LING 510: Week 6 review

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Notes: Assignment 3, Notations, Use this tool to write your proofs in word/doc.

Composition rules

Terminal Nodes (TN). If α is a terminal node, $[\![\alpha]\!]$ is given by the lexicon.

Non-Branching Nodes (NB). If α is a node with sole daughter β, then $[\![\alpha]\!] = [\![\beta]\!]$.

Function Application (FA). If α is a branching node with daughters β and γ, and $[\![\beta]\!]$ is a function whose domain contains $[\![\gamma]\!]$, then $[\![\alpha]\!] = [\![\beta]\!]([\![\gamma]\!])$.

We also added a new rule in the class given what we learned from adjectives.

Predicate Modification (PM). If α is a branching node with daughters β and γ, and both $[\![\beta]\!]$ and $[\![\gamma]\!]$ are of type $\langle e, t\rangle$, then

$$[\![\alpha]\!] = \left[\lambda x_e.\, T \text{ iff } [\![\beta]\!](x) = T \text{ and } [\![\gamma]\!](x) = T\right].$$

1 A note on conjunction

- Last week we saw that natural language conjunction is type *flexible* since it can conjoin different kinds of syntactic constituents (e.g., sentential conjunction, VP-conjunction, etc.)
- We also figured out their types and denotations.
  1. Sentential conjunction and is of type $\langle t, \langle t, t\rangle\rangle$
  2. VP-conjunction and is of type $\langle\langle e, t\rangle, \langle\langle e, t\rangle, \langle e, t\rangle\rangle\rangle$
- We previously ran with the idea that NP-conjunction is similarly of type $\langle e, \langle e, e\rangle\rangle$ but this runs into problems empirically.
- NP-conjunction is not *boolean* the way sentential and VP-conjunction are.

  Observation: VP-conjunction reduces to sentence-level conjunction.

  (1) a. John smoked and danced ⇒ John smoked and John danced
  b. John wrote a book and read a novel ⇒ John wrote a book and John read a novel

  So does conjunction of predicative adjectives.

  (2) John is clever and funny ⇒ John is clever and John is funny

  We should expect the same to hold for NP-conjunction but data shows that this isn't true.

(3) a. John and Mary met $\not\Rightarrow$??John met and Mary met
b. John and Mary are a nice couple $\not\Rightarrow$??John is a nice couple and Mary is a nice couple

- Instead, it seems that NP-conjunction forms a *plural* entity or a group.
- These facts show us that NP-conjunction behaves rather differently than boolean conjunction.

  Two options:

  1. There really is a separate non-boolean and in English that forms *groups* (Link 1983).
  2. and is type-ambiguous. There is only generalized conjunction. Some operation before conjunction handles how to get names to the right type for conjunction (Partee & Rooth 1983).

  hmmm…

2 Di-transitives and prepositions

- We added di-transitive predicates such as give to our fragment. give takes 3 arguments: a subject, a direct object and an indirect object.

  1. give is of type $\langle e, \langle e, \langle e, t\rangle\rangle\rangle$
  2. $[\![\text{give}]\!] = [\lambda x_e.[\lambda y_e.[\lambda z_e.\, T \text{ iff } z \text{ gives } y \text{ to } x]]]$

  Pop quiz

  Can you guess the type for conjunction of ditransitive predicates as in (4)?

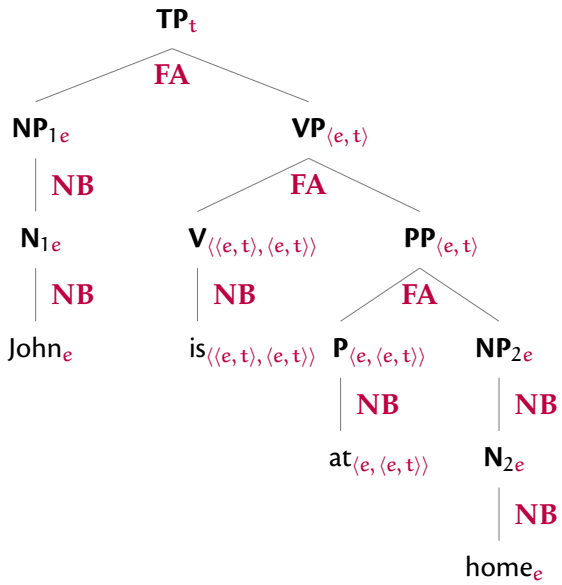
  (4) John bought and gave Mary a book.

  You will have to reason out based on the pattern of the types of NP-conjunction and VP-conjunction and the type of di-transitive predicates.

- We also introduced prepositions in our system.
- Sometimes they seem to be semantically vacuous for e.g., John gave a book to Mary and John gave Mary a book mean the same thing. The preposition to here is semantically vacuous.[1]
- We figured out the type and denotation of the locative preposition at, which is a contentful expression.

