LING5702: Problem Set 4

Due via Carmen dropbox at 11:59 PM 3/3.

1. [10 pts. – difficult!] Given the above composition rules and the following word definitions:

$$birds \stackrel{\text{def}}{=} (\lambda_r\ \lambda_s\ \mathsf{Most}\ (\lambda_x\ \mathsf{Bird}\ x \wedge r\ x)\ (\lambda_x\ s\ x)) : \mathbf{N}$$

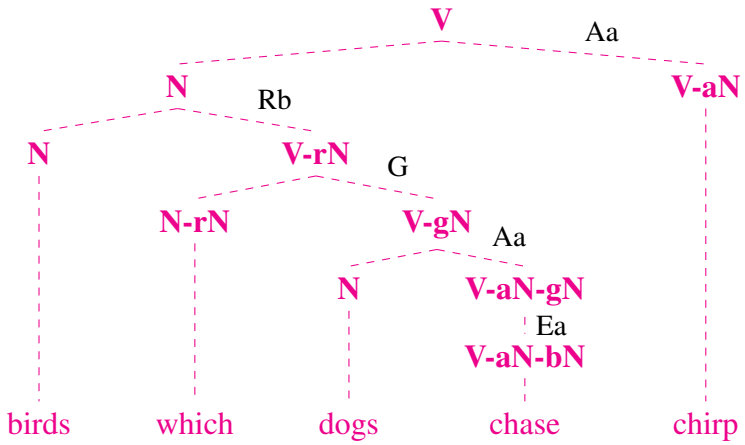
$$dogs \stackrel{\text{def}}{=} (\lambda_r\ \lambda_s\ \mathsf{Most}\ (\lambda_x\ \mathsf{Dog}\ x \wedge r\ x)\ (\lambda_x\ s\ x)) : \mathbf{N}$$

$$which \stackrel{\text{def}}{=} (\lambda_q\ \lambda_r\ \lambda_s\ q\ r\ s) : \mathbf{N\text{-}rN}$$

$$chase \stackrel{\text{def}}{=} (\lambda_p\ \lambda_q\ \lambda_r\ \lambda_s\ q\ (\lambda_x\ \mathsf{True})\ (\lambda_x\ p\ (\lambda_y\ \mathsf{True})\ (\lambda_y\ \mathsf{Some}\ (\lambda_e\ \mathsf{Chase}\ y\ x\ e \wedge r\ e)\ (\lambda_e\ s\ e)))) : \mathbf{V\text{-}aN\text{-}bN}$$

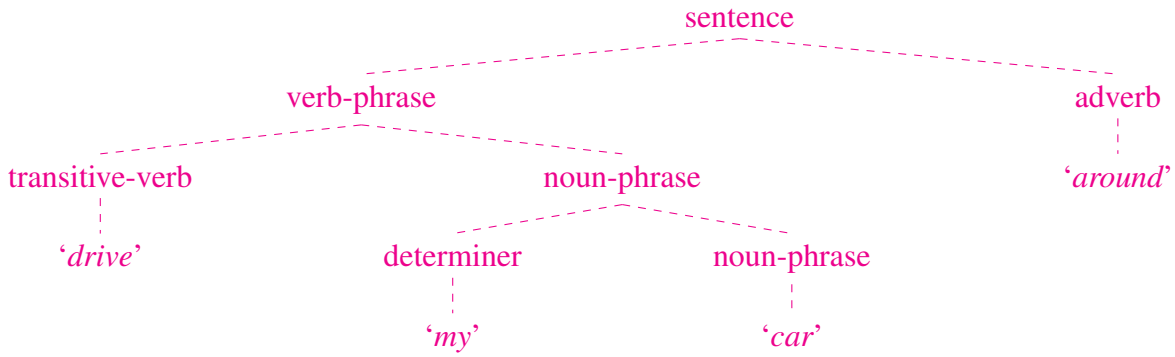
$$chirp \stackrel{\text{def}}{=} \lambda_q\ \lambda_r\ \lambda_s\ q\ (\lambda_x\ \mathsf{True})\ (\lambda_x\ \mathsf{Some}\ (\lambda_e\ \mathsf{Chirp}\ x\ e \wedge r\ e)\ (\lambda_e\ s\ e))) : \mathbf{V\text{-}aN}$$

what is the lambda calculus translation of the following syntactic analysis tree:

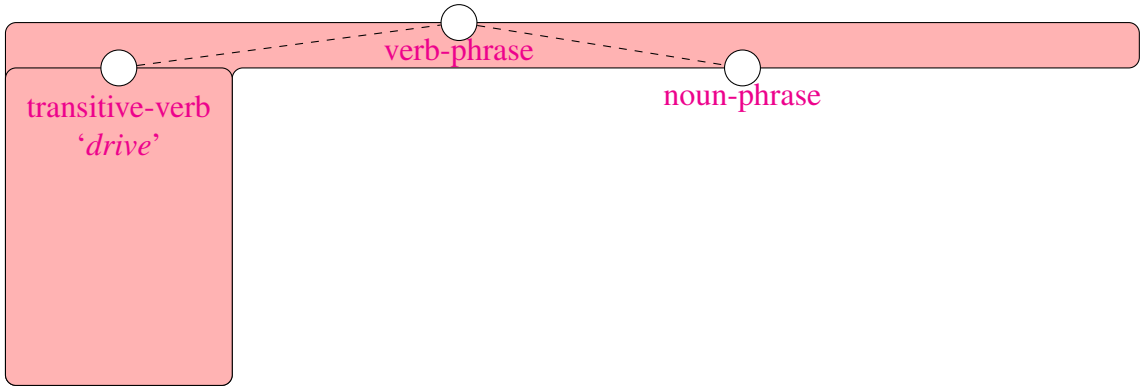


(You do not have to provide the entire beta-reduction, just the result.)

