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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

Review: Lexical rules (1/4)

- 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

Review: Lexical rules (2/4)

- 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*).

Review: Lexical rules (3/4)

- By hypothesis, *lexeme-to-word-rule*s 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.

Review: Lexical rules (4/4)

- 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:

```
nom_pl_noun-lex-rule := infl-ltow-rule &
  [ DTR common-noun-lex,
      SYNSEM.LOCAL [ CAT.HEAD.CASE nom,
    CONT.HOOK.INDEX.PNG.NUM pl ]].


nom_pl_noun :=
  %suffix (* er)
  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.

Raising/control: Analysis (1/2)

- 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 ] ].
```

I can eat glass

- 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-relation* 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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