[1] So we take it to be an identity function of the appropriate type.

(5) John is at home.

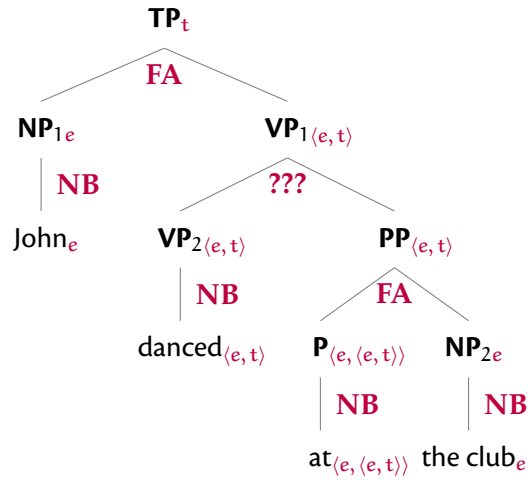


Lexical entries

$[\![\text{John}]\!] = j$
$[\![\text{Mary}]\!] = m$
$[\![\text{home}]\!] = h$
$[\![\text{is}]\!] = [\lambda f : f \in D_{\langle e,t\rangle}. f]$
$[\![\text{at}]\!] = [\lambda y : y \in D_e.[\lambda x : x \in D_e. \text{T iff x's location is y}]]$

Lets varify that this entry for at does work. Consider (6). What are the truth conditions for this sentence?

(6) John danced at the club.



Lexical entries

$[\![\text{John}]\!] = j$
$[\![\text{the club}]\!] = c$
$[\![\text{danced}]\!] = [\lambda x_e. \text{T iff x danced}]$
$[\![\text{at}]\!] = [\lambda y_e.[\lambda x_e. \text{T iff x's location is y}]]$

Subproof a. PP

1. $\left[\!\!\left[\begin{array}{c}\text{PP}_{\langle e,t\rangle}\\ \text{P}_{\langle e,\langle e,t\rangle\rangle}\ \ \text{NP}_{2e}\\ \text{NB}\ \ \text{NB}\\ \text{at}_{\langle e,\langle e,t\rangle\rangle}\ \ \text{the club}_e\end{array}\right]\!\!\right] = \left[\!\!\left[\begin{array}{c}\text{P}_{\langle e,\langle e,t\rangle\rangle}\\ \text{NB}\\ \text{at}_{\langle e,\langle e,t\rangle\rangle}\end{array}\right]\!\!\right]\left(\left[\!\!\left[\begin{array}{c}\text{NP}_{2e}\\ \text{NB}\\ \text{the club}_e\end{array}\right]\!\!\right]\right)$ (by FA)

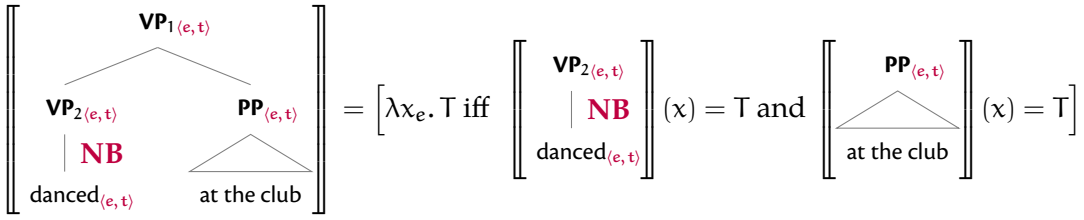
2. $= [\![\text{at}]\!]([\![\text{the club}]\!])$ (by NB)

3. $= [\lambda x_e.[\lambda y_e.\,\text{T iff x's location is y}]](c)$ (by lexical entries)

4. $= [\lambda y_e.\,\text{T iff x's location is c}]$ (by β-reduction)

At VP_1 we have a type-clash between VP_2 and PP which are both of type $\langle e, t\rangle$. Here we will implement the rule of predicate modification.

Subproof b. VP_1

1. 

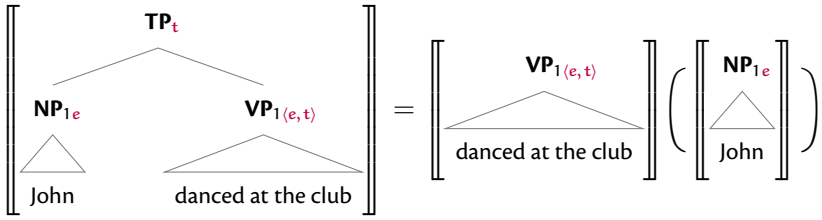
(by PM)

2. $= [\lambda x_e.\,\text{T iff } [\![\text{danced}]\!](x) = \text{T and } [\![\text{PP}]\!](x) = \text{T}]$ (by NB)

3. $= [\lambda x_e.\,\text{T iff } [\lambda y_e.\,\text{T iff y danced}](x) = \text{T and } [\lambda y_e.\,\text{T iff y's location is c}](x) = \text{T}]$
(by lexical entry, a.)

