Morphologie: Morphologie der Argumentkodierung
Synkretismen und Flexionsklassen 2

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Lit.: Alexiadou & Müller (2008)
What is the status of class features in languages with fusional noun inflection (Russian, Greek, German)?
1. Class features are present in morphology:
   They are needed to predict the choice of inflection marker for a given stem in morphology
   (gender, phonological, semantic features of the stem do not suffice).
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   They combine to yield the standard inflection classes (by underspecification, natural classes
   of inflection classes can be formed that permit a systematic account of syncretism across
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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:

$T_1$: Inflection class I, Sg.: masc

<table>
<thead>
<tr>
<th></th>
<th>zavod$_m$ (‘factory’)</th>
<th>student$_m$ (‘student’)</th>
<th>tovarišč$_m$ (‘comrade’)</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
</tr>
<tr>
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<td>a</td>
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<tr>
<td>gen</td>
<td>a</td>
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<td>a</td>
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<tr>
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<td>om</td>
<td>em</td>
</tr>
<tr>
<td>loc</td>
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<td>e</td>
</tr>
</tbody>
</table>
**T₂: Inflection class II, Sg.: fem, masc**

<table>
<thead>
<tr>
<th></th>
<th>komnat&lt;sub&gt;f&lt;/sub&gt; ('room')</th>
<th>učitel’nic&lt;sub&gt;f&lt;/sub&gt; ('fem. teacher')</th>
<th>nedel’&lt;sub&gt;f&lt;/sub&gt; ('week')</th>
<th>muščin&lt;sub&gt;m&lt;/sub&gt; ('man')</th>
</tr>
</thead>
<tbody>
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<td>ja</td>
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<td>oj(u)</td>
<td>ej(u)</td>
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<tr>
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<td>e</td>
<td>e</td>
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</tbody>
</table>
### T₃: Inflection class III, Sg.: fem

<table>
<thead>
<tr>
<th></th>
<th>tetrad’ᵢ (‘notebook’)</th>
<th>myš’ᵢ (‘mouse’)</th>
<th>doč’ᵢ (‘daughter’)</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
</tr>
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<td>Ø</td>
<td>Ø</td>
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<tr>
<td>dat</td>
<td>i</td>
<td>i</td>
<td>(er)i</td>
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<td>i</td>
<td>(er)i</td>
</tr>
<tr>
<td>inst</td>
<td>ju</td>
<td>ju</td>
<td>(er’)ju</td>
</tr>
<tr>
<td>loc</td>
<td>i</td>
<td>i</td>
<td>(er)i</td>
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</table>
T₄: Inflection class IV, Sg.: neut

<table>
<thead>
<tr>
<th></th>
<th>mestₜₙ (‘place’)</th>
<th>jablokₜₙ (‘apple’)</th>
<th>syščestvₜₙ (‘being’)</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
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<td>o</td>
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<tr>
<td>dat</td>
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<td>a</td>
</tr>
<tr>
<td>inst</td>
<td>om</td>
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<td>em</td>
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<tr>
<td>loc</td>
<td>e</td>
<td>e</td>
<td>e</td>
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</tbody>
</table>
Observation:
(i) Gender features on the stem do not suffice to predict inflection class \(N_{masc}\) can be I or II; \(N_{fem}\) can be II or III).
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Conclusion:
Class features are needed.
### Analysis

**T₅**: Syncretism within and across inflection classes in Russian

<table>
<thead>
<tr>
<th></th>
<th>Iₘ</th>
<th>IIₙₐₜ</th>
<th>IIIₙ</th>
<th>IVₙ</th>
</tr>
</thead>
<tbody>
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<td>nom</td>
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<td>Ø</td>
<td>o</td>
</tr>
<tr>
<td>acc</td>
<td>Ø/a</td>
<td>u</td>
<td>Ø</td>
<td>o</td>
</tr>
<tr>
<td>dat</td>
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<td>i</td>
<td>u</td>
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<tr>
<td>gen</td>
<td>a</td>
<td>i</td>
<td>i</td>
<td>a</td>
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<tr>
<td>inst</td>
<td>om</td>
<td>oj</td>
<td>ju</td>
<td>om</td>
</tr>
<tr>
<td>loc</td>
<td>e</td>
<td>e</td>
<td>i</td>
<td>e</td>
</tr>
</tbody>
</table>
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: [±subject], [±governed], [±oblique]