2. Consult the lecture notes (#11) on hierarchical sequential prediction. According to the model in those notes, assume the following complex event (a sentence) is being recognized:



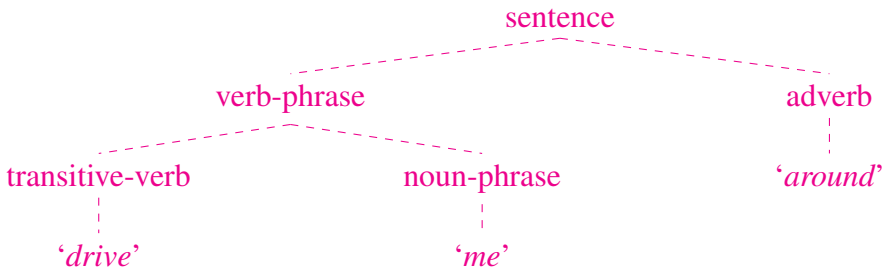
and the following event fragments have already been constructed:



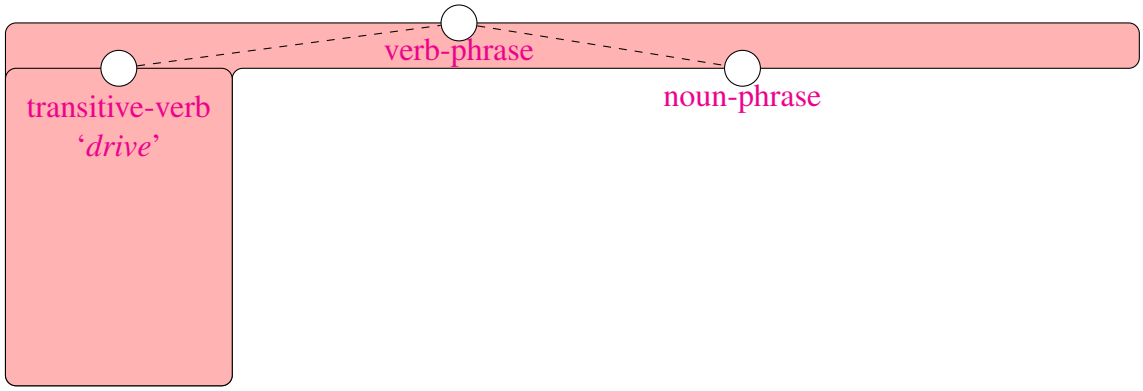
(a) [6 pts.] Draw the events and event fragments that would exist after one terminal decision. (HINT: As in lecture notes 11.4, draw just one rectangle with a word inside, no tree lines.)
(b) [2 pts.] Which result (match or no-match) is used in this decision?

(c) [2 pts.] How many distinct (disjoint) events or event fragments exist in memory now?

3. Now assume the following complex event (a sentence) is being recognized:



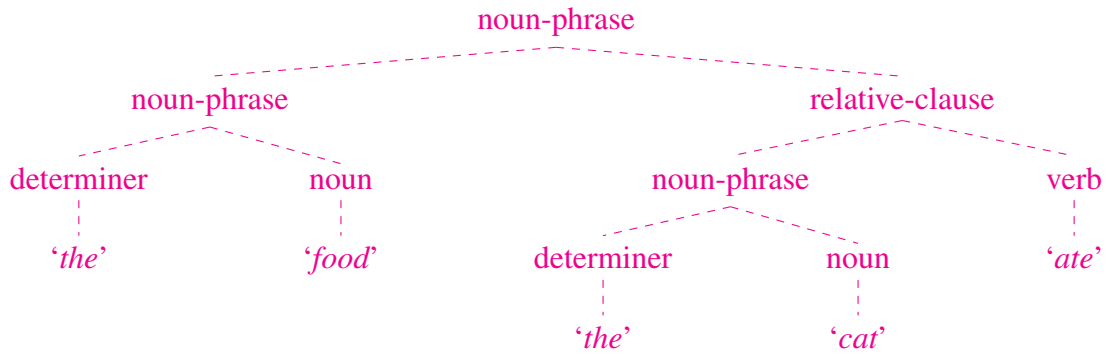
and the following event fragments have already been constructed:



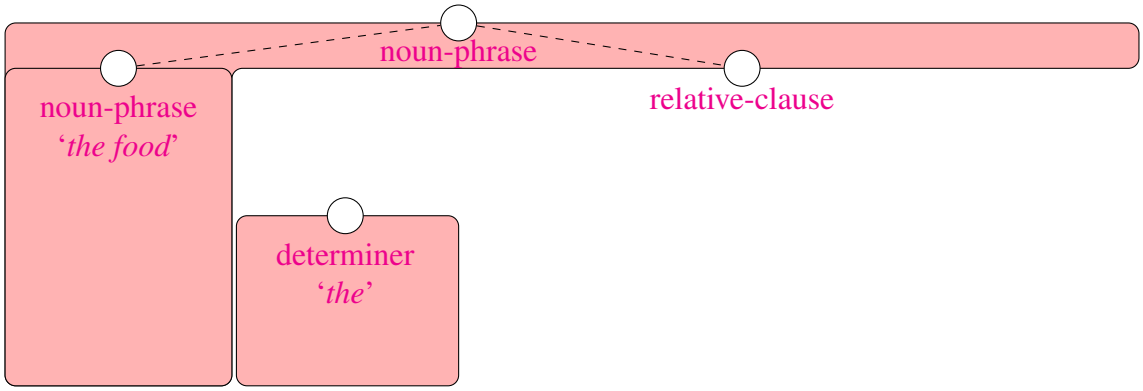
(a) [6 pts.] Draw the events and event fragments that would exist after one terminal decision. (HINT: As in lecture notes 11.4, draw just one rectangle with a word inside, no tree lines.)
(b) [2 pts.] Which result (match or no-match) is used in this decision?

(c) [2 pts.] How many distinct (disjoint) events or event fragments exist in memory now?

4. Now assume the following complex event (a noun phrase) is being recognized:



and the following events and event fragments have already been constructed:

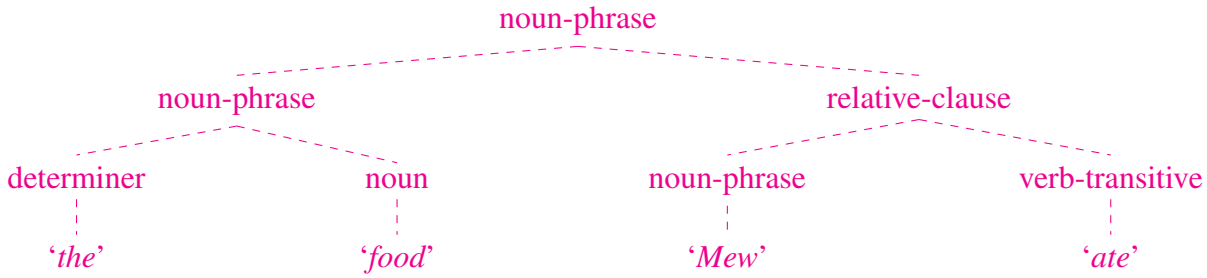


(a) [6 pts.] Draw the events and event fragments that would exist after one nonterminal decision. (HINT: As in lecture notes 11.4, draw just one rectangle with a pair of tree lines inside it.)

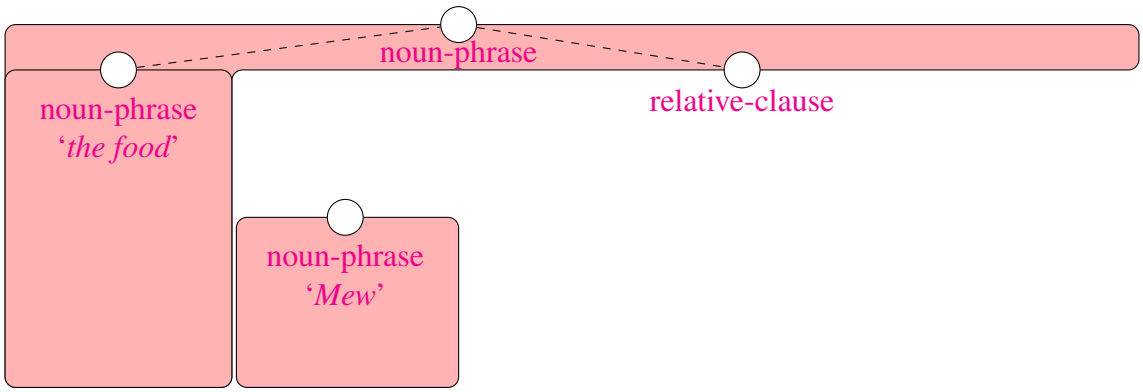
(b) [2 pts.] Which result (match or no-match) is used in this decision?

(c) [2 pts.] How many distinct (disjoint) events or event fragments exist in memory now?

5. Now assume the following complex event (a noun phrase) is being recognized:



and the following events and event fragments have already been constructed:



(a) [6 pts.] Draw the events and event fragments that would exist after one nonterminal decision. (HINT: As in lecture notes 11.4, draw just one rectangle with a pair of tree lines inside it.)

(b) [2 pts.] Which result (match or no-match) is used in this decision?

(c) [2 pts.] How many distinct (disjoint) events or event fragments exist in memory now?