Distributed Morphology:
Global Impoverishment in Sierra Popoluca

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SoSe 2006

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**Goal:**
An analysis of verbal argument encoding morphology in Sierra Popoluca on the basis of Distributed Morphology that is maximally economical and accounts for all instances of syncretism (marker homonymy).
Claims

Main claims:

1. Morphological underspecification is needed.
2. Person features and case features must be decomposed into smaller units ($[\pm 1, \pm 2]; [\pm \text{gov}]$).
3. Impoverishment is needed.
4. Impoverishment is brought about by deletion rules (Halle & Marantz (1993, 1994)), not by the interaction of feature co-occurrence restrictions and feature hierarchies (Noyer (1992)).
5. The local domain of impoverishment can be larger than the functional morpheme (Q-morpheme).
6. Post-syntactic vocabulary insertion can be replaced by pre-syntactic probe-driven Agree (Alexiadou & Müller (2005), based on Chomsky (2000, 2001)); post-syntactic impoverishment can be reformulated as a pre-syntactic operation.
Sierra Popoluca:
A Mixe-Zoque language spoken in Mexico (Isthmus of Tehuantepec, Veracruz, Soteapan: `Soteapan Zoque'); speakers < 30,000.
Lit.: Elson (1960a,b), Elson & Pickett (1964), Lind (1964), Marlett (1986).

Table 1: Accusative vs. ergative pattern of argument encoding (Plank (1995))

<table>
<thead>
<tr>
<th></th>
<th>accusative pattern</th>
<th>ergative pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\text{DP}_{\text{ext}-V_i}$</td>
<td>$\text{DP}_{\text{ext}-V_t}$</td>
</tr>
<tr>
<td>$\text{DP}_{\text{int}-V_i}$</td>
<td>$\text{DP}_{\text{int}-V_t}$</td>
<td>$\text{DP}_{\text{int}-V_i}$</td>
</tr>
<tr>
<td></td>
<td>nom</td>
<td>erg</td>
</tr>
<tr>
<td></td>
<td>acc</td>
<td>abs</td>
</tr>
</tbody>
</table>
Absolutive Markers

(1) Absolutive markers in intransitive contexts:

a. A-ník-pa
   1.ABS-go-INC
   ‘I am going.’

b. A-pí:šiň
   1.ABS-man
   ‘I am a man.’

c. Ta-ho:š-y-pa
   1.INCL.ABS-take.a.walk-INC
   ‘You and I take a walk.’

d. Ø-Wiʔk-pa
   3.ABS-eat-INC
   ‘He eats.’

e. Ø-Ník-pa šiwan
   3.ABS-go-INC John
   ‘John is going.’

f. Ø-Koʔc-taː-p šiwan
   3.ABS-hit-PASS-INC John
   ‘John is being hit.’

(Marlett (1986, 364))

(Elson (1960b, 208))
Absolutive and ergative markers in transitive contexts:

a. A-Ø-koʔc-pa
   1.ABS-3.ERG-hit-INC
      ‘He hits me.’

b. Ø-Aŋ-koʔc-pa
   3.ABS-1.ERG-hit-INC
      ‘I hit him.’

c. M-aŋ-koʔc-pa
   2.ABS-1.ERG-hit-INC
      ‘I hit you.’

d. Ø-l-koʔc-pa
   3.ABS-3.ERG-hit-INC
      ‘He hits him.’