<table>
<thead>
<tr>
<th>Case</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>nominative</td>
<td>[+subj,–gov,–obl]</td>
</tr>
<tr>
<td>accusative</td>
<td>[–subj, +gov,–obl]</td>
</tr>
<tr>
<td>dative</td>
<td>[–subj, +gov,+obl]</td>
</tr>
<tr>
<td>genitive</td>
<td>[+subj, +gov,+obl]</td>
</tr>
<tr>
<td>instrumental</td>
<td>[+subj,–gov,+obl]</td>
</tr>
<tr>
<td>locative</td>
<td>[–subj,–gov,+obl]</td>
</tr>
</tbody>
</table>
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Decomposition of cases in Russian: [±subject], [±governed], [±oblique]

- nominative: [+subj,–gov,–obl]
- accusative: [–subj,+gov,–obl]
- dative: [–subj,+gov,+obl]  ergative? → [+subj,+gov,–obl]
- genitive: [+subj,+gov,+obl]
- instrumental: [+subj,–gov,+obl]
- locative: [–subj,–gov,+obl]
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 ([±marginal], [±marked] in addition to the “standard” class features A, B); Nesset (1994) on Russian noun inflection ([±nom-end] and [a/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).)
(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’)

Gereon Müller (Institut für Linguistik)
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],[+\alpha],[+subj, -gov, +obl]\}
4. /e/: \{[+N],[+\alpha, +\gamma],[+obl]\}
5. /e/: \{[+N],[+\alpha],[+subj, -gov, +obl]\}
6. /o/: \{[+N],[+\alpha, +\gamma],[+obl]\}
7. /Ø/: \{[+N],[-\gamma],[+obl]\}
8. /i/: \{[+N],[+\alpha],[+obl]\}
9. /u/: \{[+N],[-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.
**Assumption:**
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 $F$ such that (i) and (ii) hold.
(i) $I_i$ bears more features in $F$ than $I_j$ does.
(ii) There is no higher-ranked set of features $F'$ such that $I_i$ and $I_j$ have a different number of features in $F'$.

(7) **Hierarchy of features:**
Number $\gg$ Class $\gg$ Case
### T₆: The interaction of inflection markers in the singular in Russian

<table>
<thead>
<tr>
<th></th>
<th>I: [+α,−γ]</th>
<th>II: [−α, +γ]</th>
<th>III: [−α,−γ]</th>
<th>IV: [+α, +γ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom:</td>
<td>/∅/⁹</td>
<td>/a/¹⁰</td>
<td>/∅/⁹</td>
<td>/o/⁶</td>
</tr>
<tr>
<td>[+subj,−gov,−obl]</td>
<td>(/a/¹⁰)</td>
<td>(/a/¹⁰)</td>
<td>(/a/¹⁰)</td>
<td>(/a/¹⁰)</td>
</tr>
<tr>
<td>acc:</td>
<td>/∅/⁹</td>
<td>/u/⁹</td>
<td>/∅/⁹</td>
<td>/o/⁶</td>
</tr>
<tr>
<td>[−subj, +gov,−obl]</td>
<td>(/u/⁹, /a/¹⁰)</td>
<td>(/a/¹⁰)</td>
<td>(/u/⁹, /a/¹⁰)</td>
<td>(/a/¹⁰)</td>
</tr>
<tr>
<td>dat:</td>
<td>/u/⁹</td>
<td>/e/⁴</td>
<td>/i/⁸</td>
<td>/u/⁹</td>
</tr>
<tr>
<td>[−subj, +gov, +obl]</td>
<td>(/a/¹⁰)</td>
<td>(/i/⁸, /u/⁹, /a/¹⁰)</td>
<td>(/u/⁹, /a/¹⁰)</td>
<td>(/a/¹⁰)</td>
</tr>
<tr>
<td>gen:</td>
<td>/a/¹⁰</td>
<td>/i/⁸</td>
<td>/i/⁸</td>
<td>/a/¹⁰</td>
</tr>
<tr>
<td>[+subj, +gov, +obl]</td>
<td></td>
<td>(/a/¹⁰)</td>
<td>(/a/¹⁰)</td>
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</tr>
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<td>/om/³</td>
<td>/oj/¹</td>
<td>/ju/²</td>
<td>/om/³</td>
</tr>
<tr>
<td>[+subj,−gov, +obl]</td>
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<td>(/i/⁸, /a/¹⁰)</td>
<td>(/i/⁸, /a/¹⁰)</td>
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<td>/e/⁴</td>
<td>/i/⁸</td>
<td>/e/⁵</td>
</tr>
<tr>
<td>[−subj,−gov, +obl]</td>
<td>(/a/¹⁰)</td>
<td>(/i/⁸, /a/¹⁰)</td>
<td>(/a/¹⁰)</td>
<td>(/a/¹⁰)</td>
</tr>
</tbody>
</table>
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], [–γ], [+subj, +gov, +obl] \}

