

Grammar Engineering for Deep Linguistic Processing SS2012

Lecture 6: Core Phenomena

Yi Zhang

Department of Computational Linguistics & Phonetics
Saarland University

Language Technology Lab
German Research Center for Artificial Intelligence

June 2012



Outline

- 1 Agreement
- 2 Modification
- 3 Argument Optionality



Agreement

Syntactic agreement is distinct from semantic agreement

- *Someone brought their car* (gender-neutral)
- [AmE] *Google **is** releasing their new phone* vs.
[BrE] *Google **are** releasing their new phone*

Agreement in English: subject/verb and determiner/noun

Those dogs bark

- Excluding pronouns, only 'number' is relevant
- Pronouns also agree with the verb *be* for 'person'
- In tag questions, also see agreement for 'gender'
She won the race, didn't she?
- Pronoun-antecedent agreement is semantic



Agreement

Syntactic agreement is distinct from semantic agreement

- *Someone brought their car* (gender-neutral)
- [AmE] *Google **is** releasing their new phone* vs.
[BrE] *Google **are** releasing their new phone*

Agreement in English: subject/verb and determiner/noun

Those dogs bark

- Excluding pronouns, only 'number' is relevant
- Pronouns also agree with the verb *be* for 'person'
- In tag questions, also see agreement for 'gender'
She won the race, didn't she?
- Pronoun-antecedent agreement is semantic



Agreement

Syntactic agreement is distinct from semantic agreement

- *Someone brought their car* (gender-neutral)
- [AmE] *Google **is** releasing their new phone* vs.
[BrE] *Google **are** releasing their new phone*

Agreement in English: subject/verb and determiner/noun

Those dogs bark

- Excluding pronouns, only 'number' is relevant
- Pronouns also agree with the verb *be* for 'person'
- In tag questions, also see agreement for 'gender'
She won the race, didn't she?
- Pronoun-antecedent agreement is semantic

Mechanisms in the Matrix

- Syntactic agreement properties are constrained in SYNSEM.LOCAL.AGR
- Semantic agreement properties are constrained in SYNSEM.LOCAL.CONT.HOOK.INDEX.PNG
- Types for nouns specify inherent properties, e.g. [PERSON 3rd]
- Inflectional rules associate affixation on nouns with NUMBER
- Rules for present-tense verbs associate affixation with SUBJ number
- Modifiers in English don't show agreement, but in other languages, modifiers impose constraints via the HEAD.MOD attribute



Outline

- 1 Agreement
- 2 Modification
- 3 Argument Optionality



Syntax of Modification

- Modifiers select the heads they modify via the MOD feature (inside HEAD)
- The value of MOD is a list of *synsems*
- Head-modifier rules are cross-classified according to order (*head-adj*, *adj-head*) and the intersective/scopal distinction



Intersective Modifiers

- *head-compositional*: syntactic head is semantic head
- ARG1 is MOD'S INDEX (*individual*)
- LTOP = MOD'S LTOP (constraint on rule)



Scopal Modifiers

- Serve as semantic head daughters
- Identify their own INDEX with their MOD's INDEX
- Take a handle-valued ARG1
- Insert a *qeq* between their ARG1 and their MOD's LTOP



In General

- The phrase structure rules for intersective and scopal modifiers need to be different
- Use subtypes of *local* to constrain which rule gets used



scopal-mod-phrase

```
scopal-mod-phrase := head-mod-phrase-simple &  
  [ NON-HEAD-DTR.SYNSEM.LOCAL [  
    CAT.HEAD.MOD < [ LOCAL scopal-mod ] >,  
    CONT.HOOK #hook ],  
  C-CONT [ HOOK #hook,  
    HCONS <! !> ] ] .
```



isect-mod-phrase

```
isect-mod-phrase := head-mod-phrase-simple &
                    head-compositional &
[ HEAD-DTR.SYNSEM.LOCAL.CONT [
    HOOK.LTOP #hand,
    MSG no-msg ],
NON-HEAD-DTR.SYNSEM.LOCAL [
    CAT.HEAD.MOD < [ LOCAL intersective-mod ] >,
    CONT.HOOK.LTOP #hand ],
C-CONT.HCONS <! !> ].
```



Modifier Attachment

VP/N-bar attachment

- Attach to non-SPR-saturated phrases
- + Correct grammatical results
 - The cat chased that fierce dog.
 - *The cat chased fierce that dog.
- Spurious ambiguity
 - The fierce dog near the cat barked
 - ((fierce dog) (near the cat))
 - (fierce (dog (near the cat)))



Modifier Attachment (cont.)

NP/S attachment for (post-head) modifiers

- + Correct grammaticality and no spurious ambiguity
- Asymmetry for adverb attachment
 - The dogs left quickly. (attaches to S)
 - The dogs quickly left. (attaches to VP)
- Asymmetry for adjectival modifiers
 - The dogs angry at the cats bark. (attaches to NP)
 - The angry dogs bark. (attaches to N)
- Difficult semantics: scope of negation
 - No dogs near the cat bark.



Modifier Attachment (cont.)

Alternative, using VP/Nbar attachment

- Use boolean feature - -PM ('Post-Modified')
 - ① Modifier-head-rule says head-dtr must be $[- \text{-PM} \ -]$, but mother is unmarked (enabling *fierce fierce dog*)
 - ② Head-modifier-rule says mother is $[- \text{-PM} \ +]$ so a post-modified phrase cannot be head-dtr in modifier-head rule
 - ③ Other rules preserve the - -PM feature from head-dtr to mother



Outline

- 1 Agreement
- 2 Modification
- 3 Argument Optionality



Argument Optionality

- Define a boolean-valued feature OPT for systems
- Either discharge an OPT + argument via unary rule, or
- Use a subtype of *list* called *olist* all of whose members are marked OPT +
- For example, the *subject-head* rule might simply require the head-daughter's COMPS list to have the value *olist*

