Parsing Beyond CFG
# Homework 2: TAG

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Question 1

Take the language $L_1 = \{w \in \{a, b, c\}^* | w = a^n b^n c^n, n \geq 1\}$

- (a) Give a TAG G_1 with adjunction constraints which generates L_1 ;
- (b) Give the derivation of string *aaabbbccc*
- (c) If you remove the adjunction constraints from the elementary trees in TAG you created for *(a)*, which string language would it generate?
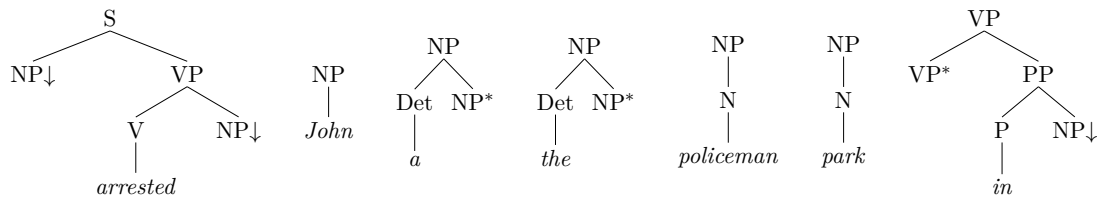
Solution:

- (a) $G_1 = \langle N, T, S, I, A \rangle$ where $N = \{S\}, T = \{a, b, c\}$,

- (b)
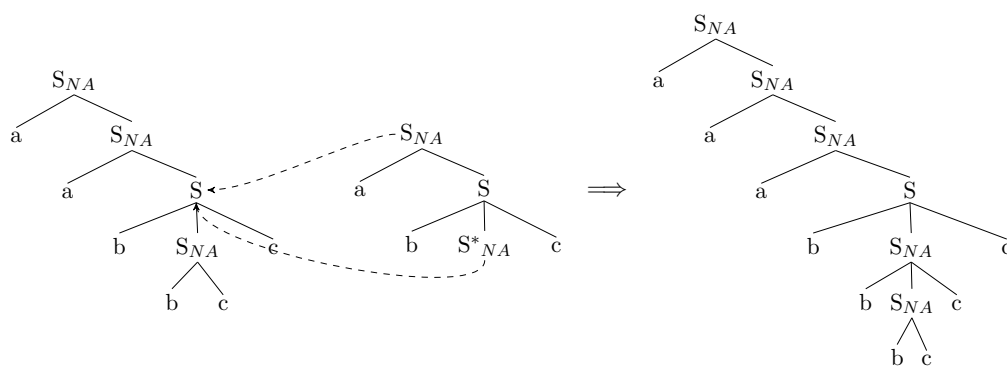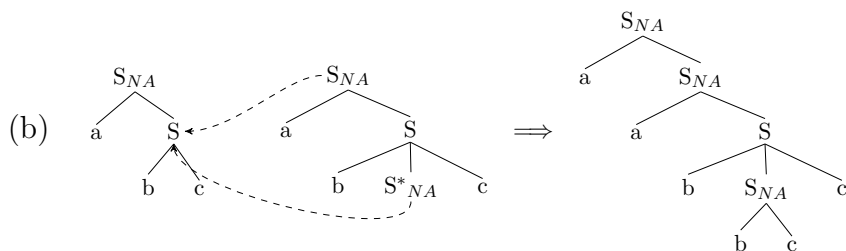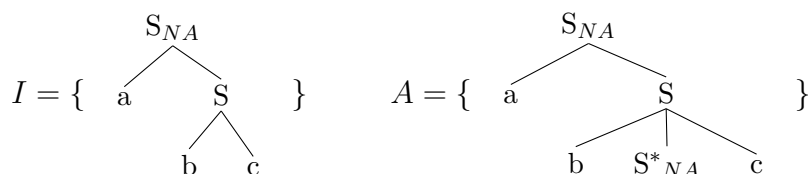
- (c) If the adjunction constraints are removed, the TAG G_1 generates the following language:

$L_1' = \{wc^n \,|\, |w|_a = |w|_b = n \text{ und für alle } w_1, w_2 \text{ mit } w = w_1 w_2 \text{ gilt } |w_1|_a \geq |w_1|_b\}$

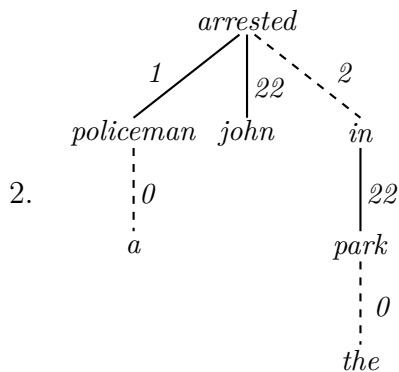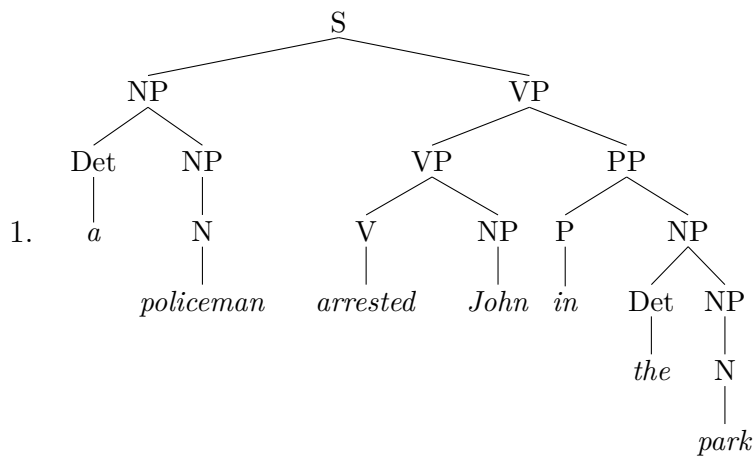## Question 2