5. /Ø/:
   \{ [+N], [+pl], [γ], [+subj, +gov, +obl] \}

6. /i/:
   \{ [+N], [+pl], [–(γ, −α), –obl] \}

7. /a/:
   \{ [+N], [+pl], [–obl] \}
**T₇**: The interaction of inflection markers in the plural in Russian

<table>
<thead>
<tr>
<th></th>
<th>I: [+α,−γ]</th>
<th>II: [−α,+γ]</th>
<th>III: [−α,−γ]</th>
<th>IV: [+α,+γ]</th>
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<td>(/a/⁷)</td>
<td>(/a/⁷)</td>
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<td>/i/⁶</td>
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<td>/ami/²</td>
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<td></td>
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<td>loc:</td>
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<td>/ax/¹</td>
<td>/ax/¹</td>
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<tr>
<td>[−subj,−gov,+obl]</td>
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</tbody>
</table>
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:**

\[
\begin{align*}
[+\alpha] \ (I, IV) & \rightarrow /\text{om}/ \ (\text{Sg.}), \ /e/ \ (\text{Sg.}) \\
[-\alpha] \ (II, III) & \rightarrow /i/ \ (\text{Sg.}) \\
[+\gamma] \ (II, IV) & \rightarrow /\emptyset/ \ (\text{Pl.}) \\
[-\gamma] \ (I, III) & \rightarrow /\emptyset/ \ (\text{Sg.}), \ /ov/ \ (\text{Pl})
\end{align*}
\]
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)  
\begin{align*}
a. & \quad \text{A rule of referral for accusative/genitive syncretism in the singular:} \\
& \quad I\{[+\alpha, -\gamma], [-\text{subj}, +\text{gov}, -\text{obl}]\} \rightarrow I\{[+\alpha, -\gamma], [+\text{subj}, +\text{gov}, +\text{obl}]\}/[+\text{animate}]_. \\
& \quad \text{b. A rule of referral for accusative/genitive syncretism in the plural:} \\
& \quad I\{[+\text{pl}], [-\text{subj}, +\text{gov}, -\text{obl}]\} \rightarrow I\{[+\text{pl}], [+\text{subj}, +\text{gov}, +\text{obl}]\}/[+\text{animate}]_.
\end{align*}
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 /Ø/\(^5\) (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).
Recent 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.

\[(11) \quad \begin{align*}
    \text{a.} \quad & [-\text{subj},-\text{obl}] \rightarrow [+\text{subj},+\text{obl}] / [+\alpha,-\gamma], [+\text{anim}] \\
    \text{b.} \quad & [-\text{subj},-\text{obl}] \rightarrow [+\text{subj},+\text{obl}] / [+\text{pl}], [+\text{anim}] 
\end{align*}\]
Noun Inflection in Greek

References:

Assumption (Ralli (1994)):
There are eight inflection classes. (Traditional view: three classes)
### Noun Inflection in Greek

