Classwork N°**7**
due to 13th April 2012

Exercise: "Application of combinators to natural language analysis: Reflexivization"

1. To apply successfully the combinators to natural language analysis, we need to handle adequately the introduction and elimination rules by beta-reduction defined for each combinator. Please remind these rules and apply them to the following sentences.

$$Wfx \ \rightarrow_\beta \ fxx$$

(a) John sent himself a letter

Hypothesis

[John=**C***John'][himself=SELF] [P$_3$ SELF=SELF P$_2$] [SELF= **W**]

1/C*John sent SELF a letter

2/B(C*John) sent SELF a letter

3/(B(C*John) SELF) sent a letter

4/(B(B(C*John) SELF) sent) a letter

5/(B(C*John) SELF) (sent (a letter))

6/(C*John) (SELF (sent (a letter)))

7/(SELF (sent (a letter)))(John)

8/(W (sent (a letter)))(John)

9/(sent (a letter))(John)(John)

(b) The fixed-point theorem proved itself

Hypothesis

[P₂ SELF=SELF P₁]

[the-fixed-point-theorem=**C*the-fixed-point-theorem**'][itself=SELF] [SELF= **W**]

d) He found himself qualified

Hypothesis

[he=C*he'][himself=SELF] [SELF= W] [P₂ SELF=SELF P₁]

1/C*he' *found* SELF *qualified*

2/C*he' SELF *found' qualified*

2/B(C*he' SELF) *found' qualified*

3/B(B(C*he' SELF)*found'*) *qualified*

4/B(C*he' SELF) (*found' qualified*)

5/(C*he') (SELF (*found' qualified*))

6/(SELF (*found' qualified*))(he)

7/(W (*found' qualified*))(he)

8/(*found' qualified*)(he)(he)

(d) Mary heard herself speaking (in a radio)

Hypothesis

[Mary=C*Mary'][herself=SELF] [SELF= W] [P₂ SELF=SELF P₁]

1/C*Mary' heard SELF speaking

2/C*Mary' SELF heard' speaking

2/B(C*Mary' SELF) heard' speaking

3/B(B(C*Mary' SELF)heard') speaking

4/B(C*Mary' SELF) (heard' speaking)

5/(C*Mary') (SELF (heard' speaking))

6/(SELF (heard' speaking))(Mary)

7/(W (heard' speaking))(Mary)

8/(heard' speaking)(Mary)(Mary)

2. Formal semantic analysis of Reflexives using combinators: "Multilingual examples"

(e) a. Marie se viděla tančit (v zrcadle) (Mary saw herself dance (in a mirror))

Hypothesis

[Marie=C*Marie'][se=REF] [REF= W]

   1/C*Marie' REF viděla tančit

   2/B(C*Marie' REF) viděla tančit

   3/B(B(C*Marie' REF) viděla) tančit

   4/B(C*Marie' REF) (viděla tančit)

   5/C*Marie' (REF (viděla tančit))

   6/C*Marie' (W (viděla tančit))

   7/(W(viděla tančit))(Marie)

   8/(viděla tančit)(Marie)(Marie) =Mary saw that Mary dance

   b. Marie viděla Petra tančit (Mary saw Peter dance)

Hypothesis

[Marie=C*Marie']

*1/C*Marie' viděla Petra tančit*

*2/B(C*Marie' viděla) Petra tančit*

*3/B(B(C*Marie' viděla) Petra)tančit*

*4/B(C*Marie' viděla) (Petra tančit)*

*5/C*Marie' (viděla (Petra tančit))*

6/ (viděla (Petra tančit))Marie =Mary saw that Peter dance

(f) a. Soudce se shledal vinným (The judge found himself guilty)

Hypothesis

[Soudce=C*Soudce'][se=REF] [REF= W]

    1/C*Soudce' REF *shledal vinným*

    2/B(C*Soudce' REF) *shledal vinným*

    3/B(B(C*Soudce' REF) *shledal*) *vinným*

    4/B(C*Soudce' REF) (*shledal vinným*)

    5/C*Soudce' (REF (*shledal vinným*))

    6/C*Soudce' (W (*shledal vinným*))

    7/(W(*shledal vinným*))(Soudce)

    8/(*shledal vinným*)(Soudce)(Soudce) = the judge found that he is guilty

    b. Soudce shledal Petra vinným. (The judge found Peter guilty)

Hypothesis

[Soudce=C*Soudce']

1/C*Soudce' shledal Petra vinným

2/B(C*Soudce' shledal) Petra vinným

3/B(B(C*Soudce' shledal) Petra) vinným

4/B(C*Soudce' shledal) (Petra vinným)

5/C*Soudce' (shledal (Petra vinným))

6/ (shledal (Petra vinným)) Soudce =the judge found that Peter is guilty

    (g) a. Jean se lave (Jean washes himself)

Hypothesis

    [Jean=C*Jean'][se=REF] [REF= W]

    1/C*Jean' REF lave

    2/B(C*Jean' REF) lave

    3/C*Jean' (REF lave)

    4/(REF lave)Jean

    5/ (lave)Jean Jean

    b. Jean lave son assiette (Jean washes his dish)

Hypothesis

[Jean=C*Jean']

1/C*Jean' lave son assiette

*2/B(C*Jean' lave) son assiette*

*3/B(B(C*Jean' lave) son) assiette*

*4/B(C*Jean' lave) (son assiette)*

*5/C*Jean' (lave (son assiette))*

6/(lave (son assiette))Jean