Defaults and head marking: maximal inheritance, minimal overriding

Andrew Hippisley
University of Kentucky
outline

1. Network Morphology fundamentals
2. Derivation and default inheritance
3. Derivational relatedness
4. Canonical derivation and inheritance
   • Russian expressive morphology, non-canonical
5. Headed derivatives
6. Defaults and the canonical
1. Network Morphology fundamentals
Network Morphology fundamentals

Knowledge representation

- word structure facts distributed over a network of nodes
- nodes linked by inheritance
- inheritance by default
- inheritance can be from more than one node
Network Morphology fundamentals

*Theoretical*

- lexeme as minimal sign
  - lexical entries are lexemes ‘filled in’
- inferential-realizational
  - features expressed as an attribute path, word form as value
- centrality of the paradigm
  - lexical entry’s theorems
- autonomous morphology
  - orthogonal hierarchies, multiple inheritance
- regularity as degree
  - *default* inheritance
2. Derivation and default inheritance
derivation and default inheritance
derivation and default inheritance

LEXEME

Verb

Čitaté

Čitatelé

pisatel ´writer´
xranitel ´‘custodian
grabitel ´‘thief´
derivation and default inheritance
derivation and default inheritance

LEXEME

Verb

Čitatě

Čitatel

WFR
derivation and default inheritance

\[ [ [x]_x \ y ]_y \]

\[ [[[x]_v \ er]_N \quad \text{'one who V's'} \]

\[ [[[bak]_v \ er]_N \]

\[ [bake]_v \]

Construction Morphology
(Booij 2005:124)

Also:
Riehemann (1998)
Kriger & Nerbonne (1993)
Deo (2007)
## inflection and derivation

<table>
<thead>
<tr>
<th></th>
<th>inflection</th>
<th>derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>build versions of a lexeme</td>
<td>build new lexeme</td>
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</tr>
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</tr>
<tr>
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<td>not always transparent</td>
</tr>
<tr>
<td>6</td>
<td>all base features inherited</td>
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</tr>
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</table>
inflection and derivation

| 6 | all base features inherited \textit{maximal} inheritance defaults | Some base features inherited \textit{non-maximal} inheritance overrides |
inflection and derivation

some base features inherited

non-maximal inheritance

overrides: morphosyntactic features
3. Derivational relatedness
derivational relatedness

Č´ITAT´

phon level
root = /č´it-/  Č´ITATEL´
stem 2 = /č´ita-/ phon level

sem level > /č´ita-tel´ /
‘read’ ‘person who reads’

syn level
syn cat = V syn level
args = 2 (NP_NP) syn cat = N
derivational relatedness

Č´ITAT´

phon level
root = /č´it-/ 
stem 2 = /č´ita-/ 
sem level
‘read’

syn level
syn cat = V 
args = 2 (NP_NP)

Č´ITATEL´

phon level
- 
/č´ita-tel´/ 
sem level
‘person who reads’

syn level
syn cat = N
derivation relatedness

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sem level
‘read’

syn level
syn cat = V
args = 2 (NP_NP)

Č´ITATEL´

phon level
-
/č´ita-tel´/
sem level
‘person who reads’

syn level
syn cat = N
derivational relatedness

ˇČ´ ITAT´ Č´ ITATEL´

mor level > mor level
Class V_1 Class N_1
derivational relatedness

Č´ITAT´ Č´ITATEL´

mor level > mor level
Class V_1 Class N_1
derivational relatedness

Č´ ITAT´ Č´ ITATEL´

mor level     >     mor level
Class V_1     Class N_1

Principle of the morpholexically coherent lexicon (Spencer 2005)
i.e. correspondence among syntactic, semantic and morphological properties
WFR

Base telˈ WFR Derivative phon level /x + telˈ /

sem level

X ‘person who Xes’

syn
t

V syn cat = N
## Lexeme Formation Template

(Construction Morphology)