#### Four Inflection Classes

<table>
<thead>
<tr>
<th></th>
<th>I: masc kip&lt;sub&gt;m&lt;/sub&gt; (‘garden’)</th>
<th>I: fem psif&lt;sub&gt;f&lt;/sub&gt; (‘vote’)</th>
<th>II: masc maxit(i)&lt;sub&gt;m&lt;/sub&gt; (‘fighter’)</th>
<th>III: fem avl(i)&lt;sub&gt;f&lt;/sub&gt; (‘yard’)</th>
<th>IV: fem pol(i)(e)&lt;sub&gt;f&lt;/sub&gt; (‘city’)</th>
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</thead>
<tbody>
<tr>
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<td>Ø</td>
<td>Ø</td>
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<td>o(n)</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
</tr>
<tr>
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<td>u</td>
<td>u</td>
<td>Ø</td>
<td>s</td>
<td>s</td>
</tr>
<tr>
<td>voc/sg</td>
<td>e</td>
<td>e</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
</tr>
<tr>
<td>nom/pl</td>
<td>i</td>
<td>i</td>
<td>es</td>
<td>es</td>
<td>is</td>
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<tr>
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<td>us</td>
<td>us</td>
<td>es</td>
<td>es</td>
<td>is</td>
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<td>on</td>
<td>on</td>
<td>on</td>
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<tr>
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### T₉: Inflection classes V–VIII

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<td>acc/sg</td>
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<td>Ø</td>
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<td>u</td>
<td>us</td>
<td>u</td>
<td>os</td>
</tr>
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<td>voc/sg</td>
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<td>Ø</td>
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<tr>
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<td>on</td>
<td>on</td>
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<tr>
<td>voc/pl</td>
<td>a</td>
<td>i</td>
<td>a</td>
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</table>
Observation:
(i) Gender features on the stem do not suffice to predict inflection class ($N_{[\text{masc}]}$ can be I or II; $N_{[\text{fem}]}$ can be I, III, or IV; $N_{[\text{neut}]}$ can be V-VIII).
Observation:
(i) Gender features on the stem do not suffice to predict inflection class ($N_{\text{masc}}$ can be I or II; $N_{\text{fem}}$ can be I, III, or IV; $N_{\text{neut}}$ can be V-VIII).
(ii) Phonological features on the stem do not suffice to predict inflection class (thematic vowels are either part of the ending, in which case they cannot encode inflection class by definition; or they are part of the stem, where they fail to unambiguously encode inflection class; see, e.g., $\text{maxit}(i)$ (‘fighter’) vs. $\text{papa}(\delta)$ (‘priest’) vs. $\text{papu}(\delta)$ (‘grandfather’) in class II).
Observation:
(i) Gender features on the stem do not suffice to predict inflection class ($N_{[masc]}$ can be I or II; $N_{[fem]}$ can be I, III, or IV; $N_{[neut]}$ can be V-VIII).
(ii) Phonological features on the stem do not suffice to predict inflection class (thematic vowels are either part of the ending, in which case they cannot encode inflection class by definition; or they are part of the stem, where they fail to unambiguously encode inflection class; see, e.g., maxit(i) (‘fighter’) vs. papa($\delta$) (‘priest’) vs. papu($\delta$) (‘grandfather’) in class II).
(iii) Semantic features on the stem do not suffice to predict inflection class.
T_{10}: Syncretism within and across inflection classes in Greek

<table>
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<th>‘1.decl.’</th>
<th>‘3.decl.’</th>
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<tr>
<td></td>
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<td>$II_{m}$</td>
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<td>s</td>
<td>$\emptyset$</td>
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<td>o(n)</td>
<td>$\emptyset$</td>
<td>$\emptyset$</td>
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<tr>
<td>gen/sg</td>
<td>u</td>
<td>$\emptyset$</td>
<td>s</td>
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<tr>
<td>voc/sg</td>
<td>e</td>
<td>$\emptyset$</td>
<td>$\emptyset$</td>
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<td>nom/pl</td>
<td>i</td>
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<td>acc/pl</td>
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<td>gen/pl</td>
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<tr>
<td>voc/pl</td>
<td>i</td>
<td>es</td>
<td>es</td>
</tr>
</tbody>
</table>
(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: $[-\text{subj},-\text{gov},-\text{obl}]$)
(13) Decomposition of inflection classes in Greek: $[\pm \alpha], [\pm \beta], [\pm \gamma]$

