamma$]]	V: [[$-\alpha+\beta+\gamma$]]	VI: [[$-\alpha+\beta-\gamma$]]	VII: [[$-\alpha-\beta-\gamma$]]	VIII: [[$-\alpha-\beta+\gamma$]]
nom/sg	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³
acc/sg	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³	/ <u>(e)n</u> / ¹ (/ \emptyset / ³)	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³
dat/sg	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³	/ <u>(e)n</u> / ¹ (/ \emptyset / ³)	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³
gen/sg	/ <u>(e)s</u> / ² (/ \emptyset / ³)	/ <u>(e)s</u> / ² (/ \emptyset / ³)	/ <u>(e)s</u> / ² (/ \emptyset / ³)	/ <u>(e)s</u> / ² (/ \emptyset / ³)	/ <u>(e)n</u> / ¹ (/ \emptyset / ³)	/ \emptyset / ³	/ \emptyset / ³	/ \emptyset / ³

Vocabulary Items (Plural)

(19) Inflection markers (plural):

1. /"ern/: { [+N], [+pl], [+ α , + β , + γ], [-subj, +gov, +obl] }
2. /"er/: { [+N], [+pl], [+ α , + β , + γ] }
3. /(e)n/: { [+N], [+pl], [- β , + γ], [-subj, +gov, +obl] }
4. /"(e)n/: { [+N], [+pl], [- β , - γ], [-subj, +gov, +obl] }
5. /(e)/: { [+N], [+pl], [- β , + γ] }
6. /"(e)/: { [+N], [+pl], [- β , - γ] }
7. /(e)n/: { [+N], [+pl], [+ β] }

Competition in the Plural

T₁₇: The interaction of inflection markers in the plural in German

	I: [+α-β+γ]	II: [+α-β-γ]	III: [+α+β+γ]	IV: [+α+β-γ]	V: [-α+β+γ]	VI: [-α+β-γ]	VII: [-α-β-γ]	VIII: [-α-β+γ]
nom/pl	/(e)/ ⁵	/'(e)/ ⁶	/'er/ ² (/(e)n/ ⁷)	/(e)n/ ⁷	/(e)n/ ⁷	/(e)n/ ⁷	/'(e)/ ⁶	/(e)/ ⁵
acc/pl	/(e)/ ⁵	/'(e)/ ⁶	/'er/ ² (/(e)n/ ⁷)	/(e)n/ ⁷	/(e)n/ ⁷	/(e)n/ ⁷	/'(e)/ ⁶	/(e)/ ⁵
dat/pl	/(e)n/ ³ (/e/ ⁵)	/'(e)n/ ⁴ (/'e/ ⁶)	/'ern/ ¹ (/'er/ ² ,/(e)n/ ⁷)	/(e)n/ ⁷	/(e)n/ ⁷	/(e)n/ ⁷	/'(e)n/ ⁴ (/'e/ ⁶)	/(e)n/ ³ (/e/ ⁵)
gen/pl	/(e)/ ⁵	/'(e)/ ⁶	/'er/ ² (/(e)n/ ⁷)	/(e)n/ ⁷	/(e)n/ ⁷	/(e)n/ ⁷	/'(e)/ ⁶	/(e)/ ⁵

General Considerations

Observation:

Verbs do not impose inflection class restrictions on their arguments.

Note:

There is no verb-subject agreement with respect to inflection class. In fact there is even no noun-adjective agreement with respect to inflection class.

(20) **No inflection class agreement in Spanish.**

- a. la chica inteligente
the girl intelligent
- b. el chico inteligente
the boy intelligent

Class Features and Syntax

Conclusion:

Syntax cannot interpret class features. Class features are necessary in morphology but uninterpretable in syntax.

- (21) **Legibility Condition** (Chomsky (2000), Chomsky (2001)):
Morpho-syntactic features can be present in some component of grammar only if they are interpretable in this component.

Further conclusion, given the Legibility Condition:

Class features are absent in syntax.

Proposal

Note:

Features that are uninterpretable at LF must be deleted in syntax, and they can be deleted by participating in an Agree operation. Agree applies under matching of a probe and a goal if both involve uninterpretable features (and may be accompanied by Merge (movement)).

Proposal:

Class features act as probes in morphology.

Morphology \rightarrow Syntax = Syntax \rightarrow Semantics

Assumption:

- (i) Agree operates in syntax to remove LF-uninterpretable features before LF is reached.
- (ii) Agree operates in morphology to remove syntactically uninterpretable features before syntax is reached.

(22) Components of Grammar:

Lexicon \rightarrow Morphology \rightarrow Syntax \rightarrow PF, LF

- a. Lexicon: list of exceptions
- b. Morphology: probe-driven Agree (= fusional inflection), pure (selection-driven) Merge (perhaps incl. derivational morphology)
- c. Syntax: probe-driven Agree (incl. movement), pure (selection-driven) Merge (perhaps incl. derivational morphology, see below)

Fusional Noun Inflection

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 - e. The inflection marker determined by the Subset Principle is selected from the lexicon and merged with the noun stem, resulting in Agree.

