A tutorial on lexical classes

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INTRODUCTION

Goals of the tutorial

§1   Our brief:

☞ to address the key issues arising from exponence phenomena in which the lexicon is divided into arbitrary subsets, notably   (a) inflectional classes
and   (b) cophonologies.

§2   Our focus:

☞ to explore the advantages and drawbacks of theories that model such phenomena by means of diacritic features.

Overview

§3   The discussion will touch upon the following questions:

- *Architectural issues*

    How must the grammar be organized in order to guarantee the syntactic inertness of inflectional class features?

    Can syntactic features like gender be sensitive to inflectional class membership, and can inflectional class membership be determined by phonological properties?

- *Perspectives on inflectional class features (1): denial*

    To what extent can inflectional class features be eliminated by
         (a)   storing complex items in the lexicon
    and   (b)   invoking replacive mechanisms of exponence ('overwriting')?

- *Perspectives on inflectional class features (2): strengthening*

    Instead of eliminating inflectional class features, do we rather need a more elaborate theory (e.g. one based on feature decomposition) capable of accounting for a wider range of phenomena (e.g. cross-class syncretism)?

- *Class features in phonology: cophonologies*

    Can patterns of overlap between cophonologies be captured through the decomposition of cophonology diacritics, just like syncretisms between inflectional classes?

    Can derived environment effects in phonology be analysed in terms of the percolation of cophonology diacritics within morphological structures?

<div align="center">**ARCHITECTURAL ISSUES**</div>

Basic properties of inflectional classes

§4   Inflectional classes are traditionally defined by two properties: • arbitrariness

and   • syntactic inertness.

§5   Thus, we speak of inflectional classes when the members of a lexical category (N, V, etc.) are arbitrarily divided into sets, each characterized by a different array of inflectional exponents:

e.g. 5 inflectional classes among German masc. nouns (Alexiadou and Müller 2008: 126-7)

	1	2	3	4	5
	Hund	*Baum*	*Mann*	*Strahl*	*Planet*
nom.sg.	Hund-∅	Baum-∅	Mann-∅	Strahl-∅	Planet-∅
acc/dat.sg.	Hund-∅	Baum-∅	Mann-∅	Strahl-∅	Planet-en
gen.sg.	Hund-es	Baum-es	Mann-es	Strahl-s	Planet-en
nom/acc/gen.pl.	Hund-e	Bäum-e	Männ-er	Strahl-en	Planet-en
dat.pl.	Hund-en	Bäum-en	Männ-ern	Strahl-en	Planet-en
	'dog'	'tree'	'man'	'ray'	'planet'

In this case, class membership cannot be predicted on the basis of
   • syntactic features like gender (obviously),
or   • semantic features like animacy,
or   • phonological features like the nature of the stem-final segment.

§6   A popular solution: lexically specify each stem with an inflectional class feature.

E.g.   *Hund-* [N, masculine, 1]   *Strahl-* [N, masculine, 4]
    Baum- [N, masculine, 2]   *Planet-* [N, masculine, 5]
    Mann- [N, masculine, 3]

§7   Inflectional class features are syntactically inert: i.e.   they do not trigger agreement,
            they do not drive syntactic selection.

E.g.: gender vs class in Spanish nominals (e.g. Harris 1991, 1992; Aronoff 1994: §3.2.1)

	*dí-**a***	*negr-**o***	*man-**o***	*negr-**a***
	day	black	hand	black
gender	M	M	F	F
class	*a*-stem	*o*-stem	*o*-stem	*a*-stem

Adjectives agree with the gender of the head noun, not with its inflectional class.

Bernstein (1993) claims that inflectional class features are syntactically active in more subtle ways; see Alexiadou and Müller (2008: §5.3) for a refutation.

Guaranteeing the syntactic inertness of class features

§8   One proposal: Acquaviva (2008).

Key ideas:

- Distinguish between   lexical heads in the syntax ('L-nodes')
                         and   their exponents ('roots').

- Assume that class features are properties of roots, not of L-nodes.