<table>
<thead>
<tr>
<th>Inflection Class</th>
<th>Example Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>I: $[+\alpha,+\beta,+\gamma]$</td>
<td>kip$_m$ (‘garden’), psif$_f$ (‘vote’)</td>
</tr>
<tr>
<td>V: $[+\alpha,+\beta,-\gamma]$</td>
<td>vun$_n$ (‘mountain’)</td>
</tr>
<tr>
<td>VII: $[+\alpha,-\beta,+\gamma]$</td>
<td>spiti$_n$ (‘house’)</td>
</tr>
<tr>
<td>VIII: $[+\alpha,-\beta,-\gamma]$</td>
<td>soma(t)$_n$ (‘body’)</td>
</tr>
<tr>
<td>VI: $[-\alpha,+\beta,+\gamma]$</td>
<td>krat$_n$ (‘state’)</td>
</tr>
<tr>
<td>IV: $[-\alpha,-\beta,+\gamma]$</td>
<td>pol(i)(e)$_f$ (‘city’)</td>
</tr>
<tr>
<td>II: $[-\alpha,+\beta,-\gamma]$</td>
<td>maxit(i)$_m$ (‘fighter’)</td>
</tr>
<tr>
<td>III: $[-\alpha,-\beta,-\gamma]$</td>
<td>avl(i)$_f$ (‘yard’)</td>
</tr>
</tbody>
</table>
Vocabulary Items (Singular)

(14) Inflection markers (singular):

1. /o(n)/: \{[+N],[+\alpha,+\beta,+\gamma],[+gov,–obl]\}
2. /os/: \{[+N],[+\alpha,–\beta,–\gamma],[+gov,+obl]\}
3. /us/: \{[+N],–\alpha,+\beta,+\gamma],[+gov,+obl]\}
4. /o/: \{[+N],[+\alpha,+\beta,–\gamma],[–obl]\}
5. /os/: \{[+N],[+\alpha,+\beta,–\gamma],[–obl]\}
6. /s/: \{[+N],–\alpha,\beta],[–\gamma,gov,–\gamma,obl]\}
7. /u/: \{[+N],[+\alpha],[+gov,+obl]\}
8. /Ø/: \{[+N]\}
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: $\alpha$-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 $\{ [+N],[−\alpha,+\beta],[−gov,−obl] \}$, and one specified as $\{ [+N],[−\alpha,−\beta],[+gov,+obl] \}$. 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.)
**T₁₁**: The interaction of inflection markers in the singular in Greek

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<td>/os/⁵ (=/Ø/⁸)</td>
<td>/s/⁶ (=/Ø/⁸)</td>
<td>/Ø/⁸</td>
<td>/Ø/⁸</td>
<td>/o/⁴ (=/Ø/⁸)</td>
<td>/os/⁵ (=/s/⁶, /Ø/⁸)</td>
<td>/Ø/⁸</td>
<td>/Ø/⁸</td>
</tr>
<tr>
<td></td>
<td>[–gov,–obl],</td>
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<td>[–pl]</td>
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</tr>
<tr>
<td>acc/sg:</td>
<td>/o(n)/¹ (=/os/⁵, /Ø/⁸)</td>
<td>/Ø/⁸</td>
<td>/Ø/⁸</td>
<td>/Ø/⁸</td>
<td>/o/⁴ (=/Ø/⁸)</td>
<td>/os/⁵ (=/Ø/⁸)</td>
<td>/Ø/⁸</td>
<td>/Ø/⁸</td>
</tr>
<tr>
<td></td>
<td>[+gov,–obl],</td>
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<td>[–pl]</td>
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<td></td>
</tr>
<tr>
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<td>/Ø/⁸</td>
<td>/s/⁶ (=/Ø/⁸)</td>
<td>/s/⁶</td>
<td>/u/⁷ (=/Ø/⁸)</td>
<td>/us/³ (=/Ø/⁸)</td>
<td>/u/⁷ (=/u/⁷, /Ø/⁸)</td>
<td>/os/² (=/u/⁷, /Ø/⁸)</td>
</tr>
<tr>
<td></td>
<td>[+gov,+obl],</td>
<td></td>
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<td>[–pl]</td>
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</tbody>
</table>
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], [–α, –β, +γ], [–obl] \}
5. /i/:
   \{ [+N], [+pl], [–α, +β, +γ], [–obl] \}
6. /a/:
   \{ [+N], [+pl], [–obl] \}

Gereon Müller (Institut für Linguistik)
04-006-1006
**T\textsubscript{12}: The interaction of inflection markers in the plural in Greek**

