1 Derivations of Sentences in TAG

Show derivations of these sentences:

(1) a. Who talked to Sam?
    b. What did Sam seem to try to eat?

A derivation includes:

- All of the initial and auxiliary trees.
  - Where possible, use the ones from the TAG tutorial and the other papers that were assigned.
  - Use feature structures and unification.
  - Make up new trees where necessary.
  - Add new features where necessary.

- A tree showing each adjunction.

- Since you will have to draw a lot of trees, you don’t need to draw a tree for each substitution.

- The final tree.

We realize that this is your first hand-on attempt to manipulate TAGs. We expect you to find that there are things you don’t understand yet. If you get stuck, ask Lori or Alon.
2 Extend the Grammar to Cover Tag Questions

2.1 Background

The following sentences illustrate Tag Questions:

(2)  a. You are going to the party, aren’t you?
    b. Sam read a book, didn’t he?
    c. Sam didn’t read a book, did he?
    d. Sam will have been reading, won’t he?

Tag Questions have the following constraints:

- If there is one or more auxiliary verbs in the main clause, the first one also appears in the Tag Question (see above). The sentences in (3) are ungrammatical because the auxiliary in the Tag Question does not match the first auxiliary in the main clause.

(3)  a.* You are going to the party, didn’t you?
     b.* You are going to the party, won’t you?
     c.* You will be going to the party, aren’t you?

- If there is no auxiliary verb in the main clause, the Tag Question uses the auxiliary verb ”do”.

(4)    You read a book, didn’t you?

- Main verbs do not occur in Tag Questions, only auxiliary verbs:

(5)    *You didn’t read a book, read you?

- The polarity of a sentence is whether it is negative or not. The Tag Question and the main clause have opposite polarity.

(6)    *You didn’t go, didn’t you?

You went, did you? with positive polarity in both clauses is grammatical, but it does not have the same meaning as Tag Questions with opposite polarity. Opposite polarity Tag Questions indicate uncertainty. Same polarity Tag Questions indicate disapproval, or something like that.

- The pronoun in the Tag Question has the same gender, number, and person as the subject of the main clause. It must be a pronoun, not a full noun phrase, and it must be in nominative case:

(7)  a.* He read a book, didn’t him?
     b.* The boy read a book, didn’t she?
     c.* The boy read a book, didn’t the boy?
2.2 Instructions

Formulate an initial and auxiliary trees for Tag Questions. You will need to use feature structures and co-indexing in order to handle the constraints on auxiliary verbs, pronouns, and polarity. You will probably have to make up features like \([\text{aux} +]\) to identify auxiliary verbs. Don’t be afraid to make up features.

- Draw your initial and auxiliary trees.
- Draw derivations for these sentences:
  
  (8) a. You are going to the party, aren’t you?
      b. Sam didn’t read a book, did he?

- Show a derivation in which this sentence fails:
  
  (9) * The boy read a book, didn’t she?

Because this is your first hands-on experience with TAGs, we do not expect this to be easy, even if you have written grammars in other formalisms before. You can ask questions, or even use the class mailing list for discussion.

3 TAG Parsing

Run the TAG Earley-style parsing algorithm manually on the simple TAG grammar for ‘‘Maya quickly eats Pasta’’ from the first TAG lecture slides. Show the sequence of “dotted configurations” that the chart parser would construct while recognizing the above input, similar to the table shown on slide number 19 of the TAG parsing lecture slides. At each step, indicate what operator applied on which previous configuration. You are not expected to hand in any of the constructed trees! (but you may want to draw some trees as you go along to help you keep track of the parsing).