<table>
<thead>
<tr>
<th>Base</th>
<th>tel ’ LFT</th>
<th>Derivative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>phon level</td>
<td></td>
<td>x + tel ’/</td>
</tr>
<tr>
<td>sem level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>‘person who Xes’</td>
<td></td>
</tr>
<tr>
<td>syn</td>
<td></td>
<td>syn cat = N</td>
</tr>
</tbody>
</table>
relatedness and inheritance
relatedness and inheritance

<table>
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<tr>
<th>lexemic level</th>
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<tr>
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<td>base</td>
</tr>
<tr>
<td>syntactic</td>
<td>x</td>
</tr>
<tr>
<td>semantic</td>
<td>!✓!</td>
</tr>
<tr>
<td>phonological</td>
<td>!✓!</td>
</tr>
<tr>
<td>morphological</td>
<td>x</td>
</tr>
</tbody>
</table>

čitat´ → čitatel´
formal analysis

Č´itat´:
<> == VERB
<gloss> == read
<conjugation_class> == V_I:<mor>
<root all> == č´it
<stem 2> == <root all> a
<valence> == 2.

Č´itatel´:
<> == LFT_TEL´
;base> == “Č´itat´::<>”.
formal analysis

Č´itáť:\n<> == VERB
<gloss> == read
<conjugation_class> == V_I:<mor>
<root all> == Č´it
<stem 2> == <root all> a
<valence> == 2.

Č´itatel´:\n<> == LFT_TEL´
;base> == “Č´itáť´::<>

;base gloss> == “Č´itáť´::<base gloss>”
;base stem 2> == “Č´itáť´::<base stem 2>”
### Conversion

<table>
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<tr>
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<td>✔</td>
<td></td>
</tr>
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<td>x</td>
<td>✓</td>
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---

dobro ‘good deed’
dobryj ‘kind’
## transposition

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**LEXEME**

- VERB
  - Pobel´it  LFT
  - Pobelka

**LEXEME**

- VERB
  - pobelit ´‘whitewash’
  - pobelka ´‘whitewashing’
4. Canonical derivation & inheritance
canonical derivation & inheritance

- derivative is maximally distinct from base while maintaining some connection with base
canonical derivation & inheritance

- derivative is maximally distinct from base while maintaining some connection with base
- some formal connection with base keeps the relation morphological
canonical derivation & inheritance

- derivative is maximally distinct from base while maintaining some connection with base
- some formal connection with base keeps the relation morphological
- in an inheritance framework, canonical derivation is maximal inheritance from the LFT node
non-canonical derivation

- towards maximal inheritance from Base, minimal inheritance from LFT
non-canonical derivation

- towards maximal inheritance from Base, minimal inheritance from LFT
- inheritance of Base’s morphosyntactic features
non-canonical derivation

- towards maximal inheritance from Base, minimal inheritance from LFT
- inheritance of Base’s morphosyntactic features
- category preserving derivation
### non-canonical derivation

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category preserving derivation

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Dom

LFT

Dom´išče
category preserving derivation

gromadn-yj ryž-ij       dom-išč-e
huge-SG.M rust-SG.M    house(M)-AUG-SG(IV)
‘The huge red-rust house’ (Chekov, *Svetlaja ličnost´)

- Class I → masculine, e.g. *dom*
- Class II → feminine
- Class III → feminine
- Class IV → neuter
category preserving derivation

s  godoval-ym  brat-išk-oj
with year-SG.M.INS  brother(M)-PEJ-SG.INS(II)
‘with your one-year-old brother’

- Class I → masculine, e.g. *brat*
- **Class II → feminine**
- Class III → feminine
- Class IV → neuter
**Russian expressive morphology**

*dom* ‘house’, *topor* ‘axe’, *kniga* ‘book’, *šinel* ‘coat’

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<tr>
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<th>DIM</th>
<th>AUG</th>
<th>PEJ</th>
<th>AFFECT</th>
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<tbody>
<tr>
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<td>domik</td>
<td>domišče</td>
<td>domiško</td>
<td>-</td>
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<tr>
<td>topor</td>
<td>toporik</td>
<td>toporišče</td>
<td>toporiško</td>
<td>toporčik</td>
</tr>
<tr>
<td>kniga</td>
<td>knižka</td>
<td>knižišča</td>
<td>-</td>
<td>knižočka</td>
</tr>
<tr>
<td>Šinel</td>
<td>šinelka</td>
<td>-</td>
<td>šineliška</td>
<td>šineločka</td>
</tr>
</tbody>
</table>