<table>
<thead>
<tr>
<th></th>
<th>I: $[+\alpha+\beta+\gamma]$</th>
<th>II: $[-\alpha+\beta-\gamma]$</th>
<th>III: $[-\alpha-\beta-\gamma]$</th>
<th>IV: $[+\alpha+\beta-\gamma]$</th>
<th>V: $[-\alpha+\beta+\gamma]$</th>
<th>VI: $[+\alpha-\beta+\gamma]$</th>
<th>VII: $[-\alpha-\beta+\gamma]$</th>
<th>VIII: $[+\alpha-\beta-\gamma]$</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom/pl: $[-\text{gov},-\text{obl}], [+\text{pl}]$</td>
<td>/i/(^5) $(/a/^6)$</td>
<td>/es/(^4) $(/a/^6)$</td>
<td>/es/(^4) $(/a/^6)$</td>
<td>/is(^2) $(/a/^6)$</td>
<td>/a/(^6)</td>
<td>/i/(^5) $(/a/^6)$</td>
<td>/a/(^6)</td>
<td>/a/(^6)</td>
</tr>
<tr>
<td>acc/pl: $[+\text{gov},-\text{obl}], [+\text{pl}]$</td>
<td>/us/(^3) $(/i/^5, /a/^6)$</td>
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<td>/i/(^5) $(/a/^6)$</td>
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<td>/a/(^6)</td>
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References:
## T₁₃: Major inflection classes I–IV

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<thead>
<tr>
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<th>IV: masc, neut</th>
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<tbody>
<tr>
<td></td>
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<td>Baumₘ (‘tree’)</td>
<td>Buchₙ (‘book’), Mannₘ (‘man’)</td>
<td>Strahlₘ (‘ray’), Augeₙ (‘eye’)</td>
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<td>Ø</td>
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<tr>
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## T₁₄: Major inflection classes V–VIII

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<tr>
<th>Case</th>
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<th>VII: fem</th>
<th>VIII: fem</th>
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<tr>
<td></td>
<td>Planetₘ (‘planet’)</td>
<td>Ziege₇ (‘goat’)</td>
<td>Maus₇ (‘mouse’)</td>
<td>Drangsal₇ (‘distress’)</td>
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<tr>
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<td>(e)n</td>
<td>&quot;(e)&quot;</td>
<td>(e)</td>
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<tr>
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<td>(e)n</td>
<td>(e)n</td>
<td>&quot;(e)&quot;</td>
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<td>(e)n</td>
<td>(e)n</td>
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 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\text{[masc]} can be I, II, IV, or V; N\text{[fem]} can be VI, VII, or VIII; N\text{[neut]} can be I or III).
Independently Motivated Features?

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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).
(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.)
### T₁₅: Syncretism within and across inflection classes in German

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<tr>
<th></th>
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<th>IIₘ</th>
<th>IIIₙₘ</th>
<th>IVₘₙ</th>
<th>Vₘ</th>
<th>VIₙ</th>
<th>VIIₙ</th>
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<tbody>
<tr>
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<tr>
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<tr>
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<td>Ø</td>
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<td>Ø</td>
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<td>Ø</td>
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<td>(e)s</td>
<td>(e)s</td>
<td>(e)s</td>
<td>(e)n</td>
<td>Ø</td>
<td>Ø</td>
<td>Ø</td>
</tr>
<tr>
<td>nom/pl</td>
<td>(e) &quot;(e)&quot; &quot;er&quot; (e)n</td>
<td>(e)n</td>
<td>(e)n</td>
<td>&quot;(e)&quot;</td>
<td>(e)</td>
<td>(e)</td>
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<td>(e)n</td>
<td>(e)n</td>
<td>&quot;(e)&quot;</td>
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<td>(e)n</td>
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<td>(e)n</td>
<td>&quot;(e)n&quot;</td>
<td>(e)</td>
<td>(e)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Case Decomposition

Decomposition of cases in German: \([\pm \text{subject}], [\pm \text{governed}], [\pm \text{oblique}]\)

- nominative: \([+\text{subj}, -\text{gov}, -\text{obl}]\)
- accusative: \([-\text{subj}, +\text{gov}, -\text{obl}]\)
- dative: \([-\text{subj}, +\text{gov}, +\text{obl}]\)
- genitive: \([+\text{subj}, +\text{gov}, +\text{obl}]\)
(17) Decomposition of inflection classes in German: \([\pm \alpha], [\pm \beta], [\pm \gamma]\)