- Assume that roots are subject to late insertion in a modular feed-forward architecture where morphology is postsyntactic.

| SYNTAX | ← L-nodes live here. |

⇩

| MORPHOLOGY | ← Roots and class features enter the computation here. |

⇩

| PHONOLOGY |
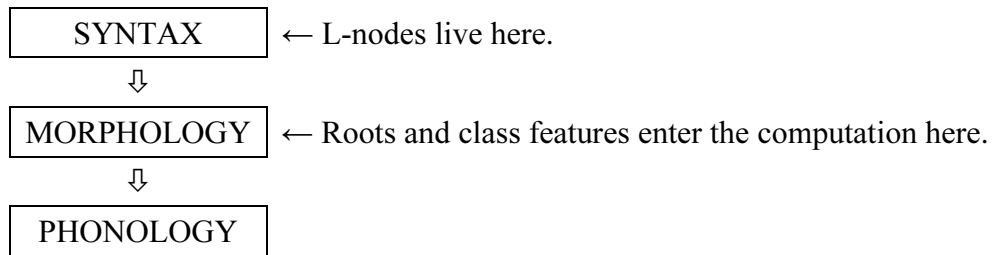
Inflectional class → gender

§9   Problem:

Acquaviva's architecture allows for rules assigning class membership on the basis of syntactic properties, but not for rules assigning syntactic properties on the basis of class membership.

> […E]very analysis where gender features feed morphological realization faces the problem posed by cases where gender depends on the phonological shape of an exponent. The problem is particularly acute in a framework like Distributed Morphology, because abstract features cannot be licensed or copied after Vocabulary insertion.
>
> Acquaviva (2008: 16)

§10   Russian noun classes:

	1	2	3	4	
nom.sg.	-∅	-a	-∅	-o	
acc.sg.	-∅ (-a)†	-u	-∅	-o	†animates only
gen.sg.	-a	-i	-i	-a	
dat.sg.	-u	-e	-i	-u	
inst.sg.	-om	-oj	-ju	-om	
loc.sg.	-e	-e	-i	-e	(Alexiadou and Müller 2008: 108)

Some default rules (Aronoff 1994: §3.2.2):

<u>Acquaviva</u>

(i)   ⎧ [N, Feminine] → [2] ⎫   ✓
(ii)   ⎩ [N] → [1]   ⎭   ✓

(iii)   [N, 3] → [Feminine]   ✘

Can we replace rule (iii) with a static filter forbidding the insertion of class-3 stem into a non-feminine terminal?

(iv)
$$\left[\begin{array}{c} \text{N} \\ \text{-fem} \end{array}\right]$$
$$\not\uparrow$$
$$[3]$$
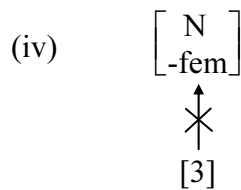
No! There are a few nonfeminine class-3 nouns (masc. *put'* 'way', neut. *imja* 'name'). Rule (iii) is a genuine default rule applying in feature-filling mode only.

§11   Arapesh noun classes and genders (Aronoff 1992, 1994: ch. 4; I retain his transcriptions)

Gender	Class	Sg. noun	Pl. noun	Alternation	Gloss	Sg. adjective	Pl. adjective	Sg. Agr. prefix on V	Pl. Agr. prefix on V
I	1	agaby̧	agabys	by̧~bys	'back'	bagara-bi	bagara-bysi	ba-	sa-
II	2	ñibør	ñiryb	bør~ryb	'belly'	bagara-børi	bagara-røbi	ba-	ba-
III	3a	aijag	aijas	ag~as	'leg'	bagara-gi	bagara-gasi	ga-	sa-
	3b	aweg	awegas	g~gas	'seed'				
IV	4a	ilokų	ilameb	kų~meb	'a bird'	bagaro-kwi	bagara-ui	kwa-	wa-
	4b	yahakų	yaharib	kų~rib	'a fruit tree'				
	4c	unukų	unib	kų~ib	'teeth mother'				
	4d	anikų	aniguhijer	kų~guhijer	'rattan species'				
	4e	barahokų	barahijer	kų~ijer	'granddaughter'				
	4f	amagokų	amagou	kų~u	'fly'				
V	5	irum	iripi̧	m~ipi̧	'breadfruit'	bagara-mi	bagare-ipi	ma-	pa-
VI	6	narun	narøb	n~b	'wave'	bagara-ni	bagara-bi	na-	ba-
VII	7	araman	aramum	n~m	'man'	bagara-ni	bagara-mi	na-	ha-
VIII	8a	kobiñ	kobiš	iñ~iš	'ditch'	bagare-ñi	bagare-ši	ña-	ša-
	8b	bode	bodehas	V~Vhas	'stone axe'				
IX	9a	barupų	barugwis	pų~gwis	'mountain track'	bagara-pi	bagara-si	pa-	sa-
	9b	apapų	apas	pų~s	'banana'				
X	10	jur	juguh	r~guh	'snake'	bagara-ri	bagara-guhi	ra-	wha-
XI	11a	alit	alitogų	t~togų	'shelf'	bagara-ti	bagara-gwi	ta-	gwa-
	11b	nybat	nybagų	t~gų	'dog'				
XII	12	nauh	naruh	uh~ruh	'tooth'	bagaro-whi	bagara-ruhi	wha-	ha-
XIII	13	atah	ateh	ah~eh	'ear'	bagara-hi	bagare-hi	ha-	ha-

