Defaults and head marking: maximal inheritance, minimal overriding

Andrew Hippisley
University of Kentucky
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

Čitatě

Čitatel

pisatel “writer”
xranitel “custodian”
grabitel “thief”
derivation and default inheritance
derivation and default inheritance
derivation and default inheritance

[ [x]_X y ]_Y

Construction Morphology
(Booij 2005:124)

[ [x]_v er ]_N 'one who V's'

[[bak]_v er]_N

Also:
Riehemann (1998)
Kriger & Nerbonne (1993)
Deo (2007)
<table>
<thead>
<tr>
<th></th>
<th>inflection and derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>build versions of a lexeme</td>
</tr>
<tr>
<td>2</td>
<td>determined by syntax</td>
</tr>
<tr>
<td>3</td>
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<td>4</td>
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<td>7</td>
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</table>
## inflection and derivation

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</tr>
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<td>obligatory</td>
<td>not obligatory</td>
</tr>
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</tr>
<tr>
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<td>all base features inherited</td>
<td>some base features overridden</td>
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## Inflection and Derivation

<table>
<thead>
<tr>
<th></th>
<th>All base features inherited maximal inheritance defaults</th>
<th>Some base features inherited non-maximal inheritance overrides</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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-/
stem 2 = /č´ita-/

sem level
‘read’

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

Č´ITATEL´

phon level

-sem level
‘person who reads’

syn level
syn cat = N
derivational relatedness

Č´ITAT´

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

sem level
‘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
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
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/

/x + telˈ /

sem level

X

‘person who Xes’

syn

V

syn cat = N
### Lexeme Formation Template (Construction Morphology)

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

<table>
<thead>
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<th>lexemic level</th>
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</tr>
</thead>
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<tr>
<td></td>
<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´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´:<>”.

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

<table>
<thead>
<tr>
<th><strong>lexemic level</strong></th>
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<tbody>
<tr>
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</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>

**dobro** ‘good deed’

**dobryj** ‘kind’
### Transposition

<table>
<thead>
<tr>
<th>Lexemic Level</th>
<th>Inheritance Source</th>
<th>Base</th>
<th>LFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syntactic</td>
<td></td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>Semantic</td>
<td>✓</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Phonological</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Morphological</td>
<td>x</td>
<td></td>
<td>✓</td>
</tr>
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**Lexeme**

- **Verb**
  - **Pobel´it** LFT
  - **Pobelka**
  - *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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<tr>
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<td>✔</td>
</tr>
<tr>
<td>semantic</td>
<td>!✔!</td>
</tr>
<tr>
<td>phonological</td>
<td>!✔!</td>
</tr>
<tr>
<td>morphological</td>
<td>✗</td>
</tr>
</tbody>
</table>
## Category Preserving Derivation

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</tr>
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<td>! ✔!</td>
</tr>
<tr>
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<tr>
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</tr>
</tbody>
</table>

The table shows the inheritance sources for different lexemic levels. The symbols represent the following:
- ✔️: Inheritance is preserved
- ✗: Inheritance is not preserved
- !: Partial inheritance

The figure on the right side of the table illustrates the relationship between Dom, LFT, and 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’

<table>
<thead>
<tr>
<th>Base</th>
<th>DIM</th>
<th>AUG</th>
<th>PEJ</th>
<th>AFFECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>dom</td>
<td>domik</td>
<td>domišče</td>
<td>domiško</td>
<td>-</td>
</tr>
<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
headed 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-canonical *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}
      - $V \rightarrow N \rightarrow \text{compound}_N \rightarrow V$ 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** [[guţbuc-en]_{PL} ik] head marking
head marking: maximal base inheritance

- headed derivatives

```
gu.jdubcenik  [[gu:jbud-en]_{PL} ik]  head  marking
```

čost  wam  gu:j bud-en - ik=en  dis  mayjûnâ-idi
appear.PST  her.OBL  babygoat-PL-DIM =3.PL  very  hungry-INTENS

