Michael Yoshitaka Erlewine & Hadas Kotek September 10, 2014

Review: Compositional semantics (continued)

Updates:

Website: `http://people.linguistics.mcgill.ca/~michael.erlewine/focus-wh/`

Office hours (room 215): mitcho Fridays 1–3pm; Hadas Mondays 3–5pm

Today: More of the semantic system, quantifiers

1 The basic system

The principle of compositionality: the meaning of a complex expression depends upon its constituent parts and the way they are combined.

- **Basic types:**
  - e for individuals, in D_e
  - t for truth values, in $\{0, 1\}$
- **Definition:** If σ and τ are types, then $\langle\sigma, \tau\rangle$ is a type. An object of type $\langle\sigma, \tau\rangle$ is a function which takes an argument of type σ and returns an object of type τ

Lambda notation: "λx. *<something involving x>*" takes an argument, *x*, and returns *<something involving x>*.

Exercise: Give types and lexical entries for:

(1) *Mitzi*

(2) *purrs*

(3) *bit-John* (as one verb)

Definition: Functional Application (FA)
If α has β and γ as its daughter constituents and $[\![\beta]\!] \in \mathrm{D}_\sigma$ and $[\![\gamma]\!] \in \mathrm{D}_{\langle\sigma,\tau\rangle}$,
then $[\![\alpha]\!] = [\![\gamma]\!]([\![\beta]\!])$

Exercise: Draw a tree, give types at each node, and give the truth conditions:

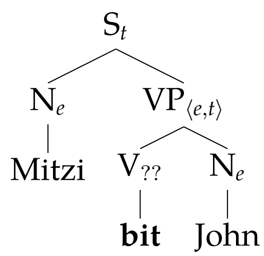
(4) Mitzi purrs

(5) Mitzi bit-John

2 Working backwards

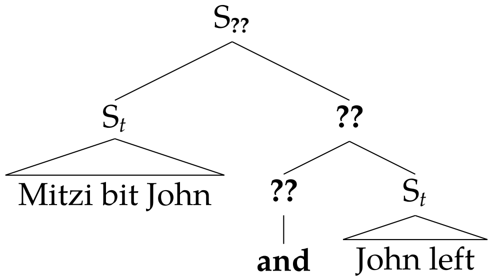
Let's decompose "bit John":

(6)

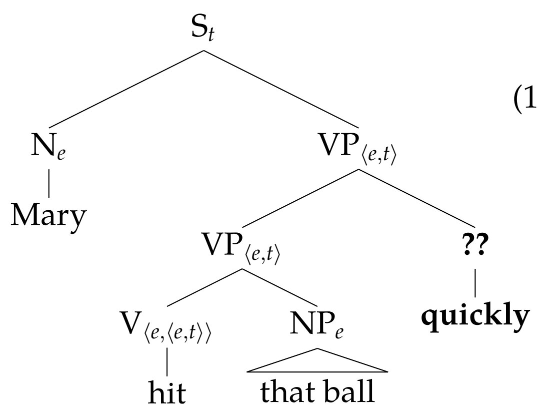


<u>**Exercise:**</u> Fill in the type and denotation for **bolded** nodes.

(7)



(8)



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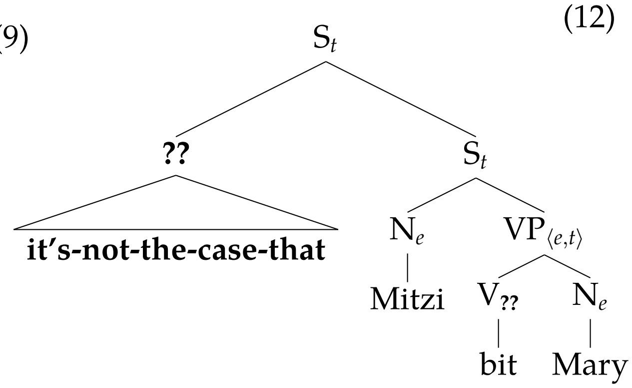
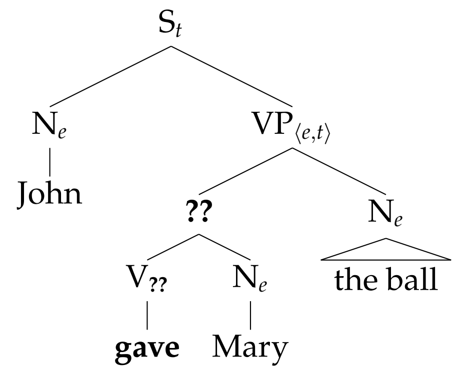
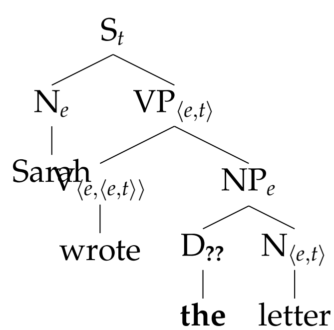