(Elson (1960b, 208))

e. Ø-l-koʔc-yah-pa
      ‘They hit him.’/‘He hits them.’/‘They hit them.’
   (Elson (1960b, 209))
Further Contexts for Ergative Markers

(3) Ergative markers as possessive markers:
   a. an-tiłk
      1.ERG-house
      ‘my house’
   b. M-an-haẗuŋ
      2.ABS-1.ERG-father
      ‘You are my father.’ (Elson (1960b, 208))

(4) Ergative markers in adjunct clauses:

   mu an-nịk
   when 1.ERG-go

   ‘when I went’ (Elson (1960b, 208), Marlett (1986, 364))
(5) **Syntactic structure of ergative/absolutive marking (for (2-b), simplified):**

![Syntactic Structure Diagram](image)

(6) **Order of verbal affixes in Sierra Popoluca:**

Table 2: Fusional case/person markers in Sierra Popoluca

<table>
<thead>
<tr>
<th></th>
<th>ABS</th>
<th>ERG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>a</td>
<td>an</td>
</tr>
<tr>
<td>1.incl</td>
<td>ta</td>
<td>tan</td>
</tr>
<tr>
<td>2.</td>
<td>mi</td>
<td>iñ</td>
</tr>
<tr>
<td>3.</td>
<td>Ø</td>
<td>i</td>
</tr>
</tbody>
</table>

(7) Marker clash in Sierra Popoluca:
   a. If local person (1./2.) and 3. person co-occur, only the marker for local person shows up, irrespective of its status as ABS or ERG.
   b. If 1. and 2. person co-occur, complex markers arise via /i/ deletion; the order is ABS-ERG:
      (i) 2.ABS ← 1.ERG = mi-an > man
      (ii) 1.ABS ← 2.ERG = a-iñ > an

(8) An optimality-theoretic analysis:
    Parse-1./2. ⊃ Align(Pers)-Left ⊃ Parse-3, Parse-Case
Late vocabulary insertion:

a. Functional morphemes like v and T contain fully specified bundles of morpho-syntactic features in syntax; however, they do not yet contain phonological material.

b. Inflection markers are vocabulary items that pair phonological and (often underspecified) morpho-syntactic features; they are inserted post-syntactically in accordance with the Subset Principle.
Subset Principle

(10) Subset Principle (Halle (1997)): A vocabulary item $V$ is inserted into a functional morpheme $M$ iff (i) and (ii) hold:

(i) The morpho-syntactic features of $V$ are a subset of the morpho-syntactic features of $M$.

(ii) $V$ is the most specific vocabulary item that satisfies (i).

(11) Specificity of vocabulary items (Lumsden (1992), Noyer (1992), Wiese (1999)): A vocabulary item $V_i$ is more specific than a vocabulary item $V_j$ iff there is a class of features $F$ such that (i) and (ii) hold.

(i) $V_i$ bears more features belonging to $F$ than $V_j$ does.

(ii) There is no higher-ranked class of features $F'$ such that $V_i$ and $V_j$ have a different number of features in $F'$. 
Impoverishment and Fission

Morpho-syntactic features can be deleted post-syntactically before
vocabulary insertion takes place; this effects a “retreat to the general
case”.

(13) **Fission** (Noyer (1992), Frampton (2002), not Halle & Marantz (1993)):
If insertion of a vocabulary item $V$ with the morpho-syntactic features $\beta$
takes place into a fissioned morpheme $M$ with the morpho-syntactic
features $\alpha$, then $\alpha$ is split up into $\beta$ and $\alpha-\beta$, such that (a) and (b) hold:
a. $\alpha-\beta$ is available for further vocabulary insertion.
b. $\beta$ is not available for further vocabulary insertion.
Case and Person Features

(14) **Case** (Bierwisch (1967)):
   a. ERG = [+gov]
   b. ABS = [−gov]

(15) **Person** (Noyer (1992), Wiese (1994), Frampton (2002)):
   a. 1 = [+1,−2]
   b. 1_{incl} = [+1,+2]
   c. 2 = [−1,+2]
   d. 3 = [−1,−2]
### Natural Classes of Persons in Icelandic Verbal Inflection

