Introduction to Grammar Engineering using HPSG

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Modification: Dimensions of variation

- Determine what can modify what
  - PPs modify either nominal phrases or verbal phrases
  - Adjective modify nominal phrases
  - Adverbs modify verbal phrases
Modification: Dimensions of variation

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  - PPs modify either nominal phrases or verbal phrases
    - Adjectives modify nominal phrases
    - Adverbs modify verbal phrases
- Account for order of modifiers and heads
  - PPs follow head
  - Adjectives precede head (simple ones, anyway)
  - Adverbs either precede or follow
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- Avoid spurious ambiguity for phrases with multiple modifiers
- Distinguish modifier PPs from complement PPs
  *The dog barked* near the cat
  *Kim gave the cat* to Sandy
What modifies what, and who decides?

- Decide whether head or modifier does selection
  - If head selects, then must allow for multiple modifier types, and determine order of each – redundancy for e.g. PPs
  - If modifier selects, then can use abstract pos type modable as supertype of verb and noun
What modifies what, and who decides?

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  If head selects,
  then must allow for multiple modifier types,
  and determine order of each – redundancy for e.g. PPs
  
  If modifier selects,
  then can use abstract pos type *modable* as supertype of *verb* and *noun*

- Decide whether head is SPR-saturated
  
  Do PPs attach to S and NP, or to VP and N-bar?
  (and similarly for adjectives and adverbs)
Order of modifier and head

- Have two modifier rules (unavoidable)
- Constrain HEAD value for each modifier daughter
  Requires additional abstract pos types: premodifier, postmodifier
  Requires multiple inheritance for the type adv
Candidate grammar: VP/N-bar attachment

Positive

- Correct grammaticality results
  
  The cat chased that fierce dog.
  *The cat chased fierce that dog.
Candidate grammar: VP/N-bar attachment

Positive

- Correct grammaticality results
  - *The cat chased that fierce dog.*
  - *The cat chased fierce that dog.*

Negative

- Spurious ambiguity
  - *The fierce dog near the cat barked.*
    - [[fierce dog] [near the cat]]
    - [fierce [dog [near the cat]]]
Spurious ambiguity

- Consider restricting pre-head modifiers to modify only word, not phrase
  Undergenerates: *the fierce fierce dog*
Spurious ambiguity

- Consider restricting pre-head modifiers to modify only word, not phrase
  Undergenerates: *the fierce fierce dog*
- Consider attachment of post-head modifiers to NP/S, not Nbar/VP
NP/S attachment for (post-head) modifiers

Positive

- Still correct grammaticality for these data sets
- No spurious ambiguity
NP/S attachment for (post-head) modifiers

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Potential Negatives

- Asymmetry for adverb attachment
  
  *The dogs left quickly.* (attaches to S)
  
  *The dogs quickly left.* (attaches to VP)

- Asymmetry for adjectival modifiers (eventually)
  
  *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.*
Other alternatives, using VP/N-bar attachment

- Add boolean feature --PM (‘Post-Modified’)
  1. Modifier-head-rule says head-dtr must be [--PM --], but mother is unmarked (enabling fierce fierce dog)
  2. Head-modifier-rule says mother is [--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
Other alternatives, using VP/N-bar attachment

- Add boolean feature \(--\text{PM}\) (‘Post-Modified’)
  1. Modifier-head-rule says head-dtr must be \([--\text{PM} -]\), but mother is unmarked (enabling \textit{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 \(--\text{PM}\) feature from head-dtr to mother

- Use additional types to distinguish “nuclear” vs. “extended” phrases
  Leads to additional complexity in the phrase type hierarchy
Prepositional phrases: Modifiers or complements?

Modifiers

- Iteration within a phrase
  
  *The dog barked near the cat on Monday near the office.*

- Transparent semantics
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Complements

- Obligatory co-occurrence
  
  *The dog gave the cat.*

- Idiosyncratic selection of preposition
  
  *The dog gave the cat at that aardvark.*

- Opaque (unpredictable) semantics
  
  *The dog belongs to the boy.*