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Review of lexical rules, Raising/control, Sentential negation
Overview

- Review of lexical rules
- Raising/control
- Analysis of raising/control
- Sentential negation
- Demo: interactive unification, how to read a chart
Conceptually allow for succinct lexica by producing multiple words on the basis of single lexical entries.

In the implementation, very similar to non-branching phrase structure rules, except:

- May change orthography
- Must all apply before (lower in the tree) any syntax rules
To force lexical rules to apply, syntax rules require [INFLECTED +], and (most) lexical entries are [INFLECTED –].

(Why aren’t they forced to apply just because they must apply before any syntax rules?)

Therefore we distinguish between lexical rules which change the INFLECTED value (from – to +) (*lexeme-to-word-rule*) and those that don’t (*lexeme-to-lexeme-rule*).
By hypothesis, *lexeme-to-word-rules* can only monotonically add SYNSEM information.

If you have a *lexeme-to-lexeme-rule* which is only monotonically adding SYNSEM information, copy up the whole SYNSEM.

If you need to change SYNSEM information, copy up that which you do not change.
Lexical rules can either be spelling changing (inflecting-lex-rule) or not (constant-lex-rule).

Under what circumstances are the latter useful?

How do you force, say, an uninflected verb to be third singular?
Lexical rules: Example

From Scott’s Armenian grammar:

\[
\text{nom\_pl\_noun-lex-rule} := \text{infl-ltow-rule} \&
\]
\[
\quad [ \text{DTR common-noun-lex},
\quad \text{SYNSEM.LOCAL} [ \text{CAT.HEAD.CASE nom},
\quad \text{CONT.HOOK.INDEX.PNG.NUM pl} ] ].
\]

\[
\text{nom\_pl\_noun} :=
\]
\[
\quad \%\text{suffix}(\ast \text{ er})
\]
\[
\text{nom\_pl\_noun-lex-rule}.
\]
(Subject) raising/control: Examples

- Prototypical raising verb:
  Kim seemed to help Sandy.

- Prototypical control verb:
  Kim tried to help Sandy.
Raising/control: Similarities

- ‘Downstairs’ verb has no overt subject (possibly, in other languages: has an overt pronominal subject which is obligatorily controlled).
- Subject of upstairs verb is semantically related to downstairs verb.
- (In English:) Downstairs verb is infinitival.
Raising/control: Differences

- In raising, the subject does not play a role with respect to the upstairs predicate.
- That is, raising verbs have one fewer semantic arguments than syntactic arguments.
- In control, the subject does play a role with respect to the upstairs predicate.
- That is, the index of the subject appears as the value of an ARGn feature in two different relations.
Raising/control tests

- The semantic differences between raising and control make possible several tests to tell them apart:
  - Raising verbs can take expletive subjects, control verbs cannot.
  - Raising verbs can take idiom chunk subjects, control verbs cannot.
  - Passivizing the complement changes the meaning in a sentence with a control verb, but not with a raising verb.
In English: raising/control verbs select for a subject and an infinitival complement.

Both ensure that the subject is semantically related to the complement by identifying the index of the subject with the HOOK.XARG of the complement.

Verbs that end up being ‘downstairs’ cooperate by coindexing their SUBJ and their HOOK.XARG values.

(In a language with overt, obligatorily controlled pronouns in these constructions, the pronoun would still be coindexed with the XARG.)
Raising/control: Analysis (2/2)

trans-first-arg-raising-lex-item := basic-two-arg &
    [ SYNSEM [ LOCAL.ARG-S < [ LOCAL.CONT.HOOK.INDEX #ind ],
    LOCAL.CONT.HOOK [ XARG #ind,
    LTOP #ltop ] ] >,
    LKEYS.KEYREL [ ARG1 #ltop ] ] ].

trans-first-arg-control-lex-item := basic-two-arg &
    [ SYNSEM [ LOCAL.ARG-S < [ LOCAL.CONT.HOOK.INDEX #ind ],
    LOCAL.CONT.HOOK [ XARG #ind,
    LTOP #ltop ] ] >,
    LKEYS.KEYREL [ ARG1 #ind,
    ARG2 #ltop ] ] ].

verb-lex := basic-verb-lex &
    [ SYNSEM.LOCAL [ CAT.VAL.SUBJ < [ LOCAL.CONT.HOOK.INDEX #xarg ] >,
    CONT.HOOK.XARG #xarg ] ].
English modals are treated as raising verbs (cf. tests).

Although this is somewhat controversial.

Assume the same for *can* cross-linguistically for our MT purposes, while recognizing that this might not be right.

Note that in some languages, the same meaning might be expressed via an affix on the verb, in which case it could be handled by a lexical rule.

Any other possibilities?
Sentential negation, or:  
*It doesn’t hurt me.*

- Involves an *adv-rel*ation with the PRED value `neg_r_rel`.
- The `neg_r_rel` takes as its ARG1 a handle that qeqs the verb relation (to allow quantifiers to scope in between).
- Syntactically, sentential negation in English involves auxiliaries selecting the adverb *not* as their first complement and making sure the right thing happens with the semantics.
- How does negation work in your languages?
Lab 4 prep

- Learn how to say *I can eat glass. It doesn’t hurt me* in your language.
- Understand how the modal (*can*) and the negation (*n’t, not*) are attaching.
- Are they affixes on the verb? Adverbs? Verbs which take infinitival or other sentential complements?
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