<table>
<thead>
<tr>
<th>Class</th>
<th>Inflection</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>([+\alpha,-\beta,+\gamma])</td>
<td>Hund(_m) (‘dog’), Schaf(_n) (‘sheep’)</td>
</tr>
<tr>
<td>II</td>
<td>([+\alpha,-\beta,-\gamma])</td>
<td>Baum(_m) (‘tree’), Nagel(_m) (‘nail’)</td>
</tr>
<tr>
<td>III</td>
<td>([+\alpha,+\beta,+\gamma])</td>
<td>Buch(_n) (‘book’), Kalb(_n) (‘calf’), Mann(_m) (‘man’)</td>
</tr>
<tr>
<td>IV</td>
<td>([+\alpha,+\beta,-\gamma])</td>
<td>Strahl(_m) (‘ray’), Auge(_n) (‘eye’)</td>
</tr>
<tr>
<td>V</td>
<td>([-\alpha,+\beta,+\gamma])</td>
<td>Planet(_m) (‘planet’), Bote(_m) (‘messenger’)</td>
</tr>
<tr>
<td>VI</td>
<td>([-\alpha,+\beta,-\gamma])</td>
<td>Ziege(_f) (‘goat’)</td>
</tr>
<tr>
<td>VII</td>
<td>([-\alpha,-\beta,-\gamma])</td>
<td>Maus(_f) (‘mouse’)</td>
</tr>
<tr>
<td>VIII</td>
<td>([-\alpha,-\beta,+\gamma])</td>
<td>Drangsal(_f) (‘distress’), Finsternis(_f) (‘darkness’)</td>
</tr>
</tbody>
</table>
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]

T_{16}: The interaction of inflection markers in the singular in German

<table>
<thead>
<tr>
<th></th>
<th>I:  [+(\alpha)–(\beta)+(\gamma)]</th>
<th>II:  [+(\alpha)–(\beta)–(\gamma)]</th>
<th>III:  [+(\alpha)+(\beta)+(\gamma)]</th>
<th>IV:  [+(\alpha)+(\beta)–(\gamma)]</th>
<th>V:  [−(\alpha)+(\beta)+(\gamma)]</th>
<th>VI:  [−(\alpha)+(\beta)–(\gamma)]</th>
<th>VII:  [−(\alpha)–(\beta)+(\gamma)]</th>
<th>VIII:  [−(\alpha)–(\beta)–(\gamma)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom/sg</td>
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<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
</tr>
<tr>
<td>acc/sg</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(e)n/(^1) (/(\emptyset)/^3)</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
</tr>
<tr>
<td>dat/sg</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(e)n/(^1) (/(\emptyset)/^3)</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
</tr>
<tr>
<td>gen/sg</td>
<td>/(e)s/(^2) (/(\emptyset)/^3)</td>
<td>/(e)s/(^2) (/(\emptyset)/^3)</td>
<td>/(e)s/(^2) (/(\emptyset)/^3)</td>
<td>/(e)s/(^2) (/(\emptyset)/^3)</td>
<td>/(e)n/(^1) (/(\emptyset)/^3)</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
<td>/(\emptyset)/^3</td>
</tr>
</tbody>
</table>
Vocabulary Items (Plural)

(19) Inflection markers (plural):

1. /"ern/:
   \{[+N],[+pl],[+\alpha,+\beta,+\gamma],[-subj,+gov,+obl]\}
   \{[+N],[+pl],[+\alpha,+\beta,+\gamma]\}

2. /"er/:
   \{[+N],[+pl],[+\alpha,+\beta,+\gamma]\}

3. /(e)n/:
   \{[+N],[+pl],[–\beta,+\gamma],[-subj,+gov,+obl]\}
   \{[+N],[+pl],[–\beta,+\gamma]\}

4. /"(e)n/:
   \{[+N],[+pl],[–\beta,+\gamma],[–subj,+gov,+obl]\}
   \{[+N],[+pl],[–\beta,+\gamma]\}