#### (16)

<table>
<thead>
<tr>
<th>[A] Weak conjugation, class 1: krefja (‘demand’)</th>
<th>[B] Strong conjugation, class 3: sleppa (‘slip’)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>present</strong></td>
<td><strong>past</strong></td>
</tr>
<tr>
<td>1.Sg. kref</td>
<td>krafdhi</td>
</tr>
<tr>
<td>2.Sg. krefur</td>
<td>krafdhir</td>
</tr>
<tr>
<td>3.Sg. krefur</td>
<td>krafdhi</td>
</tr>
<tr>
<td>1.Pl. krefjum</td>
<td>kröfdhum</td>
</tr>
<tr>
<td>2. Pl. krefjidh</td>
<td>kröfdhudh</td>
</tr>
<tr>
<td>3. Pl. krefja</td>
<td>kröfdhu</td>
</tr>
</tbody>
</table>

(i) In past singular contexts, \([\pm 1]\) is deleted, and 1. and 3. person become indistinguishable: \([-2]\) (Frampton (2002), also see Wiese (1994)).
(ii) In present singular contexts, \([\pm 2]\) is deleted, and 2. and 3. person become indistinguishable: \([-1]\).
(17) Feature hierarchy (for determining specificity):

\[ [\pm \text{gov}] \gg [\pm 1] \gg [\pm 2] \]
(18) **Vocabulary items:**

a. /n/ $\leftrightarrow [+\text{gov}]$

b. /a/ $\leftrightarrow [+1]$

c. /i/ $\leftrightarrow [-1]$

d. /m/ $\leftrightarrow [+2] ([-\text{gov}])$

e. /t/ $\leftrightarrow [+2] ([+1])$

(19) **Impoverishment rule [A] (local):**

$[N\text{gov}] \rightarrow \emptyset /[-N1,-N2]___ \Rightarrow$

(i) $[+\text{gov}] \rightarrow \emptyset /[-1,-2]___$

(ii) $[-\text{gov}] \rightarrow \emptyset / [+1,+2]___$

(20) **Impoverishment rule [B] (global):**

$[-1,-2] \rightarrow \emptyset / [-\text{gov}]___$
Results of Cyclic Vocabulary Insertion

(21)  a.  ABS:
   (i)  [+1,−2,−gov] → /a/
   (ii) [+1,+2,−gov] → /t-a/
   (iii) [−1,+2,−gov] → /m-i/
   (iv) [−1,−2,−gov] → /Ø/

   b.  ERG:
   (i)  [+1,−2,+gov] → /a-n/
   (ii) [+1,+2,+gov] → /t-a-n/
   (iii) [−1,+2,+gov] → /i-n/
   (iv) [−1,−2,+gov] → /i/

   c.  ABS-ERG
   (i)  [+1,−2,−gov] [+1,−2,−gov] (2 → 1) /a-n/
   (ii) [+1,−2,−gov] [+1,−2,−gov] (1 → 2) /m-a-n/
   (iii) [−1,+2,−gov] [−1,+2,−gov] (3 → 3) /i/
   (iv) [−1,+2,−gov] [−1,+2,−gov] (1 → 3) /a-n/
   (v)  [−1,+2,−gov] [−1,+2,−gov] (2 → 3) /i-n/
   (vi) [−1,+2,−gov] [−1,+2,−gov] (3 → 1) /a/
   (vii) [−1,+2,−gov] [−1,+2,−gov] (3 → 2) /m-i/
Effects of rule [A]:

1. Occurrence of /t/ instead of /m/ in the context $1_{incl}$.ABS.
2. Absence of /n/ in the context $3_{ERG}$. 
Effects of the Rules

Effects of rule [A]:
1. Occurrence of /t/ instead of /m/ in the context $1_{incl}.ABS$.
2. Absence of /n/ in the context $3.ERG$.