The relationship between gender and class is one-to-many. Therefore,

  • class predicts gender,

but • gender does not predict class.

E.g.   [Class:4a] → [Gender:IV]
        [Class:4b] → [Gender:IV]
        [Class:4c] → [Gender:IV]   etc, etc.

§12   An alternative to Acquaviva (2008): Alexiadou and Müller (2008).

Key ideas:

- Morphology is presyntatic:

    Lexicon   ⇨ Morphology   ⇨ Syntax   ⇨   PF, LF

- Noun stems are stored in the lexicon with gender and class features.

- The morphology matches the class features of noun stems with those of the appropriate inflectional exponents; the matching operation ('Agree') deletes the class features.

Implications:

- Class features are syntactically inert because they are deleted prior to syntax.

- Redundancy rules of the form [N, 3] → [Feminine] can be active in the lexicon.

Phonology → inflectional class?

§13   Arapesh again (Aronoff 1992, 1994: ch. 4):

Aronoff claims that, in Arapesh, noun class membership is largely determined by the phonological properties of the stem (see specially 1992: 31-2, 1994: §4.2.3):

e.g.   [N, $Xb\underline{y}$] → [Class:1]   e.g. $agab\underline{y}$ → class 1

         <[N, Class:1, Number:Pl], ($X \rightarrow Xs$)> $agab\underline{y}_{[1]}$ → pl. *agaby**s***

Class features need be stipulated only when not uniquely determined by the phonological properties of the stem: e.g.   classes 4a, 4b, 4c, 4d, 4e, 4f   (stem = $Xk\underline{u}$)

                                              classes 9a, 9b   (stem = $Xp\underline{u}$)

                                              classes 11a, 11b   (stem = Xt)

However, Aronoff's analysis begs the question: an amorphous, process-based approach to exponence is *assumed*, rather than *demonstrated*.

§14   Straightforward piece-based alternative:

in Arapesh, noun class membership consists in the selection of particular pairs of thematic elements for the realization of singular and plural number.

E.g.   sg.   pl.

		sg.	pl.
class 1	Aronoff's implicit segmentation	*agab**y***	*agaby-**s***
	alternative segmentation	*aga-**by***	*aga-**by**-**s***
class 12	Aronoff's implicit segmentation	*nauh*	*na<**r**>uh*
	alternative segmentation	*na-**uh̥***	*na-<**r**>**uh***

This account, unlike Aronoff's, naturally captures the fact that the thematic elements that appear in singular nouns often reappear as gender markers in the singular forms of adjectives and of subject agreement prefixes:

e.g.   sg.   pl.

	sg.	pl.
class-12 (therefore gender-XII) noun	*na-**uh***	*na-<r>uh*
gender-XII adjective	*bagaro-**wh**-i*	*bagara-<r>uh-i*
gender-XII subject agreement prefix	***wh**-a-*	*h-a-*

If, as Aronoff claims, the final /uh/ of class-12 nouns is not a morph, but rather part of the stem, how come it is used as a gender marker in adjectives and verbs?

☞   If the piece-based analysis of Arapesh nouns is correct, noun classes in this language are just like those of Italian: they are defined by pairs of sg. and pl. thematic elements.

e.g.	sg.	pl.		
	*libr-**o***	*libr-**i***	'book'	(M)
	*cas-**a***	*cas-**e***	'house'	(F)
	etc.			