4. $= [\lambda x_e.\,\text{T iff x danced and x's location is c}]$ (by β-reduction)

Derivation. TP

1. 

(by FA)

2. $= [\lambda x_e.\,\text{T iff x danced and x's location is c}](j)$ (by b., NB)

3. $= \text{T iff j danced and j's location is c}$ (by β-reduction)

4. John danced at the club is true iff John danced and John's location was the club.

Great! Our entry for at works as expected. Can you think of any examples where this entry for at might run into a problem? How about the following?

(7) John forgot cookies at home.

3 Modification

- Modifiers are expressions that modify the meaning of other expressions.

  i.e., they tell you something special about the expression they modify. For example, red in red car tells you something special about the car.

  (Common nouns are similar. politician gives you a description of things in the world.)

- One way to think of them is in terms of a *filter*. Given an entity, they tell you whether that special description is true of that entity or not. For instance,

  angry filters out individuals that do not match the description of being angry.

  (politician filters out individuals that do not match that description.)

- Another way to think of them is they *restrict* the meaning of the expression they modify. Something special has to be true about the expression they modify apart from the original truth conditions.

- So for red car, we may think of this as a description that is true of things that are red which are cars OR things that are cars which are also red.

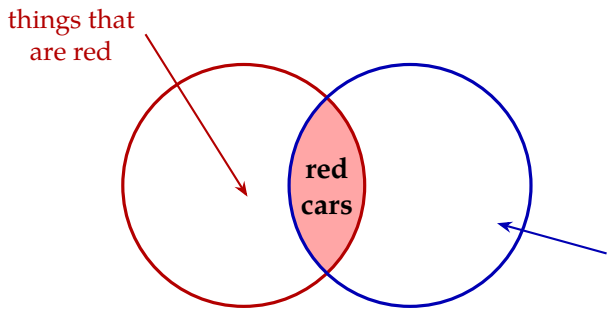
- Either way we get a restricted set of entities from either descriptions as some things get filtered out.

- Similarly, for young politician, we may think of young as a filter that filters out all the things that are politicians that are not young.

- So you get a subset of things that are politicians which are also young.

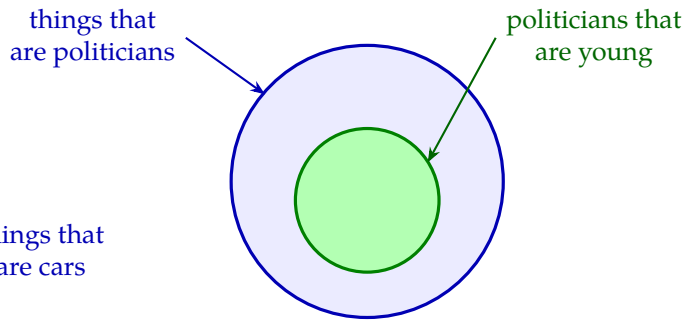
- We call modifiers like red *intersective adjectives* whereas modifiers like young are called *subsective adjectives*.

Intersective: ***red car***



$[\![\text{red car}]\!] = [\![\text{red}]\!] \cap [\![\text{car}]\!]$

Subsective: ***young politicians***



$[\![\text{young politician}]\!] \subseteq [\![\text{politician}]\!]$

- The crucial difference between intersective and subsective adjectives is that the latter are *relative* whereas, the former are not.

(8) a. Ferrari is a red car $\Rightarrow$ Ferrari is a car and Ferrari is red
b. Tiffany is a fast runner $\not\Rightarrow$ Tiffany is fast and Michael Cain is a runner

- The fact that intersective adjectives are descriptions that tell you whether that description is true of something or not leads us to posit that adjectives are type $\langle e, t \rangle$. Similarly, common nouns are also type $\langle e, t \rangle$.

  (9) **A test for identifying adjective type.**
  a. Let *Adj* be an adjective. If a sentence X is an Adj Y can be paraphrased felicitously as X is Adj *for* a Y then the adjective is **subsective**.
  b. For some individual X, if the sentence X is an Adj Y entails both the sentence X is Adj and the sentence X is a Y then the adjective is **intersective**.

- **Crucial observation:** Subsective adjectives are *context dependent* in some sense.

Comprehension check

Identify whether the following adjectives are intersective or subsective. Justify your answer.

1. triangular
2. narrow
3. employed
4. heavy
5. electric
6. Russian
7. loud
8. shy

References

Link, Godehard. 1983. The logical analysis of plurals and mass terms: a lattice-theoretical approach. *Formal semantics: The essential readings* 127. 147.

Partee, Barbara & Mats Rooth. 1983. Generalized conjunction and type ambiguity. *Formal semantics: The essential readings*. 334–356.