

Classwork N°5  
due to 23th March 2012

Exercise: “Application of combinators to natural language analysis: Basic structures”

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. Especially, the control of the intro. Rules can appeal to some syntactic tool. Referring to the given combinatorial rules and types, give the formal semantic analysis of the following sentences:

**CCG types:** a. primitive types: *S* for sentence, *NP* for noun phrase and proper noun, *N* for common noun  
b. derived types:  $(S \backslash NP)$  for intransitive verb (unary),  $(S \backslash NP) / NP$  for transitive verb(binary),  $(N / N)$  for adjective,  $(NP / N)$  for articles,  $(S \backslash NP) \backslash (S \backslash NP)$  for adverb of verb,  $(N / N) / (N / N)$  for the adverb of adjective, etc.

**CCG rules:**

$e1: (x/y) \quad e2: (y/z)$	$e1:x$	$x:e1 \quad \text{CONJ} \quad x:e2$
-----> <b>B</b>	-----> <b>C*</b>	-----> ( <b>Φ</b> )
$(x/z): \mathbf{B} \ e1 \ e2$	$S / (S \backslash x): \mathbf{C}^* \ e1$	$x: \Phi \ \text{CONJ} \ e1 \ e2$

- (a) *Anna met Manny.*
- (b) *Anna met and marry Manny.*
- (c) *Anna met and might married Manny.* (type of *might*:  $(S \backslash NP) / NP / (S \backslash NP) / NP$ )
- (d) *I requested and would prefer musicals.* (type of *would*:  $(S \backslash NP) / NP / (S \backslash NP) / NP$ )

2. Formal semantic analysis of Czech natural language using combinators: first try

- (e) *Krtek nosí kalhotky s kapsami.*
- (f) *Lindu má pěknou moderní židli.*