§15   Aronoff's argument against the piece-based analysis of Arapesh nouns:

> The problem is that, having performed the segmentation, we find for these classes no phonological or other property of any extracted stems that is predictive of morphological class or anything else. For these, all we can say is that a noun that is marked to take a singular suffix will take the corresponding plural suffix.
>
> (Aronoff 1992: 31)

This is an instance of a more general argument against morpheme-based theories of inflection: see the discussion of Blevins (2006) in §16ff. below.

Counterargument:

Analysing sg. forms like *na-uh* as consisting of a stem plus an affix need not imply that the stem and the affix are stored separately: see §18ff. below.

PERSPECTIVES ON INFLECTIONAL CLASS FEATURES (1): DENIAL

Blevins's Razor

§16   Blevins (2006: 82) argues that the need for inflectional class features is an artifact of morpheme-based and stem-based, as opposed to word-based, morphological theories:

> [..O]nce a morphological system has been disassembled into sets of stems and exponents, it is not in general possible to recover the original forms without introducing features that amount to "reassembly instructions". In some cases, class indices may serve this purpose. This is the function of inflection class features in analyses of Russian that represent lexemes by non-predictive stem entries.

§17   Blevins's radical conclusion:

• abandon morphs;
• model inflection analogically by reference to paradigms organized around 'principal parts'.

§18   A less radical interpretation (e.g. Wunderlich 1996, 2004):

reliance on inflectional class features may be reduced through a judicious appeal to
        (a) the lexical storage of complex stems containing class markers
and   (b) overwriting of stored class markers with inflectional exponents.

Storing stems with class markers

§19   In Spanish, membership in a particular nominal class has no effect beyond the selection of a theme vowel (henceforth TH).

On the surface, nominal theme vowels do not occur inside derivational suffixes. The theme vowel of a noun or adjective is selected by its outermost morpheme:

e.g.   man-**o**   man-az-**a**   **man-o-az-a*
              hand-TH[F]   hand-AUG-TH[F]

Here, although the feminine stem *man-o* belongs to the *o*-class, the augmentative suffix *-az-* selects the theme vowel *-a* when it attaches to feminine bases.

[Under certain circumstances, the diminutive morpheme *-it-* can be 'transparent' to the selectional requirements of the base: e.g. *man-o* 'hand' (F), diminutive *man<it>-o*. Bermúdez-Otero (2007a, 2007b) argues that, in these cases, the diminutive is in fact infixal.]

§20   The traditional approach:

Harris (e.g. 1991, 1992, among many others) assumes that the failure of nominal theme vowels to occur inside derivational suffixes is the result of a morphotactic restriction. In this view, the surface representation of Spanish nominals faithfully reflects their underlying morphological structure:

    • Morphotactic restriction

      * TH] DER]   where   DER = derivational suffix

    • Phonological derivation

    UR   [[man] o]   [[[man] aθ] a]
    SR   [má.no]   [ma.ná.θa]
            'hand'   'hand.AUG'

§21   This implies that stems and derivational suffixes are stored in the lexicon without the corresponding theme vowels; theme vowels are only inserted in the appropriate position (outside all derivational suffixes and inside the number marker, either singular $-\varnothing$ or plural -*s*) in the course of the morphological derivation. In consequence, information about the class membership of stems and derivational suffixes has to be stored as an abstract feature:

Lexical entries   ⎛ 'hand'$_N$ ⎞   ⎛AUG   ⎞
                    ⎜ /man-/   ⎟   ⎜ /-aθ-/   ⎟
                    ⎜ [Gender:F]   ⎟   ⎜ { [Class:II]$_{Gender:FEM}$ } ⎟
                    ⎝ [Class:I]   ⎠   ⎝ { [Class:I]   }   ⎠

Theme vowel selection: [[[man$_I$-] -aθ$_{II}$-] -a]

§22   The alternative (Bermúdez-Otero 2006):

Harris's basic assumption concerning the distribution of theme vowels is incorrect: the absence of nominal theme vowels before derivational suffixes on the surface is caused by a general and regular phonological process of stem-final vowel deletion (see Bermúdez-Otero 2007a for evidence).

    a.   Stem-final vowel deletion

                           σ$_W$
                           |
       V → $\varnothing$ / ___]$_{stem}$] [$_{suffix}$ V   (noniterative)

b. Phonological derivation

UR	⟦ man-o ⟧	⟦⟦ man-o ⟧ aθ-a ⟧
SR	[má.no]	[ma.ná.θa]
	'hand'	'hand.AUG'

§23 If the phonological derivations in §22a are correct, then nominal stems never occur without th corresponding theme vowels.