Based on Stankiewicz (1968)
category preserving derivation

expressive morphology is an example of category preserving derivation (Stump 1991, 1993, 2001: ch 4)
5. Headed derivatives
headled derivatives

- The product of a category preserving rule of word formation is a *headed* expression (when PFM goes derivational)
  - endocentric compounds
    - [tooth [brush]_{HEAD}]
  - output of expressive derivation rule
    - [ [dom]_{HEAD} ik]
  - head&Modifier / subsective semantics
headed derivatives

- base features persist
  - semantics
  - (important) morphosyntactic features
headed derivatives

- base features persist
  - semantics
  - (important) morphosyntactic features

- a property of a category preserving word formation rule is *transparency* (Stump 2001: 99)
  - rule allows base features to persist (PFM)
  - Network Morphology: base features are non-canonically *inherited* by the derivative lexical entry
headed derivatives

- base features persist
  - semantics
  - (important) morphosyntactic features

- a property of a category preserving word formation rule is *transparency* (Stump 2001: 99)
  - rule allows base features to persist (PFM)
  - Network Morphology: base features are non-canonically *inherited* by the derivative lexical entry
    - šineliška (fem), bratiška (masc)
    - Breton *bag* ‘boat’ → *bagig* ‘little boat’; *bihan* ‘small’ → *bihanig* ‘a little too small’ (Stump 2001: 100)
headed derivatives

- category changing rules yield unheaded expressions
  - [čitatel ’]
  - (important) features from the base are *overridden* (inheritance from the LFT)
  - that’s canonical derivation
head marking: maximal base inheritance

- headed compounds
  - head is always inflected (Stump 2010)
    - outlive/outlived [out [live-d] ]
    - understand/understood [under [stood_{PST}] ]
    - mothers-in-law [[mother-s] in law]
    - grandstand/grandstanded [grandstand]_{V-ed}
      - V → N → compound_{N} → V conversion
head marking: maximal base inheritance

- headed derivatives
  - inflecting the head is an option
    - *bratiška* [ [brat] išk]-a edge marking
    - Shughni, East Iranian ‘little baby goats’
      - *gužbucenik* [[gužbuc-en]_{PL} ik] head marking
head marking: maximal base inheritance

- headed derivatives

  guĵbucenik  \[[\text{guĵbuc-en}]_{\text{PL}} \text{ ik}\]  head marking

\begin{Verbatim}
čost         wam     guʃ buc−en − ik=en         dis    maŋʒunj-idi
appear.PST  her.OBL  babygoat-PL-DIM =3.PL  very hungry-INTENS
\end{Verbatim}

The dear little kids appeared very hungry to her.
head marking: maximal base inheritance

- for headed expressions, as well as a rule of exponence you need a rule of *composition* (Stump 2010): does the head inflect or the whole expression?
head marking: maximal base inheritance

Head Application Principle (Stump 2005: 67)

Where stem $d$ arises from stem $b$ through the application of a word-word rule $r$, then for each cell $<b,\sigma>$ in $b$’s paradigm, if $<b,\sigma>$ has realization $x$, then the corresponding cell $<d,\sigma>$ in $d$’s paradigm has realization $r(x)$. 
head marking: maximal base inheritance

**Head Application Principle** (Stump 2005: 67)

Where stem $d$ arises from stem $b$ through the application of a word-word rule $r$, then for each cell $<b,\sigma>$ in $b$’s paradigm, if $<b,\sigma>$ has realization $x$, then the corresponding cell $<d,\sigma>$ in $d$’s paradigm has realization $r(x)$.

