Grammatikformalismen für die Computerlinguistik
Midterm exam

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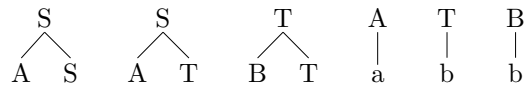
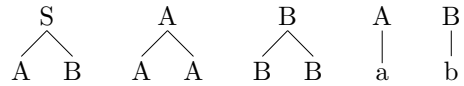
1. Consider the following TSGs:

   G_1:

   G_2:

   We assume that these TSGs have both a start symbol, namely S. I.e, only trees with root symbol S are in the tree language.

   (a) What are the string languages generated by the two TSGs?

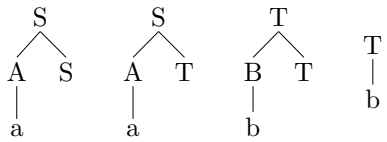
   Solution:

   Both generate the same language, namely $\{a^n b^k \mid n, k \geq 1\}$.

   (b) Decide for each of the TSGs whether it can be strongly lexicalized, i.e., whether a lexicalized TSG exists that generates the same set of trees. If so, give such a TSG. If not, explain why not and give a strongly equivalent LTAG.

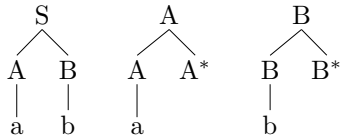
   Solution:

   G_1 can be strongly lexicalized:

   G_2 cannot be strongly lexicalized since for each n, one can find a tree in the language with all path lengths being greater than n.

   Equivalent LTAG:

2. Consider the following direct question involving the object raising verb "consider":

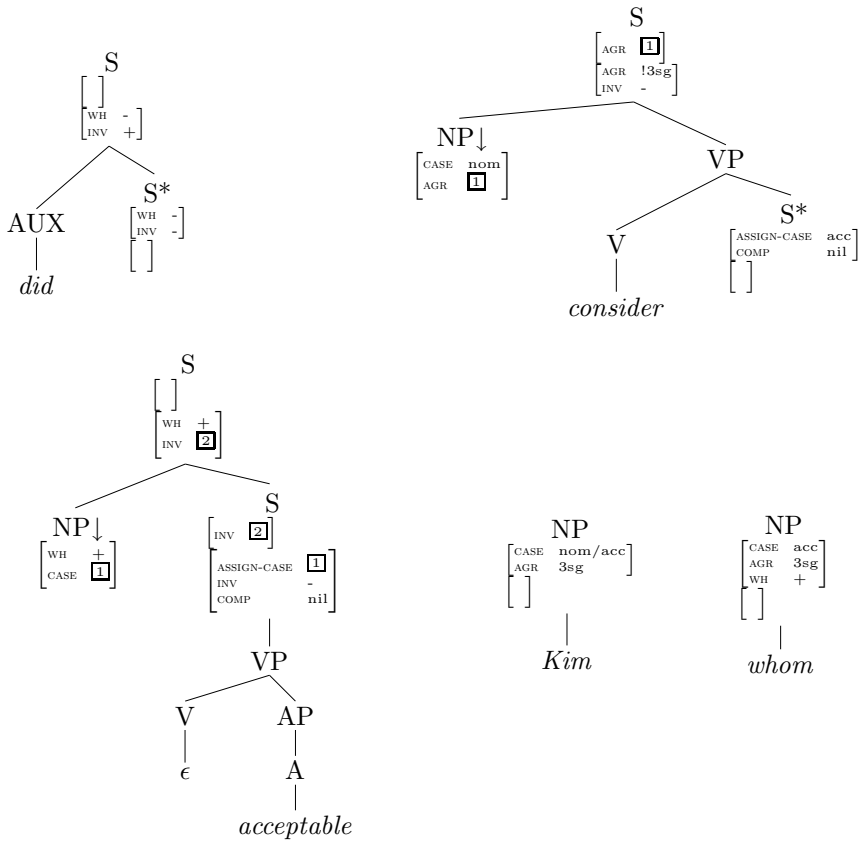
   (1) *Whom did Kim consider acceptable?*

