

## Computational Semantics (UE 903, EC2)

Consider the following abstract syntax together with its associated Montague-like semantics:

ALICE : NP  
 SOMEONE : NP  
 LEFT : NP  $\rightarrow$  S  
 BELIEVE : CC  $\rightarrow$  NP  $\rightarrow$  S  
 THAT : S  $\rightarrow$  CC  
 QR : NP  $\rightarrow$  (NP  $\rightarrow$  S)  $\rightarrow$  S

$\llbracket$ NP $\rrbracket$  =  $(e \rightarrow t) \rightarrow t$   
 $\llbracket$ S $\rrbracket$  =  $t$   
 $\llbracket$ CC $\rrbracket$  =  $t$

$\llbracket$ ALICE $\rrbracket$  =  $\lambda k. k \mathbf{a}$   
 $\llbracket$ SOMEONE $\rrbracket$  =  $\lambda k. \exists x. (\mathbf{human} x) \wedge (k x)$   
 $\llbracket$ LEFT $\rrbracket$  =  $\lambda s. s (\lambda x. \mathbf{left} x)$   
 $\llbracket$ BELIEVE $\rrbracket$  =  $\lambda c. \lambda s. s (\lambda x. \mathbf{B} x c)$   
 $\llbracket$ THAT $\rrbracket$  =  $\lambda x. x$   
 $\llbracket$ QR $\rrbracket$  =  $\dots$

where:

$\mathbf{a}$  :  $e$   
 $\mathbf{human}$  :  $e \rightarrow t$   
 $\mathbf{left}$  :  $e \rightarrow t$   
 $\mathbf{B}$  :  $e \rightarrow (t \rightarrow t)$

1. Compute the semantic representation of the sentence *Alice believes that someone left*, the abstract syntax of which is given by the following term:

BELIEVE (THAT (LEFT SOMEONE)) ALICE

2. Assume that:

QR SOMEONE  $\rightarrow_{\beta}$   $\lambda p. \exists x. (\mathbf{human} x) \wedge (p (\lambda k. k x))$

Compute another semantic representation of the sentence *Alice believes that someone left*, the alternative abstract syntax of which is given by the following term:

QR SOMEONE  $(\lambda s. \text{BELIEVE (THAT (LEFT } s)) \text{ ALICE})$

3. Assign an appropriate semantic interpretation to QR such that:

QR SOMEONE  $\rightarrow_{\beta}$   $\lambda p. \exists x. (\mathbf{human} x) \wedge (p (\lambda k. k x))$

4. Discuss the difference between the two interpretations you have obtained for the sentence *Alice believes that someone left*.