- stem $b$ cell $<\text{guǰbuc}, \{\text{NUM:PL}\}>$ is realized as **guǰbucen**
- stem $d$ is **guǰbucik** through rule $r$
- stem $d$ cell $<\text{guǰbucik}, \{\text{NUM:PL}\}>$ realized as **guǰbucenik**, i.e. $<\text{guǰbuc}, \{\text{NUM:PL}\}>$ ik
category preserving derivation

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<td>![ ]</td>
</tr>
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Dom

LFT

Dom´išče
maximal Base inheritance

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<td>✗</td>
<td></td>
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<td>✔</td>
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<td>✗</td>
<td></td>
</tr>
</tbody>
</table>
formal analysis

1. LFT_DIMINUTIVE:
   <> == LFT_HEAD_MARKING<sem feature>== small <deriv aff>== ik.

2. LFT_HEAD_MARKING:
   <> == LFT_CAT_PRESERV<mor> == "<base mor>"""<deriv aff>""
formal analysis

1. LFT_DIMINUTIVE: 
   <> ==
   LFT HEAD MARKING
   feature>== small
   == ik.

2. LFT HEAD MARKING: 
   <> ==
   LFT_CAT_PRESERV
   "<base mor>" "<der aff>"

   <mor pl> == "<base mor pl>" "<der aff>"
formal analysis

1. \text{LFT\_CAT\_PRESERV:} \\
\text{\_<> \equiv} \\
\text{LEXEME} \\
\text{"<base\ syn>"} \\
\text{<syn> \equiv} \\
\text{<gloss> \equiv} \\
\Lambda x ["<sem\ feature>" (x) \& "<base\ gloss>" (x)]
formal analysis

Theorems of Guǰbucik

Guǰbucik:<syn cat> = n.
Guǰbucik:<gloss> = small baby_goat.
Guǰbucik:<sem feature> = small.
Guǰbucik:<mor sg> = guǰbuc ik.
Guǰbucik:<mor pl> = guǰbuc en ik.
finding head marking
finding head marking

- Greg’s Sanskrit example
  - car ‘act’, abhicar [abhi [car]]
  - 3sg present indicative [abhi [car-ati]]
    - but why not [abhi [car]-ati]??
  - 3sg imperfect a-carat, abhy-a-carat,
    [abhi [a-car-at]]
finding head marking

- PFM Principles:
  - if head is marked in one cell, it’s marked in all cells (PFM’s Paradigm Uniformity Generalization)
  - coderivatives are either all head marking or not, i.e. head marking stipulated in the rule (PFM’s Coderivative Uniformity Generalization)
Russian prefixation
Russian prefixation

- **Nouns**
  - *pod-gruppa* ‘sub-group’, *ne-znanie* ‘ignorance’

- **Adjectives**
  - *ne-gramotnyj* ‘illiterate’, *bez-opasnyj* ‘dangerous’, *pre-dobryj* ‘overly kind’

- **Verbs**
  - *za-gоворит* ‘begin to speak’, *пere-делать* ‘alter’, *пere-pисать* ‘to rewrite’, *прийти* ‘come’
Russian prefixation

- Verbs
  - za-govorit́ ‘begin to speak’, pere-delat́ ‘alter’, pere-pisat́ ‘to rewrite’, prij-ti ‘come’

1st and 2nd sg non-past
Russian prefixation

- Verbs
  - za-govorit’ ‘begin to speak’, pere-delat’ ‘alter’, pere-pisat’ ‘to rewrite’, prij-ti ‘come’

<table>
<thead>
<tr>
<th>V_II</th>
<th>V_I</th>
<th>V_III</th>
</tr>
</thead>
<tbody>
<tr>
<td>govorju</td>
<td>delaju</td>
<td>pišu</td>
</tr>
<tr>
<td>govoriš’</td>
<td>delaeš’</td>
<td>pišeš’</td>
</tr>
<tr>
<td>zagovorju</td>
<td>peredelaju</td>
<td>perepišu</td>
</tr>
<tr>
<td>zagovoriš’</td>
<td>peredelaješ’</td>
<td>perepišeš’</td>
</tr>
</tbody>
</table>