Lexical entries:

$$\begin{pmatrix} \text{'hand'}_{\text{Noun stem}} \\ /\text{man-o}/ \\ [\text{Gender:F}] \end{pmatrix} \qquad \begin{pmatrix} \text{AUG} \\ /\text{-a}\theta\begin{Bmatrix} \text{-a}_{[\text{Gender:F}]} \\ \text{-o} \end{Bmatrix}/ \end{pmatrix}$$

☞ Nominal class features are redundant in Spanish because theme vowels can be stored in the lexical entries of nominal stems and nominal derivational suffixes.

Extending the account: overwriting

§24 Spanish present tenses:

	1	2
1sg.ind.	cant-o	tem-o
2sg.ind.	cant-**a**-s	tem-**e**-s
3sg.ind.	cant-**a**-∅	tem-**e**-∅
1pl.ind.	cant-**a**-mos	tem-**e**-mos
2pl.ind.	cant-**á**-is	tem-**é**-is
3pl.ind.	cant-**a**-n	tem-**e**-n
1sg.sbjv.	cant-**e**-∅	tem-**a**-∅
2sg.sbjv.	cant-**e**-s	tem-**a**-s
3sg.sbjv.	cant-**e**-∅	tem-**a**-∅
1pl.sbjv.	cant-**e**-mos	tem-**a**-mos
2pl.sbjv.	cant-**é**-is	tem-**á**-is
3pl.sbjv.	cant-**e**-n	tem-**a**-n
	'sing'	'fear'

§25 Sketch of an approach based on inflectional class features (ignoring the apparent polarity effect):

$$[\text{TH, Class:1}] \leftrightarrow \begin{Bmatrix} \text{e} & / & [\text{Tense: Present, Mood:Subjunctive}] \\ \text{a} & & \end{Bmatrix}$$

$$[\text{TH, Class:2}] \leftrightarrow \begin{Bmatrix} \text{a} & / & [\text{Tense: Present, Mood:Subjunctive}] \\ \text{e} & & \end{Bmatrix}$$

§26 Sketch of an approach based on stored class markers:

a. Lexicon

$$\begin{pmatrix} \text{'sing'}_{\text{Verb stem}} \\ /\text{kant-a}_{\text{TH}}\text{-}/ \end{pmatrix} \qquad \begin{pmatrix} \text{'fear'}_{\text{Verb stem}} \\ /\text{tem-e}_{\text{TH}}\text{-}/ \end{pmatrix}$$

http://www.bermudez-otero.com/WOTM4.pdf

a. Morphology

$$[\text{Tense: Present, Mood: Subjunctive}] \leftrightarrow \left\{ \begin{array}{l} e \ / \ a_{TH} \ \underline{\quad} \\ a \ / \ e_{TH} \ \underline{\quad} \end{array} \right\}$$

b. Phonology

	sing.1PL.PRES.SBJV	fear.1PL.PRES.SBJV
UR	⟦⟦ kant-a⟧ e-mos⟧	⟦⟦ tem-e⟧ a-mos⟧
stem-final vowel deletion		
SR	[kan.té.mos]	[te.má.mos]

PERSPECTIVES ON INFLECTIONAL CLASS FEATURES (2): STRENGTHENING

§27

> If one cannot get rid of inflection class features, one may as well promote them to a more prominent position, and let them do more work in morphology than has previously been assumed.
>
> Müller (2004: 190)

§28　The key idea: <u>analyse class features as combinations of smaller elements</u>, and use these elements to capture morphological generalizations (e.g. Oltra Massuet 1999, Müller 2004, Alexiadou and Müller 2008, Trommer 2008).

