

# LING571 – Hw5

## Feature-Based Grammars

### 1. Overview

Overall, I found this assignment to be relatively easy compared to the others.

### 2. Methodology

I started off with the example grammar. I pruned it of unnecessary rules and token and then added the token required for this assignment. Then I iteratively elaborated the basic example grammar, trying to successfully parse incrementally more sentences.

### 3. Challenges

I found the biggest obstacle after satisfying 23/24 of the input sentence. The only remaining question was:

“what did Mary put on the shelf?”

Here “put”, which is usually a transitive verb, suddenly seems to lose the requirement to have an object noun phrase. (More precisely, this object noun phrase is the answer to this question and therefore the relative clause representing this phrase (“what”) is moved to the beginning of the question.)

The problem is that, until that point, my whole grammar was based on the assumption that transitive verbs **always** require a succeeding noun phrase.

At this point, I knew there were at least two options:

1. Move the transitivity into a feature rather than a separate production. This would allow me to re-use the productions with a degree of branching based on the feature of transitivity. (In fact, I did something similar with gender, where gender must agree in the subject and verb phrase. But when creating a subordinate clause this information is “dropped”; allowing for sentence like “John saw that Mary saw herself”, where the “herself” agrees with “Mary”, not “John”. This is because the gender information is not passed from the subordinate clause to the main subject noun phrase.)
2. The second option was to change the requirement that enforces transitivity; but only when related to questions. To do this, I would have to duplicate the verb phrase rules for interrogative and declarative sentences and, then, in the interrogative section, I could relax the requirement for a transitive noun phrase for questions while still enforcing it for statements.

I chose to go with option 2 as it would be relatively quick and easy for the purposes of this assignment. However, if I were doing this for a professional implementation, I would invest the time in exploring the 1<sup>st</sup> option more thoroughly as I believe the feature-based approach results in least bloat and greater overall maintainability of the system.

### 4. Learning Outcomes

This project a great way of interacting with features as a means of supplementing purely syntax-based approaches to parsing.

On the one hand, it's very easy to express certain things like number and gender agreement; which simple syntactic approaches cannot do nearly as elegantly.

On the other hand, passing the feature values up and down the tree does make it much harder to read the grammar. I can imagine that, if we were trying to describe standard English more comprehensively, for example, it would quickly become almost debilitatingly complicated.

## 5. Completeness

I was able to complete this assignment parsing 14/14 sentences correctly and rejecting 10/10 sentences correctly, as per the sentences\_key.txt file.