The dear little kids appeared very hungry to herő
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 $\text{guǰbucen}$
- stem $d$ is $\text{guǰbucik}$ through rule $r$
- stem $d$ cell $<\text{guǰbucik}, \{\text{NUM:PL}\}>$ realized as $\text{guǰbucenik}$, i.e. $<\text{guǰbuc}, \{\text{NUM:PL}\}>$ ik
category preserving derivation

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</tr>
<tr>
<td>semantic</td>
<td>! ✓ !</td>
</tr>
<tr>
<td>phonological</td>
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</tr>
<tr>
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### maximal Base inheritance

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<tr>
<td>morphological</td>
<td>✓</td>
</tr>
</tbody>
</table>
formal analysis

1. LFT_DIMINUTIVE:
   <> ==
   LFT_HEAD_MARKING
   feature== small
   == ik.

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

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

2. LFT HEAD MARKING:
   <> ==
   LFT CAT PRESERV
   "<base mor>" "<der aff>"
   <mor pl> == "<base mor pl>" "<der aff>"
formal analysis

1. LFT CAT PRESERV: 
   \[ \langle \rangle \equiv \]
   LEXEME
   "<base syn>"
   <syn> \equiv
   \Lambda x [ "<sem feature>" (x) & "<base gloss>" (x) ]
   ...

raw text correctly transcribed
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 \([\text{abhi} \ [\text{car}]\)]
  - 3sg present indicative \([\text{abhi} \ [\text{car-ati}]\)]
    - but why not \([\text{abhi} \ [\text{car}]-\text{ati}]\)?
  - 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-govorit* ‘begin to speak’, *pere-delat* ‘alter’, *pere-pisat* ‘to rewrite’, *prij-ti* ‘come’
Russian prefixation

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

1st and 2nd sg non-past
Russian prefixation

- **Verbs**
  - o za-gоворит́ ‘begin to speak’, пеpе-делать́ ‘alter’, пеpе-пишать́ ‘to rewrite’, прийти́ ‘come’

<table>
<thead>
<tr>
<th>V_II</th>
<th>V_I</th>
<th>V_III</th>
</tr>
</thead>
<tbody>
<tr>
<td>говоржу</td>
<td>делаю</td>
<td>пишу</td>
</tr>
<tr>
<td>говоришь́</td>
<td>делясь́</td>
<td>пишешь́</td>
</tr>
<tr>
<td>заговоржу</td>
<td>переделать</td>
<td>переписыва́ть</td>
</tr>
<tr>
<td>заговоришь́</td>
<td>переделается́</td>
<td>перепишешь́</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**
  - *prij-ti* ‘come’
    - o idu, iděš’; šla (past feminine singular)
    - o pridu, priděš’; prišla (past feminine singular)

- Derived forms maintain inflectional class of the base, as well as idiosyncracies, e.g. suppletion
  - *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:
\[
<> == \text{LFT\_CAT\_PRESERV} \\
<\text{mor}> == "<\text{deriv aff}>" "<\text{base mor}>" \\
<\text{stem}> == \text{PREFIXATION}.
\]

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

неограмотный ‘illiterate’
Formal analysis

"negramotnyj ‘illiterate’"

1. LFT_CAT_PRESERV:
   \%<> == NOUN \%too restrictive
   <> == LEXEME
   <syn> == “<base syn>”
   <gloss> == \( \lambda x ["<sem feature>"(x) \& "<base gloss>" (x)] \)
   <stem> == SUFIXATION.

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> == \( \neg \).
6. Defaults and the canonical
defaults and the canonical

inflection vs derivation

1 build versions of a lexeme build new lexeme

Canonical derivation

Lexeme 1 → 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 \text{Lexeme 2}

minimally distinct, while staying morphologically connected

From Base
maximal inheritance
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minimal inheritance
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Least canonical derivation

Lexeme 1 $\rightarrow$ 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

maximal inheritance From LFT

no overriding no inheritance
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-hierchical 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