Effects of rule [B]:
2. Absence of a marker for 3. person if the other argument is also 3. person.
3. Absence of a marker for 3. person if the other argument is 1. or 2. person.
4. Absence of /i/ in the transitive contexts $1 \rightarrow 2, 2 \rightarrow 1$. (This is where the global nature of the impoverishment rule is crucial.)
A Pre-Syntactic Alternative

(22) Components of Grammar (Alexiadou & Müller (2005)):
Lexicon → Morphology → Syntax → PF, LF

Question:
Can a pre-syntactic approach to inflection handle fission and impoverishment?
**Pre-Syntactic Impoverishment**

**Impoverishment:**

Impoverishment can be viewed as a pre-syntactic operation, provided that the features that are affected are invisible for morphology, but not for subsequent syntactic operations. On this view, impoverishment of T applies in the morphological component after its features have been added, but before the Agree operation with (matching features of) an inflection marker is carried out. Impoverishment *marks* features as morphologically unaccessible, but it does not *delete* them (cf. Chomsky’s (1995) difference between deletion and erasure).
Pre-Syntactic Fission

Fission:
Suppose that the defining property of fission is that a class feature probe that has triggered an Agree operation (Alexiadou & Müller (2005)) does not delete immediately, but may trigger further Agree operations, and only deletes when no further Agree operation is possible anymore. I.e., a “fissioned morpheme” emerges as a certain kind of class feature probe (in a morpheme).

Note:
Sierra Popoluca does not have different inflection classes for verbs. The inflection class feature triggering inflection in Sierra Popoluca must therefore be trivial. See Aronoff’ (1994) definition of inflection classes:

(23) **Inflectional Class:**
An inflectional class is a set of lexemes whose members each select the same set of inflectional realizations.

Aronoff (1994, 182): “Strictly speaking, a language whose major lexical categories each have only one inflectional class will still have inflectional classes.”
A similar approach suggests itself for multiple *wh*-movement in Bulgarian (assuming that such multiple movement is a homogenous phenomenon, but cf. Bošković (2002)): The *wh*-probe feature on C does not delete after checking the first *wh*-phrase; it deletes when there is no further *wh*-phrase left.

(24) **Multiple *wh*-movement in Bulgarian:**

\[
[CP \ Koj_1 \ kogo_2 \ kakvo_3 \ C \ [TP \ t_1 \ e \ pital \ t_2 \ t_3 ]] \ ?
\]

who whom what asked
An Example

(25) (2-b) again:

a. Select $\text{ko}\text{\textsuperscript{?}}\text{c-pa}$ (‘hit’) from the lexicon.

b. Add fully specified case and person features (plus, irrelevantly, others):
   
   
   
   $\text{ko}\text{\textsuperscript{?}}\text{c-pa}:\{[-1,-2,-\text{gov}],[+1,-2,+\text{gov}]\}$
   
   (‘I hit him’)

c. Apply impoverishment rule [A] (once per feature bundle, vacuously).

d. Apply impoverishment rule [B] (once per feature set):
   
   
   
   $\text{ko}\text{\textsuperscript{?}}\text{c-pa}:\{[-1,-2,-\text{gov}],[+1,-2,+\text{gov}]\}$


e. Merge /n/ according to Subset Principle:

\[
\text{ko}\text{\textsuperscript{?}}\text{c-pa}:\{[-1,-2,-\text{gov}],[+1,-2,+\text{gov}]\} \ + \ /n/:\{[+\text{gov}]\} \rightarrow
\]

\[
\text{n-ko}\text{\textsuperscript{?}}\text{c-pa}:\{[-1,-2,-\text{gov}],[+1,-2,+\text{gov}]\}
\]

f. Merge /a/ according to Subset Principle:

\[
\text{n-ko}\text{\textsuperscript{?}}\text{c-pa}:\{[-1,-2,-\text{gov}],[+1,-2,+\text{gov}]\} \ + \ /a/:\{[+1]\} \rightarrow
\]

\[
\text{a-n-ko}\text{\textsuperscript{?}}\text{c-pa}:\{[-1,-2,-\text{gov}],[+1,-2,+\text{gov}]\}
\]

g. The inflected verb form enters syntax, with all morpho-syntactic features (whether affected by impoverishment, affected by Agree, or not affected at all) accessible to syntactic operations.


