Composition and modification

1 Review of rules

(1) **Terminal Nodes (TN):**
If α is a terminal node, $[\![\alpha]\!]$ is specified in the lexicon.

(2) **Non-branching Nodes (NN):**
If α is a non-branching node, and β is its daughter node, then $[\![\alpha]\!] = [\![\beta]\!]$.

(3) **Functional Application (FA):**
If α is a branching node, $\{\beta, \gamma\}$ is the set of α's daughters, and $[\![\beta]\!]$ is a function whose domain contains $[\![\gamma]\!]$, then $[\![\alpha]\!] = [\![\beta]\!]([\![\gamma]\!])$.

2 How to study the meaning of a part

Using the Principle of Compositionality, we can figure out the meaning of individual parts of sentences.

(4) Kara **and** Tama sleep.

(5) John likes **himself**.

(6) Sarah swims **again**.

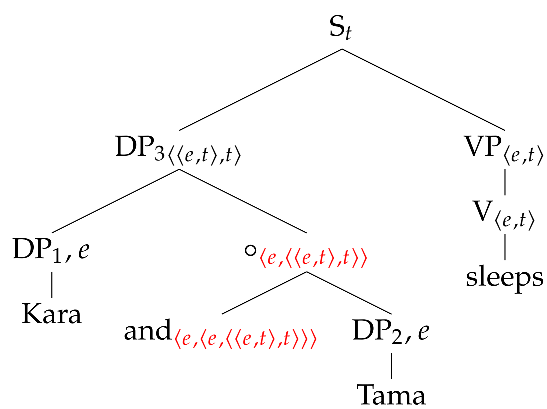
Step by step:

1. What does the whole sentence mean? Paraphrase without using the target part (in bold).
2. What is the structure of the sentence? Draw a tree.
3. Fill in semantic types. Use the Triangle Method if necessary.
4. Using your paraphrase from Step 1, work backwards to figure out the meaning of the target part (in bold).
   - Make sure the meaning you write for the target part is general: it should not include meanings which are contributed from other material in the sentence.
   - Remember that each λ should correspond to a variable in the return value. When you add a λ variable, make sure it's used.
5. Check that your final meaning matches the predicted type. Recompute the structure bottom-up to make sure it works. Make sure the meaning you proposed also works in other, similar examples.

Example:

(4) Kara and Tama sleep.

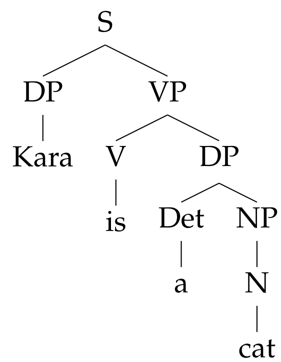
First, to figure out the types. The important thing to note is that there is no plural "Kara+Tama" in D_e. This teaches us that the type of the DP "Kara and Tama" cannot be type e. The only other option (using the Triangle Method, using Functional Application) is type $\langle\langle e,t\rangle,t\rangle$. Our goal is to figure out a way to get (3) to mean Sleep(Kara) $\wedge$ Sleep(Tama), i.e. the same as "Kara sleeps and Tama sleeps."



- $[\![\text{VP}]\!] \underset{\text{NN}}{=} [\![\text{sleep}]\!] \underset{\text{TN}}{=} \lambda x_e\ .\ \text{Sleep}(x)$
- $[\![\text{DP}_1]\!] \underset{\text{TN}}{=} \text{Kara}$
- $[\![\text{DP}_2]\!] \underset{\text{TN}}{=} \text{Tama}$
- Definition of *and*: $[\![\text{and}]\!] \underset{\text{TN}}{=} \lambda x_e\ .\ \lambda y_e\ .\ \lambda P_{\langle e,t\rangle}\ .\ P(x) \wedge P(y)$
- $[\![\circ]\!] \underset{\text{FA}}{=} [\![\text{and}]\!]\ ([\![\text{DP}_2]\!])$
  $= \left[\lambda x_e\ .\ \lambda y_e\ .\ \lambda P_{\langle e,t\rangle}\ .\ P(x) \wedge P(y)\right]$ (Tama)
  $= \lambda y_e\ .\ \lambda P_{\langle e,t\rangle}\ .\ P(\text{Tama}) \wedge P(y)$
- $[\![\text{DP}_3]\!] \underset{\text{FA}}{=} [\![\circ]\!]\ ([\![\text{DP}_1]\!])$
  $= \left[\lambda y_e\ .\ \lambda P_{\langle e,t\rangle}\ .\ P(\text{Tama}) \wedge P(y)\right]$ (Kara)
  $= \lambda P_{\langle e,t\rangle}\ .\ P(\text{Tama}) \wedge P(\text{Kara})$
- $[\![\text{S}]\!] \underset{\text{FA}}{=} [\![\text{DP}_3]\!]\ ([\![\text{VP}]\!])$
  $= \left[\lambda P_{\langle e,t\rangle}\ .\ P(\text{Tama}) \wedge P(\text{Kara})\right] (\lambda x_e\ .\ \text{Sleep}(x))$
  $= 1 \text{ iff } (\lambda x_e\ .\ \text{Sleep}(x))(\text{Tama}) \wedge (\lambda x_e\ .\ \text{Sleep}(x))(\text{Kara})$
  $= 1 \text{ iff Sleep(Tama)} \wedge \text{Sleep(Kara)}$

3 Non-verbal predicates

(7) Kara **is a** cat.



Compositionality allows us to (a) use what we know and (b) work backwards.

(8) Kara sleeps and is a cat.

The semantics for conjunction developed in PS3 (hopefully) is only defined for conjunctions of equal semantic type.

(9) a. Austin is a city and Austin is in Texas.
b. Austin is a city and is in Texas.
c. Austin is a city and in Texas.
d. * Austin is a city and Texas.

4 Modification

(10) a. Kara is a black cat.
b. Kara is black and Kara is a cat.

(11) a. Austin is a city in Texas.
b. Austin is a city and Austin is in Texas.

Each pair of sentences in (10a,b) and (11a,b) is truth-conditionally equivalent. We call such modifiers *intersective*.

Option 1: Intuitively, *black* modifies *cat*. Write a semantics so that ⟦black⟧ modifies ⟦cat⟧ through Functional Application.

(12) ⟦black⟧ = $\lambda P_{\langle e,t\rangle} \,.\, \lambda x \,.\, \text{Black}(x) \wedge P(x)$

The disadvantage of this approach is that attributive adjectives (modifiers) and predicate adjectives have different semantics, although taking a predicate adjective $\langle e,t\rangle$ and converting it to its attributive form $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$ is easy: *IFS* (p. 193–195) and *EFS* (pp. 82–84) both describe this procedure.[1]

Option 2: Introduce a new composition rule.

(13) **Predicate Modification (PM):** from H&K
If α is a branching node, $\{\beta,\gamma\}$ is the set of α's daughters, and $[\![\beta]\!]$ and $[\![\gamma]\!]$ are both in $D_{\langle e,t\rangle}$, then $[\![\alpha]\!] = \lambda x_e \,.\, [\![\beta]\!](x) \wedge [\![\gamma]\!](x)$.

Now we can simply use the regular $\langle e,t\rangle$ denotations for *black* and *in Texas*.

5 Non-intersective modifiers

What about the following modifiers?

(14) a. This is a fake diamond.
b. This is fake and is a diamond.

(15) a. John is a short basketball-player.
b. This is short and is a basketball-player.

(16) a. Obama is a former president.
b. * Obama is former and is a president.

[1] The use of a systematic procedure for translating a meaning in one type into a corresponding meaning in another type is called *type-shifting*.