§29　Müller (2004) on <u>transparadigmatic syncretism</u> in Russian (but cf. Baerman 2005)

- Inflectional markers in Russian nouns (repeated from §10)

	I	II	III	IV
nom.sg.	-∅	-a	-∅	-o
acc.sg.	-∅ (-a)[†]	-u	-∅	-o
gen.sg.	-a	-i	-i	-a
dat.sg.	-u	-e	-i	-u
inst.sg.	-om	-oj	-ju	-om
loc.sg.	-e	-e	-i	-e

[†]animates only

Observe, for example, that the null marker /-∅/ syncretically realizes the following feature combinations:

$$[\text{N, nom, I}] \qquad [\text{N, nom, III}]$$
$$[\text{N, acc, I}] \qquad [\text{N, acc, III}]$$

- Müller reduces these feature combinations to a single natural class

$$[+\text{N}, -\boldsymbol{\beta}, -\textbf{oblique}]$$

by assuming the following decomposition of case features

nominative =	[+subject, −governed, **−oblique**]
accusative =	[−subject, +governed, **−oblique**]
dative =	[−subject, +governed, +oblique]
genitive =	[+subject, +governed, +oblique]
instrumental =	[+subject, −governed, +oblique]
locative =	[−subject, −governed, +oblique]

and the following decomposition of class features

http://www.bermudez-otero.com/WOTM4.pdf

$$I = \quad [+\alpha, -\beta]$$
$$II = \quad [-\alpha, +\beta]$$
$$III = \quad [-\alpha, -\beta]$$
$$IV = \quad [+\alpha, +\beta]$$

In this analysis, the element $[-\beta]$ can be used to capture the commonalities between classes I and III.

CLASS FEATURES IN PHONOLOGY: COPHONOLOGIES

Derived environment effects as (non)percolation of cophonology diacritics

§30   [θ] in Catalan (Mascaró 2003):

Native cophonology:	no [θ]	⇨	*θ ≫ FAITH
Foreign cophonology:	[θ] OK	⇨	FAITH ≫ *θ

§31   Foreign bases undergo nativization in derived environments:

e.g.	*Zamora*	'Spanish place name'	/θəmoɾə/	→	[θəmóɾə]
	Zamorà	'pertaining to Zamora'	/θəmoɾə-á/	→	[səmuɾá]

§32   The fact that derivatives cease to be exceptional could be attributed, for instance, to some (refined) version of the Righthand Head Rule, RHT (see Williams 1981): the 'foreign' specification of the root […] would either be absent in the input of the derivative, because of a previous application of the RHR, or some universal constraint related to the RHR would force the embedded specification to be ignored. Whatever the best solution to lexical exceptions turns out to be, it seems that it will have to go beyond simple constraint reranking.

<div align="right">(Bonet 2004: 87)</div>

☞   Bonet's key insight: the assumption that "each affix has its own phonology" is too strong; general principles of feature percolation should apply to cophonology features as well.

§33   Some unattested patterns (Jurgec 2008: 8)

(a) *⟦Foreign ⟦Native root ⟧ affix⟧

     Because only roots bear exceptional cophonology features?

(b) *⟦Foreign ⟦Native root ⟧⟦Native root ⟧⟧

     Because exceptional cophonology features can percolate up to a nonterminal node only if present on some terminal node.

(c) *⟦Foreign ⟦Native root ⟧⟧

     Exceptional cophonology features are properties of morphs. Morphological zeros are nothing, i.e. / /, rather than symbols of nothing, i.e. /∅/, and so cannot carry exceptional cophonology features.

     This correctly predicts that morphological zeros do not trigger derived environment effects:

(d) Slovenian (Jurgec 2008: 13)

	nativized			nonnativized
u	vaʃiŋkton-a		u	wɔʃiŋktən
in(loc.)	Washington-INST.SG		in(dir.)	Washington[ACC.SG.]

Cophonology overlap through feature decomposition?

§34   Nonforeign Japanese Lexicon (Itô and Mester 1995: 823)

	Rendaku Lyman's Law	√=Foot	√=σ	*NC̥	*[p]	*[-son, +voi, μ]
Yamato	✓			✓	✓	✓
Mimetic		✓		✓		✓
Sino-Japanese			✓		✓	✓

No obvious feature decomposition to capture this pattern of overlap?

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