

Classwork N°8  
due to 20th April 2012

Exercise: “Application of combinators to natural language analysis: Passivisation”

1. There are couples of the sentences having the paraphrastic relations. What is the relation of these two sentences? What is the invariant of meaning of them? Please show and explain it using the combinators.

$((Cf)(x))(y)$ ----- $(f(y))(x)$	$(f(y))(x)$ ----- $(Cf)(x)(y)$
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Operator of passivisation [**PASS**=**B** $\Sigma$ **C**= $\Sigma$  $\circ$ **C**]

(a.1) He opened the door.

(a.2) The door was opened (by him).

be-opened y

[be-opened=PASS(open)]

PASS(open) y

**B** $\Sigma$ **C** (open) y

$\Sigma$ (**C** (open)) y

(**C** (open)) x y

((open y) x)

(b.1) Anna gave the money to John.

(b.2) The money was given to John by Anna.

is-given y (to z) (by x)

[is-given =PASS (give)]

PASS(give) y

**BΣC (give) y**

**Σ(C (give)) y**

**(C (give)) x y**

give (y) (x)

(c.1) The police chases the car.

(c.2) The car flees the police.

The car flees the police

(C\*the car) flees the police

B(C\*the car flees) the police

C\*the car (flees the police)

(flees the police) (the car)

**[flee=B(C chase)]**

(B(C chase) the police)(the car)

(C chase) (the police) (the car)

(chase (the car))the police

(c.1) I sent a card to my mother.

(c.2) My mother received a card from me.

[(send\_to)=BC(C(BC (receive\_from)))]

my mother received a card from me

(C\*my mother) received\_from me a\_card

(B(C\*my mother) received\_from) me a \_card

B(B(C\*my mother) received\_from) me) a \_card

B(C\*my mother) received\_from) (me a\_card)

(C\*my mother) (received\_from (me a\_card))

(received\_from (me a\_card))(my mother)

**now go to deeper into the semantic structure**

(received\_from (me a\_card))(my mother) (x(yz)=xyz)

[BC(C(BC (receive\_from)))=give]

sent\_to x y z → receive\_from z y x

BC(C(BC (receive\_from))) x y z

C((C(BC(receive\_from)))x) y z

((C(BC(receive\_from)))x) z y

(BC(receive\_from))z x y

C((receive\_from)z) x y

((receive\_from)z) y x

2. *Apply the operator of the passivisation to the passives in Czech*

(d.1) Petr chválí Pavla (Peter praises Paul)

(d.2) Pavel je chválen Petrem (Paul is praised by Peter)

[je chválen=PASS (chválí)]

chválí

je chválen

1/ je chválen  $y_{\text{sub}}$  (by  $x_{\text{Instr}}=\text{Petrem}$ )

2/ [je chválen=PASS (chválí)]

3/ PASS (chválí)  $y$

4/  $B \Sigma C$  (chválí)  $y$

5/  $\Sigma$  (C chválí)  $y$

6/ (C chválí)  $x' y$

7/ [ $x'$ = agentive subject]

8/ chválí  $y_{\text{acc}} x'$

(e.1) To okno bylo rozbilo včera. (Kdo to udělal?)

→ The window was broken yesterday

(e.2) To okno se rozbilo včera. (\*Kdo to udělal?)

→ The window broke (itself) yesterday

[bylo rozbilo=PASS ( REF rozbilo)]

1/ bylo rozbilo  $to\_okno_{\text{sub}}$

2/ [bylo rozbilo=PASS (REF rozbilo)]

3/ PASS (REF rozbilo)  $x$

4/  $B \Sigma C$  (REF rozbilo)  $x$

5/  $\Sigma$  (C REF rozbilo)  $x$

6/ (C REF rozbilo)  $x$

7/ [ $x'$ = agentive subject]

8/ REF rozbilo  $x'$  [REF=W]

9/ W rozbilo  $x'$

10/ rozbilo  $x' x'$