

Classwork N°4
due to 16th March 2012

1. Application of the combinators to the natural language analysis

Give the formal semantic representation of the given sentences in term of combinators using its introduction and elimination rules defined by β -reduction.

- (a) Mary sleeps.
- (b) Brazil defeated the team.
- (c) John wants to leave.

2. Application of the typed combinators to the natural language analysis

Give the formal semantic representation of the given sentences using typed combinators. The application of the combinators are controlled by the CCG rules.

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

CCG rules:

| | |
|---------------------------|-------------------------------|
| $e1:(x/y) \quad e2:(y/z)$ | $e1:x$ |
| ----->B | ----->C* |
| $(x/z): B \ e1 \ e2$ | $S/(S \setminus x): C^* \ e1$ |

Follow the next steps.

(1)Attribute first the CCG types to each linguistic expression, then (2)calculate theses types to obtain the syntactic analysis by applying the CCG rules. Finally, (3)eliminate the applied combinators with respect to each β -reduction of combinators and check if your semantic representation is well-structured normal form.

- (d) Anna married Manny.

- (e) *The class starts on Friday.*
- (f) *The students work hard.*
- (g) *Her second solo became a million seller.*
- (h) *Madonna finds a producer for her new album.*