1st and 2nd sg non-past
Russian prefixation

- Verbs
  
  o *prij-ti* ‘come’
  
  o *idu, idëš ´; šla* (past feminine singular)
  
  o *pridu, pridëš ´; prišla* (past feminine singular)
Russian prefixation

- **Verbs**
  - *o prij-ti* ‘come’
    - *o idu, idëš´; šla* (past feminine singular)
    - *o pridu, pridëš´; prišla* (past feminine singular)

- Derived forms maintain inflectional class of the base, as well as idiosyncracies, e.g. suppletion
  - *o zagovoriš´ [za [govor-iš´]]* head marking
Russian prefixation

- an extension of the Coderivative Uniformity Generalization:
  ‘all prefix-based category preserving derivation in Russian results in a head marked expression’
Formal analysis

- an extension of the Coderivative Uniformity Generalization:

‘all prefix-based category preserving derivation in Russian results in a head marked expression’

LFT_HEAD_MARKING:

\[
< > \equiv \text{LFT\_CAT\_PRESERV} \\
< \text{mor} > \equiv " < \text{deriv aff} > " \ " < \text{base mor} > " \\
< \text{stem} > \equiv \text{PREFIXATION}.
\]

PREFIXATION:

\[
< \text{stem} > \equiv " < \text{deriv aff} > " \ " < \text{base stem} > " .
\]
Formal analysis

negramotnyj ‘illiterate’
Formal analysis

negramotnyj ‘illiterate’

1 LFT_CAT_PRESERV:
   %<> == NOUN %too restrictive
   <> == LEXEME
   <syn> == “<base syn>”
   <gloss> == \( \lambda x \left[ \text{“<sem feature>”}(x) \& \text{“<base gloss>”}(x) \right] \)
   <stem> == SUFFIXATION.

2 LFT_HEAD_MARKING:
   <> == LFT_CAT_PRESERV
   <mor> == “<deriv aff>” “<base mor>”
   <stem> == PREFIXATION.

3 LFT_NEG_ADJ:
   <> == LFT_HEAD_MARKING
   <deriv aff> == ne
   <sem feature> == ¬ .
6. Defaults and the canonical
defaults and the canonical

inflection $\text{ vs }$ derivation

1. build versions of a lexeme $\rightarrow$ build new lexeme

Canonical derivation

Lexeme 1 $\rightarrow$ Lexeme 2

maximally distinct, while staying morphologically connected
defaults and the canonical

Canonical derivation
Lexeme 1 $\rightarrow$ Lexeme 2
maximally distinct, while staying morphologically connected

From Base
minimal inheritance
maximal overriding

From LFT
maximal inheritance
defaults and the canonical

Least canonical derivation

Lexeme 1 \( \rightarrow \) Lexeme 2

minimally distinct, while staying morphologically connected

From Base
maximal inheritance
minimal overriding

From LFT
minimal inheritance
defaults and the canonical

Least canonical derivation
Lexeme 1 → Lexeme 2
minimally distinct, while staying morphologically connected
And therefore most like inflection
Lexeme$_\alpha$
1 syn word$_\alpha$
2 syn word$_\alpha$
From Base
From LFT
maximal inheritance
no inheritance
no overriding
defaults and the canonical
defaults versus default situations
defaults and the canonical

defaults versus default situations

- defaults characterize system-driven generalization, A dominating B implies B gets everything A has unless overridden; hierarchical wrt non-default
defaults and the canonical

defaults versus default situations

- defaults characterize system-driven generalization, A dominating B implies B gets everything A has *unless overridden*; hierarchical wrt non-default
- default situations depend on perspective; characterize canonicity; non-hierarchical wrt non-default situation
defaults and the canonical

defaults versus default situations

- defaults characterize system-driven generalization, A dominating B implies B gets everything A has unless overridden; hierarchical wrt non-default
- default situations depend on perspective; characterize canonicity; non-hierarchical wrt non-default situation
  - Canonical: default situation may mean overriding the default
  - Non-canonical: overriding the default situation may mean inheriting the default