5. /(e)/:
   \{[+N],[+pl],[–\beta,+\gamma]\}

6. /"(e)/:
   \{[+N],[+pl],[–\beta,+\gamma]\}

7. /(e)n/:
   \{[+N],[+pl],[+\beta]\}
### Competition in the Plural

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

<table>
<thead>
<tr>
<th></th>
<th>I: $[+\alpha-\beta+\gamma]$</th>
<th>II: $[+\alpha-\beta-\gamma]$</th>
<th>III: $[+\alpha+\beta+\gamma]$</th>
<th>IV: $[-\alpha+\beta+\gamma]$</th>
<th>V: $[-\alpha-\beta+\gamma]$</th>
<th>VI: $[-\alpha+\beta-\gamma]$</th>
<th>VII: $[-\alpha-\beta-\gamma]$</th>
<th>VIII: $[-\alpha-\beta+\gamma]$</th>
</tr>
</thead>
<tbody>
<tr>
<td>nom/pl</td>
<td>/(e)/³</td>
<td>/&quot;(e)/⁴</td>
<td>/&quot;er/²</td>
<td>/(e)n/⁴</td>
<td>/(e)n/⁴</td>
<td>/(e)n/⁴</td>
<td>/&quot;(e)/⁴</td>
<td>/(e)/³</td>
</tr>
<tr>
<td>acc/pl</td>
<td>/(e)/³</td>
<td>/&quot;(e)/⁴</td>
<td>/&quot;er/²</td>
<td>/(e)n/⁴</td>
<td>/(e)n/⁴</td>
<td>/(e)n/⁴</td>
<td>/&quot;(e)/⁴</td>
<td>/(e)/³</td>
</tr>
<tr>
<td>dat/pl</td>
<td>/(e)n/³</td>
<td>/&quot;(e)n/⁴</td>
<td>/&quot;ern/²</td>
<td>/(e)n/⁴</td>
<td>/(e)n/⁴</td>
<td>/(e)n/⁴</td>
<td>/&quot;(e)n/⁴</td>
<td>/(e)n/³</td>
</tr>
<tr>
<td>gen/pl</td>
<td>/(e)/³</td>
<td>/&quot;(e)/⁴</td>
<td>/&quot;er/²</td>
<td>/(e)n/⁴</td>
<td>/(e)n/⁴</td>
<td>/(e)n/⁴</td>
<td>/&quot;(e)/⁴</td>
<td>/(e)/³</td>
</tr>
</tbody>
</table>
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
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.
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

(23)  a. The noun stem is taken from the lexicon with its inherent features (incl. class, gender features).
(23) a. The noun stem is taken from the lexicon with its inherent features (incl. class, gender features).
    b. Non-inherent features (incl. fully specified case and number features) are added in morphology.
Fusional Noun Inflection

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   a. The noun stem is taken from the lexicon with its inherent features (incl. class, gender features).
   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).
Fusional Noun Inflection

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a. The noun stem is taken from the lexicon with its inherent features (incl. class, gender features).
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.
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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.
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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.
Fusional Noun Inflection

(23)  a. The noun stem is taken from the lexicon with its inherent features (incl. class, gender features).
    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.
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’) − /i/
   \(+N,–\text{anim},–\text{pl},\{-\text{α},–\text{γ}\},\{-\text{subj},+\text{gov},+\text{obl}\}\) \(+N,\{-\text{α}\},\{+\text{obl}\}\)

b. /komnat/ (‘room’) − /u/
   \(+N,–\text{bel},–\text{pl},\{-\text{α},+\text{γ}\},\{-\text{subj},+\text{gov},–\text{obl}\}\) \(+N,\{-\text{subj},+\text{gov}\}\)
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.
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’/  
   [+N,–bel,–pl,{–α,–γ}],{–subj,+gov,+obl}]  
   – /i/  
   [+N,{-α},{+obl}] 

b. /tetrad’/  
   [+N,–bel,–pl,{–α,–γ}],{–subj,+gov,+obl}]  
   – /u/  
   [+N,{-subj,+gov}] 

c. /tetrad’/  
   [+N,–bel,–pl,{–α,–γ}],{–subj,+gov,+obl}]  
   – /a/  
   [+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., \textit{reporter}_m (‘reporter’), \textit{plaz}_f (‘beach’) in Greek, \textit{buržua}_m (‘bourgeois’), \textit{kofe}_m (‘coffee’) in Russian. These noun stems simply lack a class feature – hence, a probe that might trigger inflection.
Class Features in Syntax

Alternatives

**Note:**
Class features are needed in morphology to account for noun inflection markers in 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?
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.
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:**
A pre-syntactic approach is compatible with both the Legibility Condition and the Inclusiveness Condition; inner- and post-syntactic approaches are not.