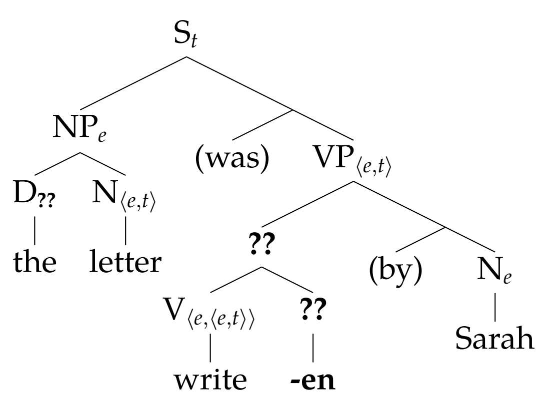
(10)



(11)



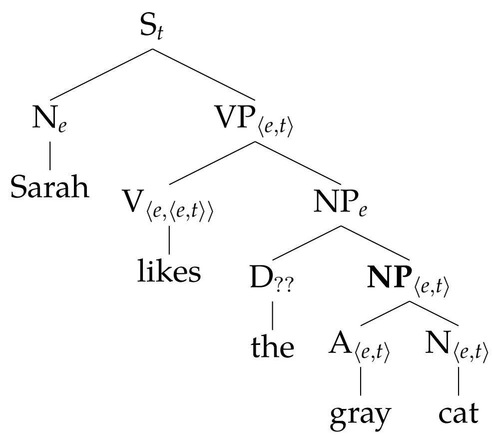
(12)



3 Modification

So far we've used the rule of *Functional Application*. In some cases, another rule is necessary:

(13)



Definition: Predicate Modification
If α is a branching node that has β and γ as its daughter constituents and $[\![\beta]\!]$ and $[\![\gamma]\!]$ are both $\in D_{\langle e,t\rangle}$, then $[\![\alpha]\!] = \lambda x.[\![\beta]\!](x) = [\![\gamma]\!](x) = 1$

Exercise: Compute the meaning of (13).

4 Sets and functions

On Monday we briefly talked about how *sets* can be thought of as *functions*, and vice versa.

A set is a collection of things (of the same type). The most common case will be *sets of individuals*.

(14)
a. $[\![\text{cat}]\!] = \lambda x_e.x$ is a cat
b. $[\![\text{human}]\!] = \lambda x_e.x$ is human
c. $[\![\text{walks}]\!] = \lambda x_e.x$ walks

(15)
a. {Mitzi, Tonya, Spike, Tama,...}
b. {John, Mary, Bill, Sue, ...}
c. {Mitzi, T-Rex, John, Mary, Godzila,...}

The objects in the set *cat* are (all) the individuals that the function $\lambda x_e.x$ is a cat is true of.

5 The denotation of quantifiers

We can think of quantifiers as relations between sets of individuals.

(16) *Some* cats purr.
$\rightsquigarrow$ The set of cats and the set of purr-ers have some individuals in common.
$\rightsquigarrow$ Some individual(s) is both a cat and a purr-er.
$[\![\text{some}]\!] = \lambda f_{\langle e,t\rangle}.[\lambda g_{\langle e,t\rangle}.$ there is some $x \in D_e$ such that $f(x) = 1$ and $g(x) = 1]$

Exercise: Draw tree and compute the truth conditions for "Some cats purr."

(17) *Two* cats purr.
$\rightsquigarrow$ The set of cats and the set of purr-ers have two individuals in common.
$\rightsquigarrow$ Two individuals are both cats and purr-ers.
$[\![\text{two}]\!] = \lambda f_{\langle e,t\rangle}.[\lambda g_{\langle e,t\rangle}.$ there are two $x \in D_e$ such that $f(x) = 1$ and $g(x) = 1]$

(18) *Every* human is mortal.
$\rightsquigarrow$ The set of humans is contained in the set of mortals
$\rightsquigarrow$ For every individual, if they are human, then they are mortal.
$[\![\text{every}]\!] = \lambda f_{\langle e,t\rangle}.[\lambda g_{\langle e,t\rangle}.$ for all $x \in D_e$ such that $f(x) = 1$, $g(x) = 1]$

(19) *No* human flies.
$\rightsquigarrow$ The set of humans does not overlap with the set of flyers.
$\rightsquigarrow$ For every individual, if they are human, then they do not fly.
$[\![\text{no}]\!] = \lambda f_{\langle e,t\rangle}.[\lambda g_{\langle e,t\rangle}.$ there is no $x \in D_e$ such that $f(x) = 1$ and $g(x) = 1]$

For next time

Heim & Kratzer pp 178–198 (most of chapter 7)

(Readings at `http://bit.ly/focus-wh-readings` — ask for password)

Problem set will be on website Wednesday evening. **Due Monday before class.** Email your problem set to both of us: `michael.erlewine@mcgill.ca, hadas.kotek@mcgill.ca`