   (a) Give the elementary trees of an FTAG G, that derives (1). Make use of the following features (such as in the lecture):

COMP	indicates presence of complementizer (that, nil)
WH	indicates presence of wh-phrase
INV	indicates do-support
AGR	agreement of number and person
CASE	case agreement
CASE-ASSIGN	for exceptional case marking

Remember that, in the case of direct questions, the root node's feature structure (after top-bottom unification) has to look like this:

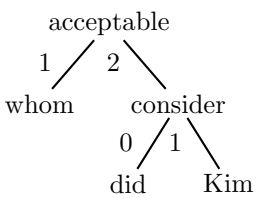
Solution:



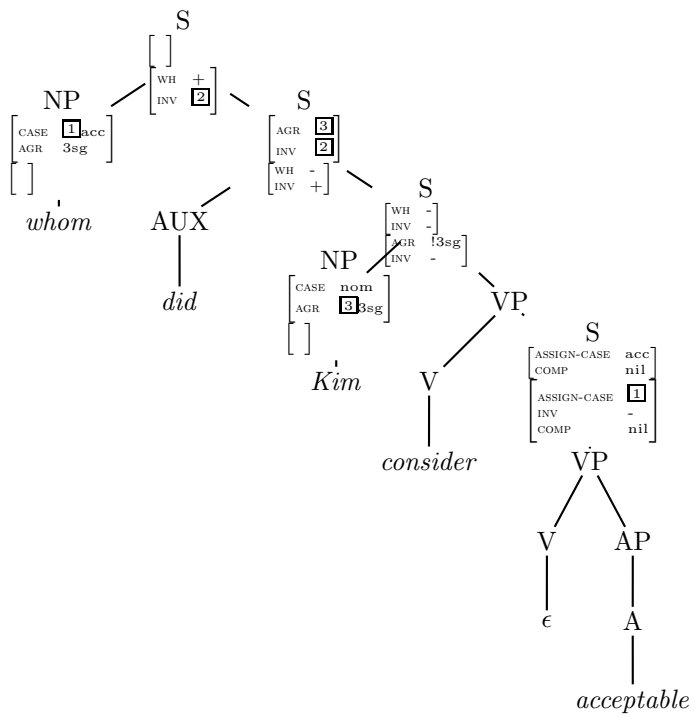
(b) Give the derivation tree (including Gorn addresses) and the derived tree (either before or after top-bottom unification) of (1) according to G.

Solution:

Derivation tree:



Derived tree:



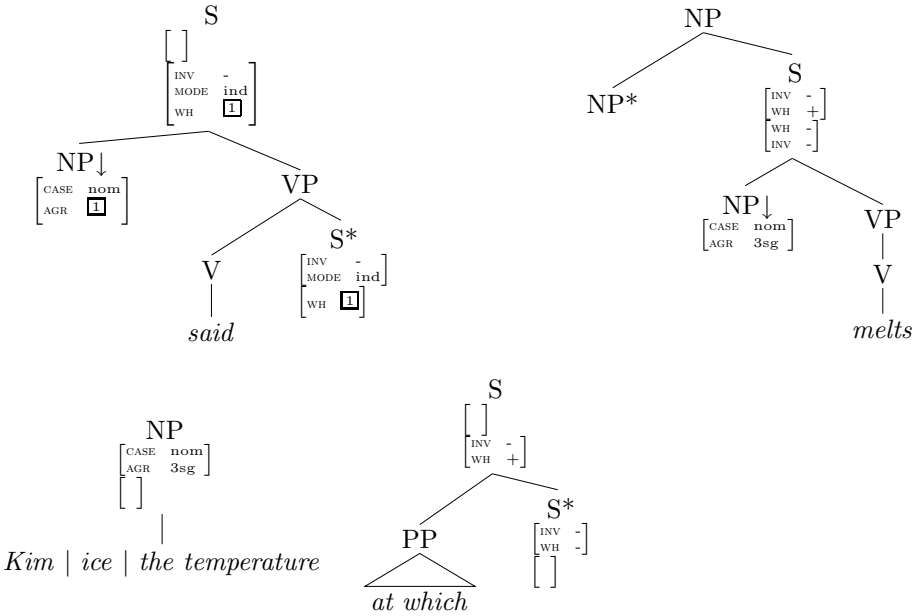
3. Consider the following nominal phrase and the accompanied relative clause:

(2) *the temperature at which Kim said ice melts*

(a) Give the elementary trees of an FTAG G, that derives (2). Make use of the features in exercise 2 (such as in the lecture), if applicable.

Remember that relative clauses adjoin to NP nodes. Internally, however, we assume relative clauses to have the same structure as indirect questions!

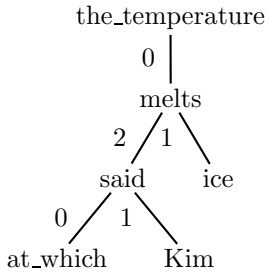
Solution:



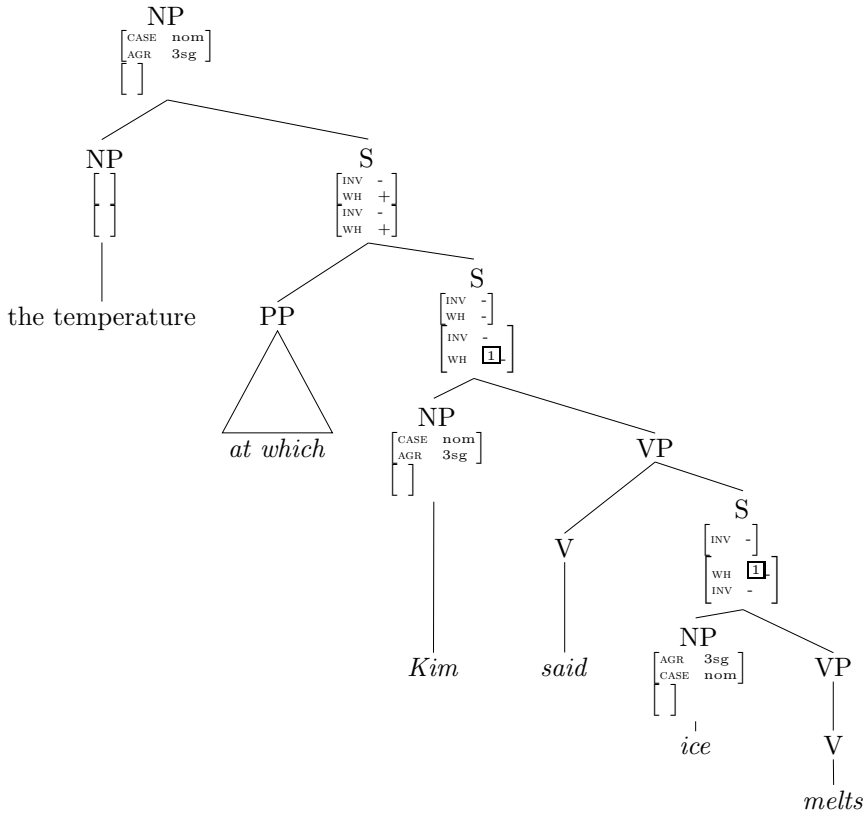
(b) Give the derivation tree (including Gorn addresses) and the derived tree (either before or after top-bottom unification) of (2) according to G.

Solution:

Derivation tree:



Derived tree:



Viel Erfolg!