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 - f. The class feature of the noun stem, and all morpho-syntactic features of the inflection marker, are deleted in morphology.

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 - b. Non-inherent features (incl. fully specified case and number features) are added in morphology.
 - c. A class feature on the noun stem acts as a probe and requires an Agree operation resulting in Merge with an inflection marker (the goal).
 - d. All of an inflection marker's features (including – often underspecified – class and Case features) are inherent.
 - e. The inflection marker determined by the Subset Principle is selected from the lexicon and merged with the noun stem, resulting in Agree.
 - f. The class feature of the noun stem, and all morpho-syntactic features of the inflection marker, are deleted in morphology.
 - g. The inflected noun enters syntax, bearing only fully specified and syntactically interpretable morpho-syntactic features.

Underspecification and Syntax

Note on (23-f):

Underspecified inflection markers give rise to a well-known problem: Syntax needs fully specified Case information, not the underspecified Case information provided by inflection markers. This problem does not arise if the morpho-syntactic features of an inflection marker are automatically deleted by an inflection operation.

(24) Fusional noun inflection as class-feature-driven Agree:

- a. /tetrad'/ ('notebook') –
 [+N, -anim, -pl, ~~{-α, -γ}~~, {-subj, +gov, +obl}]
 /i/
~~[+N, {-α}, {+obl}]~~
- b. /komnat/ ('room') –
 [+N, -bel, -pl, ~~{-α, +γ}~~, {-subj, +gov, -obl}]
 /u/
~~[+N, {-subj, +gov}]~~

General Characteristics of the Approach

Side remark:

In the terminology of Stump (2001), the present approach qualifies as “realizational”: despite being a lexical item with morpho-syntactic features, an inflection marker does not actually contribute any morpho-syntactic information to the noun that it combines with.

Maximize Matching Effects

Observation 1:

By assimilating inflection and syntactic operations, the Subset Principle can in fact be dispensed with in favour of Chomsky's (2001) principle **Maximize Matching Effects** (given that it is sensitive to the hierarchy of features in (7)).

(25) Specificity as Maximize Matching Effects:

- | | | |
|----|--|---|
| a. | /tetrad'/ | - /i/ |
| | [+N,-bel,-pl, {-α,-γ} ,{-subj,+gov,+obl}] | [+N , {-α} , {+obl}] |
| b. | /tetrad'/ | - /u/ |
| | [+N,-bel,-pl, {-α,-γ} ,{-subj,+gov,+obl}] | [+N , {-subj,+gov}] |
| c. | /tetrad'/ | - /a/ |
| | [+N,-bel,-pl, {-α,-γ} ,{-subj,+gov,+obl}] | [+N] |

Indeclinable Nouns

Observation 2:

The approach also offers a straightforward account of indeclinable noun stems in Greek and Russian for which separate inflection classes have often been stipulated; see, e.g., *reporter_m* ('reporter'), *plaz_f* ('beach') in Greek, *buržua_m* ('bourgeois'), *kofe_m* ('coffee') in Russian. These noun stems simply lack a class feature – hence, a probe that might trigger inflection.

Alternatives

Note:

Class features are needed in morphology to account for noun inflection markers Russian, Greek, and German. A priori, there are three possibilities concerning the timing of inflection:

- (26)
- a. Noun inflection applies pre-syntactically.
 - b. Noun inflection applies in the syntax.
 - c. Noun inflection applies post-syntactically.

Given that there is reason to assume that class features are absent in syntax, we have suggested a pre-syntactic approach to noun inflection where class features are deleted before the noun enters syntax. What about the alternatives?

Inner-Syntactic Approaches

1. Inner-syntactic approaches:

Class features trigger inflection in the syntax; however, a class feature that shows up in the syntax is incompatible with the Legibility Condition.

Post-Syntactic Approaches

2. **Post-syntactic approaches** (as in Distributed Morphology; see Halle & Marantz (1993), Harley & Noyer (1999)):

There are two possibilities:

(i) Class features trigger inflection post-syntactically; but they are present in syntax already. Then, the same problem as with 1. arises: At the point where a late insertion approach needs a class feature, the Legibility Condition has long forced its deletion.

(ii) Class features trigger inflection post-syntactically; they are not present in syntax, but enter the derivation after syntax (Embick (2000)), perhaps by a dissociation operation (Embick (1998)). They might then act as probes in a post-syntactic morphology and undergo deletion before PF is reached. Such an approach may at first sight seem to be able to accommodate the gist of our proposal. However, it invariably violates the **Inclusiveness Condition**.

Conclusion

Conclusion:

A pre-syntactic approach is compatible with both the Legibility Condition and the Inclusiveness Condition; inner- and post-syntactic approaches are not.

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