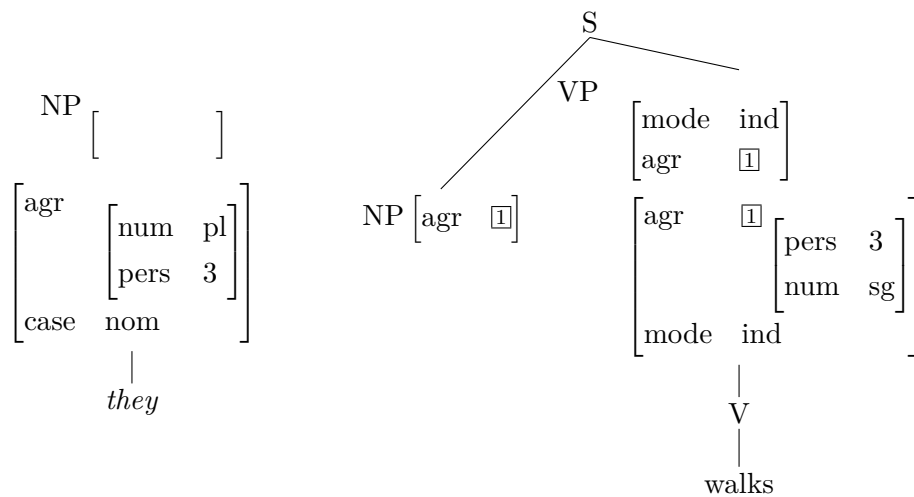Now consider the following elementary trees:

1. Give the derived tree for w = 'A policeman arrested John in the park'.

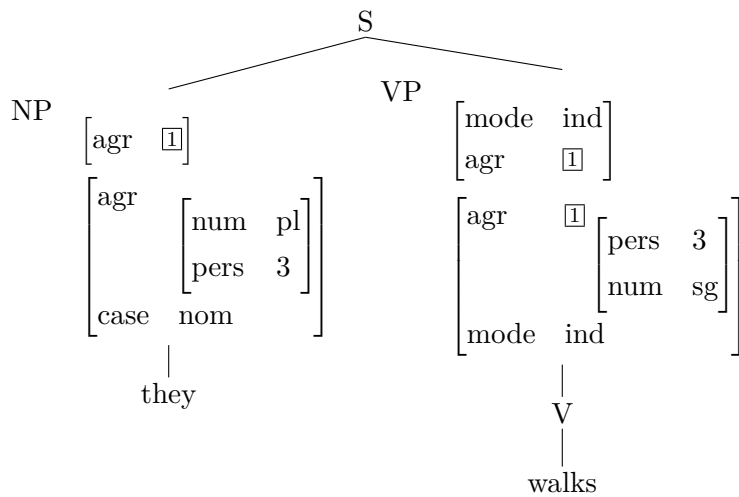2. Give the derivation tree for the same string.

Solution:

1.

2.

Question 3

Consider the following FTAG. Explain why we cannot generate *They walks* using this FTAG. Hint: show which features cannot unify at substitution.
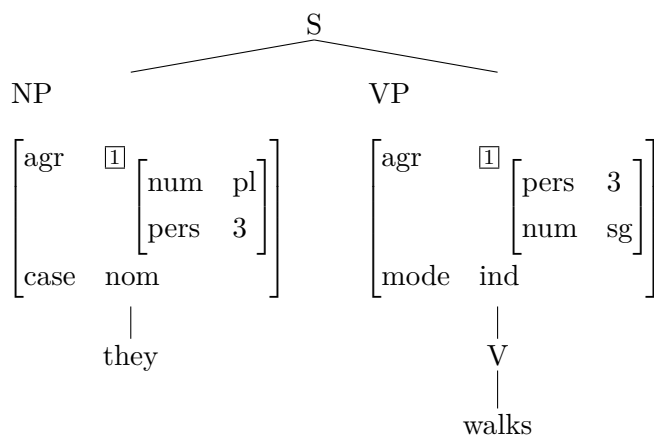
Solution:

Step 1: substitute the elementary tree for *they* into the tree for *walks* and unify the top features:

Step 2: Unify top and bottom features:

After this step we can see, that the agreement between NP and VP does not hold (i.e. we have conflicting values for the *num* feature), which rules this sentence out as being ungrammatical.